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WATER AUTHORITY

Consisting of 240,000 acres on the Westside of the San Joaquin Valley

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10/1/03 — To Don — ENTRIX

September 25, 2003

David Young, Director
Bureau of Reclamation South Central Area Office
1243 N Street
Fresno, CA 93721-1814

Re: ***Draft Comments on the Draft Environmental Impact Statement No. 01-81 Mendota Pool 10-year Exchange Agreements***

Dear Mr. Young:

The San Joaquin River Exchange Contractors Water Authority and Newhall Land and Farming Company submit these comments on the Mendota Pool 10-year Exchange Agreement, EIS No. 01-81 (hereinafter the "DEIS"). In addition to the comments in this letter, the Exchange Contractors incorporate by reference the comments in the attached letter from Kenneth D. Schmidt dated September 11, 2003.

Overview of Comments

The references in the DEIS to the Westlands Water District EIR for the original Mendota Pool Group Pumping Program refers to the EIR that was released by Westlands as a Final EIR in December 1998. Subsequent to the release of the final EIR and Westlands' decision to proceed with the project, the Exchange Contractors and Newhall filed suit in California Superior Court to stop implementation of the project. A settlement agreement for a Mendota Pool transfer pumping project was executed by the parties with an effective date of January 1, 2001. (1)

The settlement agreement describes the environmental documents for the project as being the Westlands draft EIR and final EIR, and the Phase I and Phase II reports prepared by Kenneth D. Schmidt and Associates of Fresno, consultants to the Exchange Contractors and Newhall, and Luhdorff & Scalminini, of Woodland, Consultants to the Mendota Pool Group. The DEIS recognizes at 1.3.3.2 that the "settlement agreement for the Mendota Pool transfer pumping project described the agreed-upon pumping program and mitigation measures and incorporates the findings of the Phase I and Phase II technical reports [as described in the DEIS]." Most important is the recognition in the Settlement Agreement that for purposes of the Mendota Pool pumping project agreed to in the Settlement Agreement, the environmental documentation only evaluated the (2) environmental impacts of transfer pumping to the extent discussed in the Phase I and Phase II reports. In other words, the Westlands EIR is not a stand-alone document and cannot form the basis for approval of a Mendota Pool transfer pumping project.

(3) The Exchange Contractors and Newhall submit these comments to the DEIS because in recent years, monitoring data in the project area indicate:

-1 ! A lack of shallow water level recovery, coincident with heavier pumping of shallow wells by the Mendota Pool Group.

-2 ! Pumpage to the extent considered in the DEIS over a ten-year period would likely result in a significant increase in the overdraft beneath the Columbia Canal Company service area and Newhall Land & Farms lands, and the DEIS does not address this topic at all.

-3 ! Much of the sustained Mendota Pool Group pumping is from shallow wells that tap seepage from the Mendota Pool, and the DEIS does not address where this seepage would have otherwise gone if it was not pumped by the Mendota Pool Group. Also, the pool seepage may be increased by this pumping.

-4 ! Part of Appendix D (Model Descriptions) is difficult to understand and not well substantiated; for example, reference to "the seepage factor."

-5 ! Long-term groundwater quality degradation due to Mendota Pool Group interception and exports of good quality recharge in areas near to the San Joaquin River and further north was not evaluated.

-6 ! Subsidence monitoring for the Mendota Pool Group pumping has been problematic and there was no documentation that the subsidence criteria has been met.

-7 ! The influences of rising water levels in Westlands Water District in recent years and agricultural drainage on the northeasterly gradient and movement of poor quality groundwater is not discussed in the DEIS.

Specific Comments

(1) At paragraph 2.0, the DEIS recognizes that the Settlement Agreement for the Mendota Pool Transfer Pumping Project between the Exchange Contractors, Newhall and the Mendota Pool Group "sets the guidelines for the proposed project and potential alternatives to the project." It appears then that the DEIS relied upon the Settlement Agreement and previous environmental reviews, and that the DEIS has not independently reviewed more recent hydrogeologic data that have a bearing on the project.

(2) Moreover, It appears that the DEIS' own findings are inconsistent: on the one hand, the DEIS finds in several locations that the impacts are either individually or cumulatively significant, especially with respect to groundwater levels in and around the project area. For example, section 4.1.1.2 discusses long-term effects and concludes that "water levels in the area just north of the San Joaquin River branch of the Pool are being closely monitored because the potential for overdraft appears to be high." The DEIS also recognizes that "overdraft has been occurring in portions of western Madera County northeast of Mendota for decades." But then the DEIS concludes that the proposed action (pumping almost 270,000 acre-feet) would result in a less than significant impact to overdrafted portions of Madera County.

(3) Furthermore, having concluded that there will be no impact or no long term effects, surprisingly, the DEIS then concludes that "if there is evidence that pumping is causing long-term overdraft" the Mendota Pool Group has agreed to reduce transfer pumping. There are inconsistent findings and statements. And where the DEIS concludes that "if there is evidence of incomplete recovery of groundwater levels between years, the amount of water pumped from the deep zone would be reduced in the following year to allow water levels to recover," we must conclude that the DEIS has not correctly evaluated the hydrogeologic data to support a "less than significant" impact conclusion.

(4) The DEIS cannot have it both ways. Either the long-term effects of the pumping are not adequately known and therefore need further analysis, or the effects are known, in which case the effects cannot be dismissed as insignificant.

(5) Following are some of the most important hydrogeologic issues raised in our review of the DEIS:

1. The preparers of the hydrogeologic parts of the DEIS were not identified. The reports and/or appendices should be stamped by a California certified hydrogeologist.

2. The DEIS states that there is no groundwater overdraft in the area, but this is not supported. Water-level hydrographs for the shallow aquifer (above the A-clay) indicate a lack of water-level recovery in recent years, coincident with heavier pumping of shallow wells by the Mendota Pool Group. In addition, the Mendota area is upgradient of and hydraulically connected to the Madera area, which is a well-known area of groundwater overdraft.

3. Pumpage of about 270,000 acre-feet of water by the Mendota Pool Group over a 10-year period would likely increase the overdraft in the Madera area by an average of about 27,000 acre-feet per year, which is not insignificant. The DEIS does not

address this topic at all, but rather focuses on localized seasonal drawdowns.

4. The Mendota Pool Group has gradually begun to admit that much of their sustainable pumping is from shallow wells that tap seepage from the Mendota Pool. The DEIS does not address where this seepage would have otherwise gone, if it was not pumped by the Mendota Pool Group. The impact of the loss of about 270,000 acre-feet of excellent quality recharge in the Mendota area is not clearly addressed in the DEIS. Instead, the DEIS infers that there would be little short-term impact on the groundwater quality in areas east of the Fresno Slough. However, the long-term impact of the loss of the 270,000 acre-feet of recharge of good quality water on groundwater near and north of the San Joaquin River, particularly beneath the Columbia Canal Company service area and Newhall lands is not addressed.

5. Part of the Appendix D (model descriptions) discussion is difficult to understand and not well substantiated, such as "the seepage factor." The clustering of wells whereby CCID wells and the older City of Mendota wells were grouped together is somewhat bizarre, when considering the cause of the past water quality degradation of City wells, which was not due to CCID pumpage.

6. Influences of rising water levels in Westlands Water District in recent years and agricultural drainage on the northeasterly gradient and movement of poor quality groundwater are not discussed in the DEIS.

The DEIS cannot support its conclusions that the project will result in less than significant hydrogeologic impacts in areas of the Exchange Contractors' members and Newhall.

Very truly yours,

Steve Chedester,
Executive Director

Enclosures Rec'd
cc: San Joaquin River Exchange Contractors Water Authority Board & Members
Newhall Land & Farming
Mr. Kenneth D. Schmidt

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September 11, 2003

Mr. Steve Chedester, Executive Director
San Joaquin River Exchange
Contractors Water Authority
541 H Street
Los Banos, CA 93635

Re: MPG 10-Year Exchange
Agreement, Draft EIS

Dear Steve:

Following are my comments on the May 21, 2003 Draft EIS. First, overall comments are summarized. This is followed by more detailed comments.

Overall Comments

1. The preparers of the hydrogeologic parts of the DEIS weren't identified. They should be identified and the reports and/or appendices (i.e. Appendix D) should be stamped by a California certified hydrogeologist.

2. The DEIS states that there is no groundwater overdraft in the area, but this was not supported by a thorough technical evaluation of water-level changes for wells in the area. Water-level hydrographs for the shallow aquifer (above the A-clay) near the Mendota Pool indicate a lack of water-level recovery in recent years, coincident with heavier pumping of shallow wells by the MPG. In addition, the Mendota area is upgradient of and hydraulically connected to the Madera area, which is a well known area of groundwater overdraft.

3. The pumpage of about 270,000 acre-feet of water by the MPG over a 10-year period would likely increase the overdraft in the Madera

area by an average of about 27,000 acre-feet per year, which is not insignificant. The DEIS doesn't appear to address this topic at all, but rather focuses on localized seasonal drawdowns.

4. The results of groundwater monitoring indicate that much of the MPG sustainable pumping is from shallow wells that tap seepage from the Mendota Pool. The DEIS doesn't address where this seepage would have otherwise gone, if it was not intercepted by the MPG pumping. The long-term impact of the loss of about 270,000 acre-feet of excellent quality recharge in the Mendota and Madera areas wasn't addressed in the DEIS. Instead, the DEIS infers that there would be little short-term impact on the groundwater quality in areas east of the Fresno Slough. However, the long-term impact of the loss of the 270,000 acre-feet of recharge of good quality water on groundwater near and north of the San Joaquin River, particularly in Columbia Canal Company and Newhall L&F lands, wasn't specifically addressed.

5. Part of the Appendix D (model descriptions) discussion is difficult to understand and not well substantiated, such as "the seepage factor". The clustering of wells, whereby CCID wells and the older City of Mendota wells were grouped together, is somewhat bizarre, when considering the cause of the past water quality degradation of City wells. Most of this was not due to CCID pumpage, but due to pumpage of other wells between the City wells and the Mendota Pool.

6. The influences of rising water levels and agricultural drainage in Westlands WD in recent decades on the northeasterly gradient and the movement of poor quality groundwater weren't discussed. Rather the focus was almost exclusively on groundwater pumpage in the Madera area.

7. The results of groundwater monitoring for the 2002 MPG program are important in terms of the impacts of MPG transfer pumpage. An example would be updated water-level hydrographs which could be used to evaluate groundwater overdraft. This information should have been used more in the DEIS.

8. Compaction and subsidence records for the last two years appear to be problematic, due to equipment failures, flooding, and other problems. The total subsidence due to MPG pumping through 2002 should be referenced, and a more thorough evaluation should be done in the DEIS. Specifically, the DEIS doesn't demonstrate that

subsidence can be monitored adequately or that the subsidence criteria can be met by the MPG during the 10-year period.

9. Long-term impacts of the MPG pumpage on the newly developed well field by the City of Mendota should be evaluated in more detail.

10. I understand that records of the Columbia Canal Company indicate some degradation of groundwater quality in recent years. This information should be obtained, interpreted, and carefully evaluated as part of the DEIS.

11. Some of the measured values in Figures D-3, D-5, D-6, D-8, D-9, D-11, and D-12 indicate a much greater degradation rate than is shown by the simulated lines. The reasons for these should be explained. Overall there is a lack of measured values. In addition, the simulation doesn't address the impact of heavy pumping of deep MPG wells in the late 1980's and early 1990's, when substantial degradation in groundwater quality occurred. This would have been useful data to calibrate the model against.

12. Although there are numerous shallow MPG supply wells and some shallow monitor wells near and west of the Fresno Slough branch of the pool, water-level data from these were not used to assess whether or not there is a vadose zone beneath the entire Fresno Slough branch of the pool. No such vadose zone is indicated to be present beneath the San Joaquin River branch of the pool by water-level records for shallow monitor wells. Also, there are apparently no shallow wells along the Fresno Slough branch south of Whitesbridge Road. It is likely that MPG pumpage causes more seepage from the pool, due to an increased downward head gradient beneath the pool. This situation should be more carefully evaluated.

Specific Comments

ES-3. Fourth full paragraph. Water quality in the pool isn't the only criterion that should be used. Long-term groundwater quality in and downgradient of the area should also be a criterion.

ES-5. Bullets 4 and 5. The frequency of sampling is important. How often will wells be sampled? Do the criteria apply to individual wells or discharges for groups of wells?

ES-6. The compaction monitoring is an important component, but wasn't included in the bullets.

The "Affected Environment" part of the DEIS should start off with a page or two description of the subsurface geologic conditions. This fundamental information is the basis for understanding ground-water in the Mendota area.

Last paragraph. Water-level rises beneath the Westlands WD should also be mentioned.

ES-7. First full paragraph. The "saline front" isn't the primary cause of degradation. Rather, over-pumpage in the area east of the front is the primary cause. The discussion of the movement of the saline front and degradation of City of Mendota wells is misleading. Pumping of MPG wells located between the pool and the City wells was responsible for most of the degradation. Only one brief paragraph on TDS was provided, and most of the discussion was on trace metals. The background discussion on groundwater quality should be expanded, and much more description of TDS and major constituents should be provided.

ES-10. Information in the water-level chapter of the draft MPG 2002 report indicates that overdraft is occurring near the Mendota Pool.

ES-12. The total TDS increase of 130 to 430 mg/l is not insignificant, particularly for only a 10-year period. How will this be mitigated?

The long-term impact of removing up to 270,000 acre-feet of ground quality recharge on downgradient areas wasn't discussed in the DEIS.

ES-13. More discussion should be added about the San Joaquin River branch of the pool and the influence of MPG pumping on long-term groundwater quality in this area.

ES-17. The primary adverse effects are probably the increase in overdraft in the Madera area and the long-term degradation of groundwater quality in the downgradient area. Are these irreversible impacts?

1-1. Was a cumulative evaluation of all transfer pumping done in the DEIS?

Next to last paragraph. A sentence should be added that groundwater is available and could be developed beneath most of these lands.

1-7. First paragraph, line 6. "The total quantity of water to be pumped". Is this transfer, transfer through exchanges approved by USBR, or what?

Figure 1-2. A very poor quality map. Many of the words (i.e. Five Points) can't clearly be read.

Figure 1-3. Why aren't Gravelly Ford and Aliso WD shown?

Figure 1-4. Some words (i.e. Firebaugh) are very difficult to read.

Figure 1-5. Some of the printing is difficult to read. In the title, "groundwater" should be replaced by "water level".

2-2. First line. Change "perforated interval" to "top of the perforations".

2-3. First paragraph. "Water quality in the pool" isn't the only criterion that should be considered.

2-4. Last bullet. Insert "in MPG wells" after degradation. How will shutting off of the MPG wells influence groundwater degradation elsewhere? Also, the functioning of unused MPG wells as conduits for migration of poor quality water should be evaluated, and the wells properly destroyed, if necessary.

2-5. Second paragraph. Overdraft of the groundwater above the A-clay and long-term groundwater quality degradation should also be considered.

2-6. Last paragraph. Is this in addition to adjacent use?

2-7. Fourth full paragraph. New supply wells in Westlands WD that I'm familiar with don't have "stainless steel" casing, because of the high cost of the casing. Thus the evaluation seems to be unduly biased against this alternative. The use of normal well casing should have been evaluated instead.

2-9. There are at least two typos in the first four lines. Exactly which wells are being pumped into the pool should be stated. The new City of Mendota well field is already operational and the text should reflect this.

Table 2-1. "Cumulative impacts" should be revised, as the items listed aren't impacts.

Table 2-4. Haven't Gravelly Ford WD and Aliso WD, or well owners in these districts, contributed data for the program? CCID operates the Yearout recorder and measures land surface elevations along two canals. I suggest adding overseeing the monitoring, data interpretation, and report preparation for the MPG, SJREC, and Newhall L & F.

Table 2-5. Insert MPG before "Production Wells at Pool".

Figure 2-1. Much better maps of the MPG wells are available from the annual MPG reports and should be used.

3-2. Second to last paragraph. The comment that "there are no known production wells south of Whitesbridge Road" isn't true. For example, there are a number of private and Tranquillity ID irrigation wells south of this road.

Also, groundwater quality east of the slough and near the San Joaquin River wasn't thoroughly evaluated.

3-8. A map showing these areas would be useful. Also, Etchegoinberry is not a place or town, so the term should be referenced to what it is (a well or wells?).

3-9. Item 6. Add that the new City wells are also in this area. Item 7. Insert "older" before second City of Mendota.

3-10. Second paragraph, lines 5-6. Explain how outflows can be less than inflows. Also, isn't a water budget in effect, whereby inflow equals outflow? The reader can't readily check the "budgets".

Last paragraph. How about mentioning the DMC?

3-11. Just above "arsenic". Wouldn't the MCLs for the other parameters also have to be considered?

3-12. Boron concentrations in DMC water should also be discussed.

The normal order of discussion is to discuss TDS and major constituents first. The order in the text is alphabetical, which isn't conventional. Because salinity is of over-riding importance to groundwater in the Mendota area, it should be described first and in much more detail.

3-15. The reference to "Stromburg" on SAR is somewhat bizarre, as numerous published and dated references are available. In addition, for the past few decades, "adjusted sodium adsorption ratio" has normally been considered more applicable than SAR.

3-16. TDS values should not be reported to the nearest 0.1 mg/l. The reasons for the "south gradient in water quality in the Fresno Slough" should be clearly discussed.

Last paragraph. Alluvial deposits from the Sierra Nevada are not "primarily well sorted sand" at most sites. This comment probably applies more to some of the stream channel deposits, which aren't typical of most of the alluvium.

3-17. First paragraph. The "western half of the trough" is unclear terminology and the area needs to be better identified.

The Corcoran Clay isn't about 300 feet below sea level throughout much of the valley.

The A-clay should be mentioned in Section 3.4.1 at (least one paragraph).

3-18. First paragraph. The extent of the A-clay in the area north of the San Joaquin River has apparently not been mapped.

Line 6. After (KDSA 1989) replace the rest of the sentence with ", based on a 14-day aquifer test at Arbios (northwest of Mendota)."

Line 9. After pool, add ", due to evaporation of shallow groundwater and agricultural drainage."

Section 3.4.2.2. The lower aquifer is also tapped extensively in the Panoche and Westlands WDs.

Section 3.4.2.3. More recent reports and actual monitoring data should be used to draw these conclusions, not a 1994 reference. Water-level records for shallow monitor wells at the Mendota Landfill, near the Fordel office, at the Mendota Biomass plant, and the Marvin Myers water-banking project and for shallow MPG supply wells should be obtained and carefully evaluated.

3-19. Delete first paragraph. This discussion is misleading, because Mendota Pool seepage has been determined by actual measurements.

Section 3.4.2.4. The discussion should be split into above and below the A-clay. Also, water-level elevation maps for the shallow zone indicate that seepage from the San Joaquin River moves toward a depression or depressions created by pumpage of shallow

MPG wells.

Last paragraph, first sentence. This conclusion isn't supported by water-level hydrographs for a number of wells in the area. Also, cones of depression don't necessarily define an overdrafted area. Rather water-level changes over long-term average hydrologic base periods for many wells should be used to determine where overdraft is occurring. A more thorough discussion of water-level trends for wells tapping strata above the A-clay should be provided, along with representative water-level hydrographs.

3-20. Section 3.4.2-5, line 1. Change "natural" to "pre-development". Delete the second sentence. Lateral flow above the A-clay should also be discussed. Also, groundwater still apparently flows out of the Madera area and into the Westlands WD below the Corcoran Clay.

3-21. Section 3.4.3.1. More than a "few wells" in the Westland WD tap the upper aquifer. Hundreds or more wells tap at least part of the upper aquifer, particularly after the last drought, when many flo-path wells were drilled to allow tapping of shallow groundwater.

Second paragraph. The lower aquifer is also recharged by downward flow through the Corcoran Clay.

3-22. The "Sierran Sands" beneath the eastern part of the valley aren't always predominated by sand as inferred, particularly in the interfan areas.

Last paragraph. Change SJREC to CCID.

3-23. First paragraph. Explain why compaction is greater at the Yearout site.

First full paragraph. The reference should be the USGS. Rises in the water level above the Corcoran Clay should also be mentioned, as these have significantly influenced the northeasterly gradient during the past several decades.

3-24. Again, the alphabetical order doesn't follow the convention of first discussing TDS and the major constituents. Also, the quality of groundwater in the shallow zone should be discussed first.

Section 3.4.5.2. Since pool water isn't a source of drinking water, the reference to 0.6 mg/l is questionable. Irrigation and fish and wildlife use standards are more applicable.

3-25. Section 3.4.5.3. The statement that "no molybdenum data were available for wells west of the San Joaquin River isn't true. Much of that area is in an agricultural drainage problem area, and substantial information on molybdenum is available, including from the U.S. Geological Survey and others.

3-26. Section 3.4.5.5. The section apparently lumps the shallow and deep zones, which isn't advisable.

Second paragraph, line 4. The "most recent" samples aren't the ones that were provided. Also, SAR shouldn't be discussed under the sub-heading "salinity".

3-27. Fourth paragraph. It should be mentioned that the A-clay is locally missing at some locations along the Fresno Slough branch.

Again, SAR shouldn't be discussed under salinity.

3-28. First paragraph. Irrigation criteria should also be provided.

The depth of the sediment samples should be provided. Also, were the samples collected from under the water or not?

Last paragraph. Are the analyses for saturation extract, 1:1 dilution, or what? For trace constituents, are these soluble or total concentrations?

3-30. Does the "Grasslands Watershed" extend all the way to the pool?

Was the sediment that was sampled of a uniform texture at all sites?

3-31. 3.6. Aren't the TID and JID doing monitoring?

Section 3.6.1.1. If water from these sumps entered the DMC, this should be stated.

Section 3.6.1.3. The use of the word "continuous" for selenium sampling appears to be inappropriate. That is, "daily composite" isn't the same as continuous.

3-32. It should be mentioned that some of the irrigation water from the pool was concentrated and eventually entered drains, and some of this historically entered the river.

Section 3.6.2.1. Explain where the CCID station is located.

3-33. If water from any TID or JID wells is pumped into the pool, this should be stated.

3-34. Section 3.7.1.2. The consumptive use for the MWA should be determined.

Table 3-1. The evapotranspiration should be more clearly defined. Is this "potential evapotranspiration" or what?

Table 3-2. Flows to the south should be a component for the northern pool, and inflow from the north should be a component for the southern pool. This isn't a water budget, as no "budget" balancing was presented.

Table 3-3. SAR doesn't have units.

Table 3-4. Why aren't irrigation water quality criteria used more? Some of the parameters (i.e. boron) are crop specific, thus one value isn't applicable for all crops. Chloride should be included.

Table 3-7. Delete "most" before "recent" in the title. Same for Table 3-8.

Table 3-9. Whether these are total or soluble, saturation extinct or 1:1 dilution should be explained.

Figure 3-1. An extremely poor map. It is blacked out where the most important information was to be shown.

Figure 3-5. The differences in shading prior to 2000 compared to later should be explained.

Figure 3-6. This is also an extremely poor map.

Figure 3-10. Why aren't more specific maps from the annual MPG reports provided? Much of this map is too distant from the MPG well area. Also, part of the map isn't in the Madera Basin (i.e. Fresno).

Figure 3-11. Map was already presented in Figure 3-6.

Figure 3-12. Boron was mis-spelled.

4-13. First paragraph. The San Joaquin River flows during 1999-2002 should be mentioned, and a discussion added on their significance, including how this influenced the results of monitoring.

Second paragraph. Is the cone of depression being discussed due only to MPG transfer pumping, or to all pumping? Explain the apparent discrepancy between the end of May (line 3) and August or September (line 20).

Table 3-3. Delete "most" in title, and SAR has no units.

4-4. Section 4.1.1.2. The first sentence was not supported by a sound technical evaluation. For example, water levels in the shallow zone haven't recovered since heavy MPG shallow well pumping began.

Second to last paragraph. Won't the loss of recharge that would be intercepted by MPG pumpage increase the overdraft in the Madera area? How will this be mitigated?

Last Paragraph, fourth sentence. Where is the documentation to support this?

4-5. First line. Flat gradients may also be due to a high transmissivity.

First paragraph, last two sentences. Should be deleted.

Second paragraph. Should be deleted.

Third paragraph. Monitoring <u>won't</u> "ensure that long-term overdraft of the aquifer does not occur". Also, how about reducing pumpage from the shallow zone if it is being overdrafted?

Section 4.1.2.1. Would the 9,000 acre-feet per year be from shallow or deep wells?

Last paragraph, first line. Insert "primarily" after "occur".

4-6. Second paragraph, first line. The deep (below the Corcoran Clay) zone is continuous from the western part of the Madera area to the Westlands WD. Thus pumping of more deep zone groundwater beneath Westlands WD may cause more groundwater outflow from the Madera area. However, overall there should be less added overdraft in Madera County due to this alternative.

4-7. Second paragraph, first line. This was not supported by a actual technical evaluation. Again, cones of depression aren't the only criteria for overdraft.

Last sentence. This is highly erroneous. The loss of recharge wasn't addressed.

4-8. Last paragraph, second sentence. This is incorrect. Most subsidence with the Mendota area has been due to pumping elsewhere of groundwater below the Corcoran Clay.

4-9. Section 4.2.2. In title, add "AND PUMPAGE". Construction alone doesn't cause the impact, but pumpage does. Also Figure 1-2 indicates that most of the pumpage for these lands wouldn't be near the Aqueduct.

4-10. Section 4.2.4. The project isn't proposed, its already been implemented. Also, pumpage in the B&B Ranch area is not to be increased. Rather pumpage of the new City wells would be off-set by less pumpage from irrigation wells at the ranch.

Second paragraph, line 3. Delete the word "all" (because pumpage from below the Corcoran Clay wasn't considered). Also, water levels in the shallow zone have not been recovering.

Section 4.3, last sentence. Over-pumping near the saline front is the major cause.

4-11. First paragraph. The discussion fails to disclose that most of the degradation in City wells coincided with heavy pumpage of MPG wells in the vicinity in the early 1990's.

4-12. Second paragraph. Monitoring doesn't insure that there won't be long-term ground water quality degradation.

Last paragraph. The records of the Columbia Canal Company should be obtained and carefully reviewed, as they have reported some degradation based on historical monitoring.

4-13. Calibration of the model to only the 1999-2002 period essentially doesn't consider the historical degradation in groundwater quality due to heavy pumping of MPG wells in the early 1990's. This is when much of the degradation in Mendota occurred. Thus the model would be more useful if it was also calibrated to older groundwater quality data (i.e. pre-1999).

4-14. First full paragraph. Previous MPG annual reports have reported some degradation to the south.

4-15. Item 3, line 2. Replace "some" with "a substantial amount".

Item 3. The seepage also acts indirectly to recharge the deep zone, particularly in the Madera area. This is due to downward flow through the A-clay, and that the A-clay is missing to the northeast (generally east of San Mateo Road).

4-16. Third full paragraph, fourth line. Absence of "all pumping". This statement needs to be clarified. For example, in what area? From what zone?

Last sentence. This statement contradicts common sense. Experience in the Mendota area indicates that deep zone water quality is highly influenced by surface recharge. Good examples are the quality of water from City of Mendota and Spreckels Sugar Supply wells, which is well documented.

Last paragraph, second line. "All wells" should be clarified. Do you mean all MPG wells?

4-17. Second full paragraph. What happens at the end of 10 years of MPG pumping should also be evaluated. The fact that there are no other shallow supply wells misses the point that the shallow groundwater is a source of good quality recharge to the deep groundwater. Also, many deep supply wells aren't sealed opposite the shallow zone, so even more downward flow can occur. Of more importance are long-term TDS increases in non-MPG wells downgradient (northeast) of the MPG wells.

4-18. First full paragraph. A more thorough evaluation should be done for the new City wells, in terms of a long-term impact.

Second full paragraph. U.S. Geological Survey modeling results in the agricultural drainage area indicate that about one-half of the groundwater flow was vertical through the Corcoran Clay. The last sentence is unsupported.

4-19. First full paragraph. Regarding "naturally occurring poor quality groundwater west of the Fresno Slough". This statement ignores the agricultural drainage problem area in the Westlands WD.

Third full paragraph, last sentence. Leaving five percent of the banked water would not be expected to have a noticeable influence on groundwater quality.

4-20. First paragraph. The large amount of pumpage is deceiving for evaluating impacts of MPG pumping, because a significant part of this pumpage is from below the Corcoran Clay and many of these wells are relatively great distances from the MPG wells.

Second paragraph. There was too much focus on MPG wells, and too little on downgradient wells.

Last paragraph, third line. This statement is misleading, because the location of the wells and position relative to the saline front are very important.

The range of about 300 to 660 mg/l TDS increases for the cumulative pumping is highly important. Why should more pumping be added to this, particularly near the saline front? Again, too much focus is on TDS changes for MPG wells, as opposed to downgradient wells.

Table 4-3. Should be expanded to included new City of Mendota wells, Columbia Canal Company wells (district and private), and Newhall L&F wells.

D-1. First paragraph, line 12. Is this the original smaller study area or the expanded one?

Last four sentences. Why weren't goals for groundwater quality for other wells included?

Last paragraph, last sentence. This is a bad assumption. Long-term degradation due to interception of pool seepage may take longer than several years to become apparent in downgradient areas.

Figure D-1. The decision tree infers that surface water quality is the only constraint. How about subsidence, overdraft, and groundwater quality targets?

Table D-1. The significance of the blue colors wasn't explained at the end of the table. Why are the loop wells not blue?

D-2. Second full paragraph. I thought that the smaller study area was to be used for calculations for compensating landowners.

Last paragraph. The second to last statement is conjecture. It is certainly not true along the San Joaquin River branch and is not likely true along the Fresno Slough branch south of Whitesbridge Road, due to the lack of pumping in that area near the pool.

D-3. The modeled area (groundwater quality) should include Columbia Canal Company and Newhall Land & Farming, at least south of Avenue 7.

Third full paragraph, first sentence. Delete "naturally occurring", because much of this is agricultural drainage. Again pumping in the Madera area was targeted, but water-level rises in Westlands WD were ignored. Last sentence. What aquifer is being discussed?

D-4. First paragraph, last sentence. This has not been documented.

D-6. The definition of "seepage factors" is unclear. Is this a fudge factor used to calibrate the model? Why are the overall seepage factors so much higher than the incremental (monthly) ones?

D-7. Hydraulic gradients. Again, water level rises to the southwest were ignored.

Last paragraph. Where are the concentration gradients documented? If there are in a table, it should be referenced.

D-8. First paragraph. Well construction could also be a factor, since the Fresno Slough MPG wells apparently have only minimal annular seals. Also, some of the groundwater in the Mendota area is highly corrosive, which could result in holes in the blank casing above the perforations.

Second paragraph. The referenced 1999 TDS concentration map should be provided in the DEIS. Note that the calibration was done for 1999 and later, after substantial degradation had occurred due to pumping of deep MPG wells. Figure 3-12 of the DEIS is not what was referenced. Does the "considerable uncertainty" mean that the information is not adequate for determining impacts?

D-9. What is the relation between seepage factor and pool seepage?

Table D-3. Is the overall seepage factor a monthly or annual factor? The DEIS should explain clearly whether or not the seepage factors incompass pool seepage as determined from actual measurements.

Figure D-3. Some of the measured values for TL-4C indicate a much greater degradation rate than was simulated. This should be explained.

Figure D-5. Measured values for TL-13 and TL-14 also indicate much greater rates of degradation than were simulated.

Figure D-6. Measured values for CGH-2, 9, and 10 also indicate a much greater degradation rate than the simulation indicated.

Figure D-8. Measured values for FS-10 indicated a much greater degradation rate than was simulated.

Figure D-9. What well is the open circle for?

D-10. What amount and TDS value were used for WWTF seepage?

D-11. What seepage amount and TDS value were used for Spreckels Sugar Company wastewater?

Figure D-11. The measured values for CCID 32B seem to indicate greater degradation than the simulation indicates.

Figure D-12. The measured values for TL-1 indicate greater degradation than was simulated.

Figure D-15. What well are the open circles for?

D-12. First paragraph. What was left out of the text was that the late 1980's and early 1990's were also periods of high MPG deep well pumpage.

D-13. Third paragraph, second to last line. It appears that the locations of specific wells weren't considered with respect to the saline front, because the degradation in the deep zone in the late 1980's and early 1990's coincided with heavy MPG pumping.

D-14. Last full paragraph. Is the boron increase annually or total?

Table D-7. The title has two spelling errors.

D-16. The Columbia Canal Company information should also be obtained and compiled.

Please call me if you have any questions.

Sincerely yours,

Kenneth D. Schmidt

KDS/pe

cc: C. White
R. Catania
R. Houk

Response to Comments from
San Joaquin River Exchange Contractors Water Authority

The comments received from the San Joaquin River Exchange Contractors Water Authority (SJREC) consist of a cover letter that provides an overview of the comments and identifies specific comments. Attached to the letter is a set of comments prepared by their consultant, Kenneth D. Schmidt and Associates (KDSA). Although it appears that most of the SJREC comments originated with KDSA, the comments are discussed in the order presented in the SJREC letter.

Overview of Comments

Paragraph 1

Response: Comment noted. No response necessary.

Paragraph 2

Response: The analyses presented in the draft EIS are based on data presented in the Phase I and Phase II reports (KDSA and LSCE, 2000a and 2000b), the 2000 and 2001 Annual Reports (LSCE and KDSA, 2001 and 2002), and the 2002 Annual Report (December 2003). The draft EIS does not rely on analyses presented in the 1998 WWD EIR.

Paragraph 3, bullet 1

Response: Discussion of the residual drawdowns, observed in a number of shallow wells in the Mendota area, has been added to Section 3.4.2.4 and 3.4.2.5 of the final EIS.

Please see the detailed response to Specific Comment paragraph 2 (page F-69).

Paragraph 3, bullet 2

Response: The draft EIS discusses the potential long-term effects of MPG pumpage on water levels in areas north of the San Joaquin River in Section 4.1.1.2. Overdraft in the referenced areas is caused primarily by pumping within CCC and NLF, pumping in the historically overdrafted areas of Madera County downgradient of NLF, and lack of recharge from the San Joaquin River, which has not had significant flow downstream of Gravelly Ford since January 2001. The draft EIS acknowledges some contribution of MPG pumpage to residual drawdowns in deep NLF wells near the San Joaquin River.

For additional discussion of overdraft, please see the detailed response to Specific Comment paragraph 2 (page F-69).

Paragraph 3, bullet 3

Response: A portion of the water that is pumped by shallow MPG wells (i.e. less than 130 feet deep) along the Fresno Slough branch of the Mendota Pool originates as seepage from the Pool. MPG pumping does not influence the rate of seepage from the Pool due to the presence of an unsaturated zone between the Pool and the shallow aquifer (Section 3.4.2.3; Woodward-Clyde Consultants 1994). In the absence of MPG shallow zone transfer pumping (and assuming that groundwater conditions in the area otherwise remained constant), this water would tend to flow to the east toward FWD and Spreckels Sugar Co. This would not be expected to have significant effects on the quality of water produced at these locations since all production wells in these areas are deep. Water quality in the BB Limited and FWD wells is good and has shown no sign of degradation since pumping of the shallow MPG wells along the Fresno Slough began. Degradation in the Spreckels' wells is caused by wastewater contamination rather than MPG pumping.

Paragraph 3, bullet 4

Response: The majority of the groundwater pumped by MPG wells along the Fresno Slough branch of the Pool flows from the upgradient area west of the Pool. However, evaluation of existing data and model results indicate that some of the water pumped by these wells is better quality groundwater that originates as seepage from the Pool. Factors used in the model to account for this recharge were termed "seepage factors". As discussed in Appendix D (page D-6), the incremental seepage factor influences the seasonal and year-to-year fluctuations in the simulated TDS concentrations, and the overall seepage factor influences the overall rate of degradation. Because these seepage factors are not measured values, they were adjusted during the model calibration process to improve the match between measured and simulated TDS concentrations.

Paragraph 3, bullet 5

Response: The EIS evaluates the potential for long-term groundwater quality degradation due to MPG pumping in Section 4.3. It is reasonable to assume that all pumping near the San Joaquin River, including pumping of FWD wells south of the River and pumping of CCC and NLF wells north of the River, intercepts some good quality recharge from the River. Although this has occurred for decades, there is no evidence that groundwater quality degradation is occurring near the San Joaquin River. Some groundwater quality degradation has occurred further north in CCC and NLF, but this is due to other causes. The volume of recharge intercepted by deep wells near the River is assumed to be small for two reasons:

1) During most years since Friant Dam was constructed in 1944, there has been no flow in the San Joaquin River between Gravelly Ford and the Mendota Pool. This lack of flow has significantly reduced recharge from the River.

2) All of the production wells in this area are deep, and clay layers such as the A-clay restrict the amount of vertical flow from the shallow zone to the perforated interval of the wells.

Paragraph 3, bullet 6

Response: Both the MPG and CCID (a member agency of the SJREC) have had problems with the continuous compaction recorders at Fordel, Inc. and Yearout Ranch, respectively. Manual measurements made using the dial indicator at the Fordel extensometer have enabled the MPG to calculate inelastic compaction relatively accurately each year except for 2002. Foundation damage caused by flooding at the beginning of 2002 prevented an accurate calculation of inelastic compaction for that year. The foundation damage was repaired in the spring of 2002, and similar problems are not anticipated in the future.

Compaction criteria specified in the Settlement Agreement refer only to compaction measured at the Yearout Ranch extensometer. Therefore, data from this extensometer are much more important to the signatories of the Settlement Agreement than data from other extensometers such as Fordel. Problems with data collection at the Yearout Ranch extensometer have increased to the point that both the continuous compaction data and the dial indicator readings were erroneous in 2002. These problems apparently caused CCID to delay transmittal of the compaction data to the MPG until July 2003. The raw data were transmitted in a virtually unusable form without any calculations or other analysis of the 2002 compaction. Consultants to the MPG interpreted the data and developed an estimate of inelastic compaction in 2002. Due to all the problems with the data, however, there is considerable uncertainty attached to the compaction estimate. Based on the 2003 data that have been provided so far, it appears that the 2003 compaction data will have similar problems as in 2002. A number of recommendations to improve data collection and analysis at the Yearout Ranch extensometer are made in the draft 2002 Annual Report.

Paragraph 3, bullet 7

Response: Water level changes in WWD have had effects on the gradient for groundwater flow in the western portion of the San Joaquin Valley. Declining water levels in WWD from the 1920s to the 1960s reduced the gradient for groundwater flow to the northeast in the upper aquifer (above the Corcoran Clay). Similarly, rising water levels since the late 1960s noted in the comment have steepened the regional gradient for groundwater flow. Data for the upper aquifer are extremely limited prior to the 1940s, but it is likely that current water levels are generally similar to water levels during the predevelopment period. The primary exception would be in the drainage impaired areas, where current water levels are higher than historical levels. The largest water level changes have occurred in the central and western portions of WWD west of the study area. Much less change has occurred within the study area, and these changes are considered to have had a much smaller effect on the regional gradient in the Mendota area than overdraft in western Madera County. A discussion of water level changes in WWD has been added to Section 3.4 of the final EIS.

The westernmost wells in the MPG monitoring program (the USGS monitoring well cluster in Section 10A), which are located approximately four miles west of the Fresno Slough, do not show evidence of increasing water levels since measurements began in 1987. Water levels in the two shallowest wells in this cluster have been high throughout the monitoring period, and the relatively steep gradient between this area and the Slough was included in the evaluation of existing groundwater conditions in the EIS. The impact of this gradient on groundwater quality was included in the analysis of water quality degradation occurring at MPG wells and other wells near the Slough.

Specific Comments

Paragraph 1

Response: The Settlement Agreement signed by the SJREC, NLF, and the MPG provides the bounds within which MPG transfer pumping activities must fall. The Settlement Agreement specifies the maximum amount of pumpage that could occur, the scheduling of deep zone pumpage, other design constraints, and minimum requirements for the monitoring program. It also requires that annual monitoring reports be prepared by the consultants to these parties. The federal action contemplated in this EIS is for a maximum exchange of 25,000 acre-feet of water per year. The federal action does not include any other transfer pumping that the MPG may conduct under the Settlement Agreement.

All available data collected during past and current sampling, including the 1999 through 2002 monitoring program were utilized in the preparation of the draft EIS. In addition, data obtained from Reclamation, California Department of Water Resources (DWR), the U.S. Geological Survey (USGS), and other water districts around the Pool were used. Most of the data through 2001 were included in the Phase I and Phase II reports (KDSA and LSCE, 2000a and 2000b) and the 2000 and 2001 Annual Reports (LSCE and KDSA, 2001 and 2002). Additional data from the draft 2002 Annual Report were also incorporated as available. New analytical approaches were developed for the EIS to assess the long-term effects of the proposed action on groundwater and surface water quality.

Paragraph 2

Response: The findings contained in the draft EIS are consistent relative to overdraft occurring in Madera County. The draft EIS recognizes that there are pre-existing conditions in the groundwater basin that are problematic and may affect the proposed action. Given the available data on the pre-existing conditions, the draft EIS evaluates the influence of the proposed MPG pumping program on these conditions. Sections 3.4.2 and 4.1 have been revised to reflect the following discussion.

The conclusion that the proposed action will result in a less than significant impact to overdrafted portions of Madera County is based on a combination of water level data summarized in the 2000, 2001, and draft 2002 Annual Reports and simulations conducted with the groundwater model. These analyses indicate that the contribution of MPG pumping to drawdown in the overdrafted portion of Madera County is extremely small. As discussed in Section 4.1.1 and shown in Figure 4-1, the influence of MPG pumping declines rapidly with distance from the MPG wells. The evaluation of pre-existing overdraft conditions in the study area is summarized below, followed by a discussion of the predicted impacts of the proposed action on overdraft conditions.

<u>Existing Overdraft Conditions in Study Area</u>

Overdraft has occurred for decades in the northeastern portion of the study area in Madera County. The overdraft is indicated by steadily declining groundwater levels in wells monitored historically by Reclamation and DWR and more recently by NLF and the MPG. The approximate locations of the overdrafted areas are indicated by cones of depression shown on groundwater elevation contour maps prepared by DWR (Figure 3-10). In 1989, the center of the southernmost cone of depression east of the Chowchilla Bypass was located approximately 10 miles north of the San Joaquin River. By 1999, the cone of depression had expanded in a southerly direction so that the center was only about 8 miles north of the river. The expansion of the cone of depression is primarily due to additional wells and increased pumping resulting from land use changes in the area during the past decade. Most of this area has limited surface water rights and relies primarily on groundwater. Increased pumping in the area causes overdraft due to geologic conditions and the lack of adequate surface water recharge. Lack of flow in the San Joaquin River downstream of Gravelly Ford since construction of Friant Dam in 1944 is also a significant factor. Agricultural and urban pumpage in Madera County estimated by DWR in Bulletin 118 for 2003 are approximately 551,000 acre-feet per year and 15,000 acre-feet per year, respectively. The sum of natural and applied water recharge is estimated to be 425,000 acre-feet per year, which leaves a deficit of approximately 141,000 acre-feet per year.

The area affected by historical overdraft is primarily east and north of the NLF and CCC service areas. However, lack of full recovery in NLF and CCC wells in recent years indicates that this overdraft has been spreading to the south and west. Although the determination of overdraft conditions requires a longer period of record than is available for most wells, water level data collected since 1999 indicate that deep wells in the eastern and northern portions of NLF and CCC, adjacent to the historically overdrafted areas in Madera county, have also experienced overdraft in recent years. MPG transfer pumping does not contribute measurably to this overdraft because these areas are generally beyond the maximum extent of water level impacts caused by MPG pumping.

Deep wells in the western and southern portions of NLF and CCC have also experienced residual drawdowns since 1999, and the potential for overdraft appears to be high throughout the NLF and CCC service areas. Although some of these wells are closer to the MPG wells in FWD, MPG transfer pumping does not appear to be a major factor in causing overdraft in this area. Hydrographs included in the 2000 to 2002 Annual Reports suggest that both drawdowns and residual drawdowns occurring in the NLF wells since 1999 are largely independent of the volume of MPG transfer pumping. For example, drawdowns in NLF wells were similar during periods when deep zone MPG transfer pumping was large (15,600 acre-feet in 2001) or small (3,700 acre-feet in 2002 and zero in 2003). Residual drawdowns in most NLF wells after the 2001 and 2002 irrigation seasons were also similar, even though MPG deep zone transfer pumping was much larger in 2001. Although the MPG conducted no transfer pumping in 2003, it appears that the residual drawdowns will be similar to previous years. This will be further evaluated at the end of year.

Hydrographs of wells included in the monitoring program indicate that groundwater overdraft is not occurring in the southern and western portion of the study area. However, small residual drawdowns have occurred in some of the FWD wells in recent years, especially in wells near the San Joaquin River. These wells are affected by lack of recharge from the river in recent years and by overdraft occurring north of the river in Madera County. Water levels in MPG deep wells west of the Fresno Slough have recovered fully in recent years. Water levels in most non-MPG deep wells west of the slough and the river have also exhibited full recovery. This includes the CCID, FCWD, and City of Mendota wells. The only deep wells in this area showing small residual drawdowns are the USGS monitoring wells west of the Mendota Airport.

In the shallow zone, historical water level data are more limited, and the period of record is insufficient to determine conclusively that long-term overdraft is occurring in certain areas. Data collected since 1999 from shallow monitoring wells north of the San Joaquin River in NLF and CCC indicate that overdraft is probably occurring in the shallow zone in the northern portion of the study area. This area receives little surface water recharge, and drawdowns caused by deep zone pumping propagate to the shallow zone because the A-clay is apparently absent in this area. Water levels in monitoring wells in the eastern portion of NLF near the San Joaquin River also show indications of overdraft because this reach of the river has not had significant flow since January 2001. Only the shallow NLF and CCC monitoring wells near the San Joaquin River arm of the Mendota Pool have not shown signs of overdraft since 1999.

Water level data from shallow wells in the western portion of the study area indicate that overdraft is not occurring in this area. Although a number of shallow wells experienced small residual drawdowns after the 2000 and 2001 irrigation seasons, most of these wells experienced full recovery after 2002. This includes the shallow MPG wells along the Fresno Slough arm of the Pool and monitoring wells near the Meyers Farm Water Bank at Spreckels Sugar Co. Only the shallow USGS monitoring wells west of the Mendota Airport, which are too far from the Pool to receive surface water recharge, showed small residual drawdowns at the end of 2002.

Effects of Proposed Action on Overdraft Conditions

Although overdraft is not occurring in the southern and western portion of the study area, overdraft has occurred in east of the Chowchilla Bypass in western Madera County for decades. Many wells in this area have experienced more than 100 feet of water level decline. Groundwater elevation contour maps of the deep aquifer in the Mendota area produced by DWR (1989-2000) indicate that groundwater flows into the cone of depression formed in the overdrafted area from all directions. This results in a lowering of groundwater levels in the surrounding area, which causes the overdraft to spread to adjacent areas.

Groundwater contour maps prepared since 1999 by LSCE and KDSA (2001-2003) indicate that the areal extent of drawdowns caused by MPG shallow zone pumping is generally limited to the vicinity of the well field along the Fresno Slough because the shallow aquifer is primarily unconfined. These drawdowns do not extend as far north as the San Joaquin River. Deep zone drawdowns extend much further from the pumping wells, because the deep aquifer is much more confined. Drawdowns caused by deep wells located near the San Joaquin River extend on both sides of the river, i.e., drawdowns caused by wells in

Madera County extend into Fresno County and drawdowns caused by wells in Fresno County extend into Madera County. Simulations of MPG deep zone transfer pumping conducted with the groundwater model indicate that these drawdowns would extend a maximum of 3.5 miles from the center of the deep MPG wells in FWD.

Groundwater flow beneath the San Joaquin River into Madera County is not a natural condition but is induced by pumping in the overdrafted areas. The majority of the groundwater flow into this portion of western Madera County comes from the vicinity of the San Joaquin River upstream of Gravelly Ford and beneath the river downstream of Mendota Dam. MPG pumping has no measurable effect on groundwater flow in these areas. A much smaller amount of groundwater flow into western Madera County occurs beneath the San Joaquin River upstream of Mendota Dam. Due to pumping on both sides of the river and lack of recharge from the River since the construction of Friant Dam, the gradient for flow is fairly flat in this area, and the amount of northeasterly groundwater flow into Madera County from this area is relatively small.

Groundwater elevation contour maps show that MPG pumping in FWD does not cause a reversal of gradient in this area. Therefore, the northeasterly flow beneath the San Joaquin River continues when the MPG wells in FWD are pumping. Reductions in groundwater flow due to MPG pumping conducted under the proposed action are expected to be small and would represent a very small fraction of the groundwater deficit experienced in Madera County. Therefore, MPG deep zone transfer pumping would not cause a measurable increase in the amount of overdraft in Madera County.

Water levels measured in shallow wells since 1999 indicate that MPG shallow zone transfer pumping does not cause overdraft in the shallow aquifer. Shallow zone pumping does have some effect on deep zone groundwater levels because it reduces the gradient for vertical flow from the shallow to the deep zone. This effect is primarily localized in the vicinity of the MPG well field along the Fresno Slough because drawdowns due to shallow zone pumping do not extend very far beyond this area. Both water level and quality data indicate that vertical flow from the shallow to the deep aquifer is limited due to the presence of the A-clay and other subsurface clay layers. The effect of shallow zone pumping on deep zone groundwater levels appears to have been small during the 1999-2003 period, and the effect of the proposed action is also predicted to be small. Due to the distance between the MPG well field and the overdrafted area north of the San Joaquin River, any effect of shallow zone pumping on overdraft conditions in Madera County would not be measurable.

Water level data collected from shallow and deep wells through 2003 do not indicate that groundwater overdraft is occurring in the vicinity of the MPG wells. If overdraft were to occur due to the proposed action, it would be most apparent in and near the MPG wells where project-related water level impacts are largest. The Settlement Agreement states that MPG transfer pumping would be reduced if there is evidence that transfer pumping is causing long-term overdraft.

The monitoring program would continue throughout the 10-year period of the proposed action to ensure that long-term overdraft of the aquifer does not occur due to MPG transfer pumping. Determination of overdraft conditions would be made based on evaluation of the results from the groundwater monitoring program by the hydrologists representing the MPG, NLF, and SJREC. Pumping programs would be designed on an annual basis and would be based on the results of monitoring data collected during previous years. If there is evidence of incomplete recovery of groundwater levels as a result of the proposed action, the amount of MPG transfer pumping would be reduced in the following year to allow water levels to recover.

Paragraph 3

Response: The draft EIS contains design constraints and mitigation measures to preclude significant environmental effects. The monitoring program is a key component of the proposed action as it provides data to assess the effects of the pumping program and to adaptively manage the pumping program. The draft EIS identifies those actions that will be taken should monitoring data indicate that an adverse effect has occurred.

The statement that "the potential for overdraft in these areas appears to be high" does not imply that overdraft has occurred, or that MPG pumping will significantly contribute to any overdraft that may occur in the future. A high potential for an event to occur suggests that monitoring should be undertaken to detect any signs of occurrence. Furthermore, having a plan in place should the event occur is good management practice.

Based on the available data and the design constraints included as part of the proposed action (see Section 2.1.1.3), the conclusion in the draft EIS that the proposed action will not increase long-term overdraft is justified. Water levels and recovery are being monitored in over 70 wells by the MPG. If data collected in the future as part of the monitoring program indicate that long-term overdraft is occurring as a result of MPG pumping, the MPG will reduce transfer pumping to ensure that it does not significantly contribute to long-term overdraft.

As an example of the adaptive management nature of the proposed action, the MPG voluntarily reduced both shallow and deep zone transfer pumping in 2002. This resulted in full water level recovery in all shallow and most deep MPG wells along the Fresno Slough arm of the Pool at the end of the 2002 irrigation season. Most deep wells south of the San Joaquin River experienced small residual drawdowns in 2002. Larger residual drawdowns continued after the 2002 irrigation season in the most of the CCC and NLF wells north of the San Joaquin River; water levels in these wells are primarily affected by factors other than MPG transfer pumping. The MPG elected to not pump for transfer in 2003 to increase water level recovery in the area. The extent of water level recovery at the end of 2003 will provide an indication of whether MPG transfer pumping is responsible for a portion of the residual drawdowns occurring near the San Joaquin River in both Fresno and Madera Counties.

Paragraph 4

Response: The long-term effects of MPG transfer pumping on water levels and overdraft are forecast as accurately as possible in the draft EIS given the available data. The conclusions regarding the significance of potential effects presented in the draft EIS are justified based on consideration of the model predictions, incorporation of reasonable design constraints, and identification of management actions to mitigate potential effects. For example, the groundwater model predicts that water levels near the Pool will recover on an annual basis and the MPG is monitoring groundwater levels throughout the region (Appendix B). Should groundwater levels not recover sufficiently over a period of several years the MPG will reduce pumping accordingly.

Actual effects during the proposed action can only be determined through review of data collected as part of the monitoring program. The results of each annual monitoring program will be used to adaptively manage the pumping program to ensure that MPG transfer pumping does not result in a significant contribution to cumulative effects on environmental resources.

Paragraph 5, #1

Response: A list of all persons involved in the preparation of the draft EIS is provided in Section 6.0, List of Preparers and Reviewers. Luhdorff and Scalmanini Consulting Engineers (LSCE) were primarily responsible for preparation of the hydrogeologic portions of the document. State certified professionals at LSCE have been involved with the evaluation of the proposed action; however, NEPA does not require that a certified hydrogeologist or engineer stamp sections of an EIS.

Paragraph 5, #2

Response: Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for a discussion of overdraft.

Paragraph 5, #3

Response: This comment is apparently based on the incorrect assumption that all water pumped by the MPG wells would otherwise flow to the overdrafted portions of Madera County. Although some of the water pumped by deep MPG wells (especially wells in FWD) would otherwise be expected to flow north beneath the San Joaquin River into Madera County, this is not the case for water pumped by shallow MPG wells. The groundwater ridge beneath the San Joaquin River acts as a barrier to shallow groundwater flow beneath the river, and the gradient for flow is away from the river in both directions. Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for a discussion of overdraft.

Paragraph 5, #4

Response: The potential for interception of recharge from the Pool was evaluated in the Environmental Assessments (EA) for the 2001 and 2002 exchange agreements. The MPG provided a description of the proposed pumping programs in both of the previous EAs. These descriptions identified the location, depth, and proposed pumpage on a seasonal basis for both pumping programs. In addition, actual MPG pumpage by landowner, well depth, month, and usage is provided in the Annual Reports prepared by consultants to the MPG, SJREC, and NLF.

A portion of the water that is pumped by shallow MPG wells (i.e. less than 130 feet deep) along the Fresno Slough branch of the Mendota Pool originates as seepage from the Pool. However, the comment is incorrect in implying that all of the water pumped by the MPG is from recharge of groundwater by surface water from Mendota Pool. MPG pumping does not influence the rate of seepage from the Pool due to the presence of an unsaturated zone between the Fresno Slough arm of the Pool and the shallow groundwater (Section 3.4.2.3; Woodward-Clyde Consultants 1994). In the absence of MPG shallow zone transfer pumping (and assuming that other groundwater conditions in the area remained constant), seepage from the Fresno Slough branch of the Pool would tend to flow to the east toward FWD and Spreckels Sugar Co. This would not be expected to have significant effects on the quality of water produced at these locations since all production wells in these areas are deep. Water quality in the BB Limited and FWD wells is good and has shown no sign of degradation since pumping of the shallow MPG wells along the Fresno Slough began. Degradation in the Spreckels' wells is caused by wastewater contamination rather than MPG pumping.

Paragraph 5, #5

Response: The majority of the groundwater pumped by MPG wells along the Fresno Slough branch of the Pool flows from upgradient areas west of the Pool. However, data evaluation and model results indicate that some of the water pumped by these wells is better quality groundwater believed to originate as seepage from the Pool. Factors used in the model to account for this recharge were termed “seepage factors”. As discussed in Appendix D (page D-6), the incremental seepage factor influences the seasonal and year-to-year fluctuations in the simulated TDS concentrations, and the overall seepage factor influences the overall rate of degradation. Because these seepage factors are not measured values, they were adjusted during the model calibration process to improve the match between measured and simulated TDS concentrations.

Clustering of wells used in the groundwater quality model was based on geographical location. Both the CCID and City of Mendota wells are located north and west of the City of Mendota. The clustering was not based on causality; however, the causes of water quality degradation at these wells are essentially the same. The principal cause is northeasterly movement of the saline front due to a combination of regional flow conditions (primarily groundwater flow toward the overdrafted portion of western Madera County) and local pumping downgradient (northeast) of these wells.

Paragraph 5, #6

Response: See response to SJREC Overall Comment 3, bullet 7 (page F-67).

The following responses refer to the comments provided to SJREC by their consultant, Kenneth D. Schmidt and Associates (KDSA). Because similar numbering systems were used, the following comments are preceded by the initials KDSA to distinguish them from other comments provided by SJREC.

Overall Comments

KDSA Comment 1

Response: See response to SJREC Specific Comment paragraph 5, no. 1 (page F-74).

KDSA Comment 2

Response: See response to SJREC Specific Comment paragraph 5, no. 2 (page F-74).

KDSA Comment 3

Response: See response to SJREC Specific Comment paragraph 5, no. 3 (page F-75).

KDSA Comment 4

Response: See response to SJREC Specific Comment paragraph 5, no. 4 (page F-75).

KDSA Comment 5

Response: See response to SJREC Specific Comment paragraph 5, no. 5 (page F-75).

KDSA Comment 6

Response: See response to SJREC Overall Comment paragraph 3, bullet 7 (page F-67).

KDSA Comment 7

Response: Previous reports on the MPG pumping and monitoring programs, such as the Phase I Report and the 2000 and 2001 Annual Reports contain large numbers of water level hydrographs in their appendices. These hydrographs were evaluated for the draft EIS, along with hydrographs based on data from the 2002 monitoring program, but were not included in the draft EIS. Most of the 2002 hydrographs show more complete water level recovery at the end of the year than those included in the 2001 Annual Report.

KDSA Comment 8

Response: See response to SJREC Overall Comment paragraph 3, bullet 6 (page F-67).

KDSA Comment 9

Response: The new City wells are located east of the Fresno Slough near the San Joaquin River arm of the Pool. It is anticipated that these wells will experience drawdown due to deep zone MPG pumping in the spring and fall when the wells in FWD are pumping for transfer. Water levels in the City's wells are expected to recover during the winter. Because of the location of the City's new wells, it is not anticipated that these wells will experience groundwater quality degradation due to MPG transfer pumping. Additional discussion of the potential effects of the MPG pumping on groundwater quality is provided in Section 4.3.

KDSA Comment 10

Response: The CCC is a member agency of the SJREC. Consultants to the MPG request and evaluate water quality data from CCC at the end of each year. None of the data provided to date indicate that degradation is occurring in these wells. If CCC has additional water quality data for its wells, the data should be provided to the MPG for analysis and inclusion in future annual reports.

KDSA Comment 11

Response: The focus of the calibration of the groundwater quality model was on prediction of long-term water quality trends rather than short-term fluctuations in TDS concentrations. In addition, as noted in the comment, data for individual wells were limited in many cases. Difficulties with the calibration of the model for specific wells are explained in detail on pages D-8 to D-12 of Appendix D. For wells with limited data, the simulated degradation rate was based primarily on other wells in the cluster that had longer periods of record. It is unlikely that a short-term TDS increase observed at a particular well is representative of long-term degradation trends if other wells in the area have much smaller degradation rates. In general, the model calibration for each well represents a balance between the variable data for individual wells and overall trends for all wells in the cluster. The modeling of representative long-term TDS trends was emphasized over short-term variations.

KDSA Comment 12

Response: Data from shallow wells in and near the MPG well field along the Fresno Slough branch of the Pool have been used to evaluate the presence of an unsaturated zone beneath the Pool in this area. This unsaturated zone was originally identified by Woodward-Clyde Consultants (1994) and has been verified based on recent data collected by the MPG since 1999. Because of this unsaturated zone, MPG pumping does not influence the rate of seepage between the Pool and the shallow groundwater. Increased downward head gradients have no effect on the seepage rate unless there is a direct hydraulic connection between surface and groundwater.

The analysis concerning the unsaturated zone beneath the Fresno Slough as summarized in the EIS does not apply to the area south of Whitesbridge Road. There are no monitoring wells in that area to indicate the presence or absence of the unsaturated zone. Section 3.4.2.3 of the EIS indicates that there is no unsaturated zone beneath the San Joaquin River branch of the Pool.

<u>Specific Comments</u>

KDSA ES-3. Fourth full paragraph.

Response: Surface water quality objectives in the Mendota Pool are the only criteria against which model results are evaluated, but they are not the only design constraints used to develop the annual MPG transfer pumping programs. The Settlement Agreement specifies several other constraints used in the development of the annual pumping programs. These include annual limits on shallow and deep zone MPG transfer pumpage, limits on pumpage for adjacent use, and restrictions on the timing of deep zone transfer pumpage. Additional constraints added after the Agreement was signed include the TDS and selenium criteria for individual wells and surface water quality at the MWA.

Other constraints on MPG transfer pumpage, including overdraft and subsidence, are also specified in the Settlement Agreement. These are considered when data from the monitoring program are evaluated at the end of each year, but are not simulated with models. The subsidence criterion (<0.005 foot of average annual inelastic compaction due to MPG transfer pumping) was the primary basis for the annual limit on deep zone transfer pumpage (12,000 acre-feet), as discussed in the Phase II Report (KDSA and LSCE, 2000b).

KDSA ES-5. Bullets 4 and 5.

Response: Sampling of the MPG wells will be conducted on an annual basis. Although groundwater quality fluctuates seasonally, it generally changes slowly from year to year, and an annual sampling frequency is considered appropriate. The TDS and selenium groundwater quality limits agreed to by the MPG are applicable to individual wells.

KDSA ES-6

Response: A bullet has been added in the referenced section, and in Section 2.1.1.4, to identify the subsidence and compaction monitoring.

The regional geologic conditions are described in Section 3.4.1. Expanded discussions for the Mendota Pool area and Westlands Water District are provided in Sections 3.4.2 and 3.4.3, respectively.

For discussion of rising groundwater levels in WWD, see response to SJREC Overall Comment paragraph 3, bullet 7 (page F-67).

KDSA ES-7. First full paragraph.

Response: The draft EIS acknowledges that groundwater degradation is a widespread phenomenon throughout the western San Joaquin Valley. There are likely multiple factors affecting this degradation including, but not limited to, the chemistry of the soils in this region (elevated salt and selenium concentrations), application of irrigation water which leaches these constituents, the quality of the irrigation water, and the quantity of groundwater pumping by all entities in this region.

The northeasterly movement of the saline front is the primary cause of groundwater quality degradation in the Mendota area. This movement is caused by a combination of regional flow conditions and local pumping downgradient (northeast) of the front. The saline front would exist and continue to move in a northeasterly direction in the absence of MPG transfer pumping. The draft EIS evaluates the contribution of the proposed action and other MPG transfer and adjacent use pumping on the rate of movement of the saline front and associated groundwater quality degradation at the wells.

MPG pumping is considered to be a relatively minor factor in historical degradation at the City of Mendota wells, for several reasons:

1) The timing of the degradation, most of which occurred during the 1980s prior to any significant MPG pumping, is consistent with that of degradation occurring at CCID wells located northwest of the City. Northeasterly movement of the saline front was responsible for the degradation in both areas, and MPG pumping could not have been a factor in movement of the front in the vicinity of the CCID wells.
2) The MPG wells are generally located cross-gradient to, not downgradient of, the City's wells. Therefore, MPG pumping would not be expected to have a major effect on degradation at the City's wells.

3) Simulations conducted with the groundwater model indicate that MPG transfer pumping would be responsible for no more than six percent of future groundwater quality degradation predicted to occur at the City's wells.

The summary of existing groundwater quality (Section 3.4.5.5) contains two pages of discussion on TDS concentrations, and Tables 3-10 and 3-11 contain TDS data for all wells in the monitoring program. Readers seeking more detail on this subject can refer to the 2000, 2001 and 2002 Annual Reports (LSCE and KDSA 2001, 2002, 2003).

KDSA ES-10

Response: The referenced data were not available when the draft EIS was being prepared. Please see the detailed response to SJREC Specific Comment paragraph 3 (page F-61) for a discussion of overdraft.

The discussion of overdraft in the Executive Summary and Sections 3.4.2.4, 3.4.2.5, and 4.1.1.2 of the final EIS has been revised to reflect information contained in the draft 2002 Annual Report. The last sentence of the paragraph referenced in the comment states that MPG transfer pumping will be reduced if there is evidence that this pumping is causing long-term overdraft.

KDSA ES-12

Response: As discussed in Section 4.3.1, results of the groundwater quality model indicate that MPG transfer pumping would be responsible for the majority of groundwater quality degradation predicted to occur in shallow wells located along the Fresno Slough branch of the Pool. All of these wells are MPG wells. In the deep zone, MPG pumping is estimated to be responsible for only a small portion of the overall degradation. In non-MPG wells located west of the Fresno Slough and the San Joaquin River (i.e., the CCID, City of Mendota, and AES Mendota wells), MPG transfer pumping is estimated to be responsible for a maximum of six percent of the predicted groundwater quality degradation. This was not considered a significant impact in the draft EIS.

The amount of good quality surface water recharge that would be pumped by MPG wells is greatly overstated in this comment. Only a small fraction of the water pumped by deep MPG wells originates as seepage from the Pool. The percentage is higher for the shallow MPG wells but does not represent the majority of the pumpage. Pool seepage not pumped by the MPG wells would otherwise flow to the east toward FWD and Spreckels Sugar Co. under current groundwater conditions. This water would not flow north beneath the San Joaquin River into Madera County due to the groundwater ridge beneath this reach of the River. Increased flow of shallow groundwater east of the Fresno Slough would not be expected to have significant effects on water quality since all production wells in this area are deep. Water quality in the BB Limited and FWD wells is currently good and has shown no sign of degradation since pumping of the shallow MPG wells began. Degradation observed in the Spreckels' wells is caused by wastewater contamination rather than MPG pumping.

KDSA ES-13

Response: The effect of MPG transfer pumping on groundwater quality near the San Joaquin River arm of the Pool is discussed in Section 4.3.2. In general, it appears that MPG pumping has little effect on water quality in this area. Groundwater quality is good in this area, and there is no evidence that degradation has occurred since MPG pumping began in 1989. No degradation is predicted to occur in this area due to the proposed action.

KDSA ES-17

Response: As discussed in response to the comment on page ES-12 (see above), only a fraction of the water pumped for the proposed action and other MPG transfer and adjacent use pumping would otherwise provide recharge to overdrafted areas of Madera County. The primary causes of overdraft in this area are excessive agricultural and municipal pumping and limited surface water recharge. Based on the Department of Water Resources Bulletin 118 for 2003, agricultural and urban pumping in the Madera subbasin are approximately 551,000 acre-feet per year and 15,000 acre-feet per year, respectively. Whereas the sum of natural and applied water recharge was estimated to be 425,000 acre-feet per year. Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for a discussion of overdraft.

Groundwater quality degradation due to the proposed action is only predicted to occur near the MPG well field along the Fresno Slough arm of the Pool and upgradient (west of this area). After the conclusion of the proposed action, surface water recharge is expected to offset much of the degradation that would occur during the proposed action.

KDSA Page 1-1

Response: The draft EIS evaluates the effects of all MPG activities including pumping for exchange with Reclamation, other transfer, and adjacent use as these activities relate to all other pumping activity in the area. The objective of the evaluation conducted in the EIS is to isolate the effects of the proposed action from all other effects. The discussion of each potential effect in Section 4 includes an evaluation of cumulative effects from all MPG and other pumpage in the area.

KDSA Page 1-1. Next to last paragraph.

Response: A sentence has been added in the final EIS. Please note that the following paragraphs discuss groundwater resources. The potential to develop groundwater resources in this region is evaluated in the "New Well Construction" alternative.

KDSA Page 1-7. First Paragraph, line 6.

Response: The text has been clarified to indicate that the referenced sentence refers to the total quantity that would be pumped for transfer. The amount that would be exchanged with Reclamation would be smaller.

KDSA Figure 1-2.

Response: An improved map is provided in the final EIS.

KDSA Figure 1-3.

Response: In the final EIS, this figure has been replaced with Figure 1-5 from the draft EIS.

KDSA Figure 1-4.

Response: A clearer map is provided in the final EIS.

KDSA Figure 1-5.

Response: This figure has been moved to Figure 1-3 in the final EIS and is printed on 11x17 paper to improve legibility.

KDSA Page 2-2. First line.

Response: Comment noted. No change is required.

KDSA Page 2-3. First paragraph.

Response: See response to KDSA comment on page ES-3 (page F-78).

KDSA Page 2-4. Last bullet

Response: Reduction of pumping activities by the MPG would reduce the effect of that pumping on groundwater quality degradation in water pumped by the wells and other groundwater in the vicinity of the wells.

MPG wells that are permanently removed from the pumping program due to elevated TDS or selenium concentrations will be properly abandoned.

KDSA Page 2-5. Second paragraph.

Response: The text was modified to include the recommended constraint. Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for a discussion of overdraft.

KDSA Page 2-6. Last paragraph.

Response: Yes. Under either of the two No Action alternatives the MPG could continue to pump for adjacent use (up to 14,000 acre-feet per year) and could exchange up to 9,000 acre-feet per year with other users around the Pool.

KDSA Page 2-7. Fourth full paragraph.

Response: The calculation was based on an estimated cost per well of $250,000 (see Section 4.7.2). The cost of installing a well below the Corcoran Clay may range between $150,000 and $1,000,000 depending on the depth and construction of the well. The EIS estimated a cost per acre-foot of $289 based on a well cost of $250,000. If the wells cost $150,000, the estimated cost per acre-foot for water exchanged would be $232. For a $1,000,000 well, the estimated cost would be $716 per acre-foot of water. Therefore, the estimated cost per acre-foot of the New Well Construction alternative in the draft EIS is at the lower end of the potential range of costs. The text has been edited to indicate the range of well costs and to remove the reference to stainless steel casing.

KDSA Page 2-9

Response: The typographical errors have been corrected. The description of the City of Mendota's new well field has been expanded based on information provided by the City in its comment letter (page F-37).

KDSA Table 2-1

Response: The table header has been revised to indicate that these other projects will be considered in the evaluation of cumulative effects.

KDSA Table 2-4

Response: Table 2-4 identifies the primary participants in the Mendota Pool Monitoring Program. No data have been requested from Gravelly Ford WD or well owners within the District. Some well owners in Aliso WD have provided limited data to the monitoring program. Others have given permission to the MPG to monitor water levels in their wells. Their participation is identified in the text of Section 2.1.1. A more detailed description of the various participants and their roles in the monitoring program is provided in Appendix B. Text regarding the entities involved in preparation of the annual reports has been added to Table 2-4 and Appendix B.

KDSA Table 2-5

Response: Change made.

KDSA Figure 2-1

Response: Comment noted.

KDSA Page 3-2

Response: The text of Section 3.1.2 has been revised to indicate that the nearest non-MPG production wells south of Whitesbridge Road are located south of the Mendota Wildlife Area.

Recent data from MPG production wells located south of the San Joaquin River, and the NLF and CCC wells located north of the River are provided in Tables 3-10 and 3-11. These tables also include data from wells owned by the City of Mendota, BB Limited, and Spreckels Sugar, Inc., which are located east of the Fresno Slough.

KDSA Page 3-8

Response: “Etchegoinberry” refers to three unused MPG wells in the central portion of the well field west of the Fresno Slough. One of these, Etchegoinberry No. 2, is used by the MPG for water level monitoring.

KDSA Page 3-9. Item 6.

Response: Change made.

KDSA Page 3-9. Item 7.

Response: Change made.

KDSA Page 3-10. Second paragraph, lines 5–6.

Response: The differences between inflows and outflows for the northern and southern Pool represent the calculated flow to the south across Transect A-A’ during the May to September period each year. The annual water budget for the entire Pool balances. More detailed water budgets are provided in the annual monitoring reports.

KDSA Page 3-10. Last paragraph.

Response: A reference to the DMC has been added.

KDSA Page 3-11.

Response: The evaluation focused on those parameters that are of greatest concern to water quality, agricultural uses, and wildlife. The selection of those parameters (arsenic, boron, molybdenum, selenium, and salinity) was based on the results of previous analyses in the annual reports, previous environmental documents, and comments received on the previous documents. Results of all surface water quality monitoring are provided in Appendix C.

KDSA Page 3-12.

Response: The final EIS indicates that water from the DMC is the primary source of boron and other constituents measured in the northern Fresno Slough (see Section 3.3.2.6). The results of analyses for boron in the DMC are provided in Table 3-3.

The order of discussion of the constituents of concern is consistent throughout the document. The discussion of salinity (as EC or TDS) is described in more detail than for the trace elements.

KDSA Page 3-15.

Response: These samples were analyzed for irrigation suitability, which does not include the adjusted SAR.

KDSA Page 3-16.

Response: The reported precision of the TDS measurements has been corrected. The generally north to south gradient in water quality in the Fresno Slough arm of the Pool applies to trace elements such as boron, molybdenum, and selenium. The gradient probably relates to the proximity of the sampling locations to the DMC, which is the main source of water to the Pool. This gradient does not apply to salinity, which is somewhat higher in the southern portion of the Pool due to MPG pumping.

KDSA Page 3-16. **Last Paragraph.**

Response: Although the statement is generally true for the Mendota area, the term "well sorted" has been removed from the general description of alluvial deposits from the Sierra Nevada.

KDSA Page 3-17.

Response: The text "western half of the trough" has been replaced with "western half of the Valley"

The text has been edited to remove reference to the elevation of the Corcoran Clay.

The A-clay is discussed in the first paragraph of Section 3.4.2.1.

KDSA Page 3-18. First paragraph.
Response: Comment noted.

KDSA Page 3-18. Line 6.
Response: Change made.

KDSA Page 3-18. Line 9.
Response: The causes of poor quality shallow groundwater are not discussed in this section.

KDSA Page 3-18. Section 3.4.2.2.
Response: This change has been made in the final EIS, with the qualification that almost all of this pumping occurs outside of the study area.

KDSA Page 3-18. Section 3.4.2.3
Response: See response to KDSA overall comment No. 12 (page F-78).

KDSA Page 3-19
Response: The discussion is appropriate. The seepage estimate included in the Phase I Report (KDSA and LSCE, 2000a) is for the entire Mendota Pool. The extent of the hydraulic connection between surface water and groundwater cannot be inferred based on this seepage estimate.

KDSA Page 3-19. Section 3.4.2.4.
Response: Groundwater levels in the shallow and deep zones are discussed in this section, although more detail is provided for the deep zone. The groundwater elevation contour maps included in the Annual Reports for the MPG monitoring program indicate that shallow groundwater is flowing away from the San Joaquin River arm of the Pool in both directions. Some of the groundwater that flows south from the San Joaquin River area could eventually flow to MPG wells along the Fresno Slough. Because the cone of depression is localized to the vicinity of the shallow wells, pumping of shallow MPG wells will not increase the rate of seepage from the San Joaquin River arm of the Pool.

KDSA Page 3-19. Last paragraph, first sentence.
Response: All water level hydrographs evaluated for the draft EIS are included in the Annual Reports for the MPG monitoring program. Hydrographs prepared for the draft 2002 Annual Report indicate that residual drawdowns have continued in the northeastern portion of the study area but not in the western portion. The overdraft discussion in Section 3.4.2.4 has been revised in the final EIS to reflect the current data.

Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for additional discussion of overdraft.

KDSA Page 3-20. Section 3.4.2.5, line 1.
Response: "Natural" has been changed to "pre-development" in the first and second sentences. A discussion of lateral flow above A-clay and beneath the Corcoran Clay has been added to this section.

KDSA Page 3-21. Section 3.4.3.1.
Response: The third sentence has been revised to reflect the information provided in the comment.

KDSA Page 3-21. Second paragraph.
Response: The text "through the Corcoran Clay" has been added after "percolation of groundwater" in line 2.

KDSA Page 3-22.
Response: The text "in the Mendota area" has been added to the generalized description of the Sierran sands.

KDSA Page 3-22. **Last paragraph.**
Response: Change made.

KDSA Page 3-23. First paragraph.
Response: There are two principal factors that result in greater compaction at the Yearout Ranch extensometer:

1) Drawdowns are significantly larger at Yearout Ranch because there are more deep wells in this area. During the 2000-2002 period, the maximum annual drawdown at Fordel, Inc. ranged from 50 to 80 percent of the maximum drawdown at Yearout Ranch.

2) The primary difference between compaction at the two sites is due to differences in lithology. The A-clay is absent at the Fordel location, and the aquifer above the Corcoran Clay consists almost entirely of sands. The A-clay is present at the Yearout Ranch site, and approximately 10 percent of the total saturated thickness above the Corcoran Clay consists of clay layers, which are much more susceptible to inelastic compaction.

KDSA Page 3-23. First full paragraph.
Response: The citation format is correct. A discussion of water level increases both above and below the Corcoran Clay has been added to this section.

KDSA Page 3-24.
Response: The order of discussion of the constituents of concern is consistent throughout the document. Within the discussion for each

constituent, the water quality in the shallow zone is discussed before water quality in the deep zone.

KDSA Page 3-24. Section 3.4.5.2.

Response: The cited value of 0.6 mg/l for boron is based on the "severe or unacceptable" value for the RWQCB proposed boron objective for protection of full beneficial uses in the lower San Joaquin River at Vernalis (Table 3-4). The general irrigation standard is 0.7 mg/l (Ayers and Wescot 1985). Other applicable standards are higher.

KDSA Page 3-25. Section 3.4.5.3.

Response: The sentence has been revised. No molybdenum data for wells north or west of the San Joaquin River were provided to the MPG by other participants in the water quality monitoring program.

KDSA Page 3-26. Section 3.4.5.5.

Response: This section contains a separate discussion of the salinity of the shallow groundwater (page 3-26) and deep groundwater (page 3-27).

KDSA Page 3-26. Second paragraph, line 4.

Response: The sentence has been revised. The data that are discussed were the most recent data available at the time that the draft EIS was prepared. The final EIS incorporates data and conclusions from the draft 2002 Annual Report, as appropriate.

SAR is related to salinity and was therefore included, in separate paragraphs, under the heading of salinity. When assessing the effects of SAR, the corresponding salinity of the irrigation water is required.

KDSA Page 3-27. Fourth paragraph.

Response: The occurrence of the A-clay and its influence on vertical movement of groundwater are discussed in Section 3.4.2.1.

SAR is related to salinity and was therefore included, in separate paragraphs, under the heading of salinity. When assessing the effects of SAR, the corresponding salinity of the irrigation water is required.

KDSA Page 3-28. First paragraph.

Response: Table 3-4 provides irrigation water quality criteria and criteria for Refuge water supplies. The Refuge water supply criteria are based on both irrigation and wildlife considerations. The Refuge water supply criteria are the most stringent relative to salinity and are therefore protective of other uses of the water.

Sediment samples were collected from within the channel using an Ekman grab sampler deployed from a boat. All sediment samples were collected from the top two centimeters of sediment. All sediment samples were analyzed using standard USEPA or ASTM methods. All analyses for trace elements are reported as total concentrations on a dry weight basis. The description of the sediment sampling in Section 3.5 has been expanded to include additional detail.

KDSA Page 3-30.

Response: The Grasslands Watershed does not extend to the Pool, but it receives water from the Pool through the CCID Main Canal.

As indicated by grain size analysis, the sediment was not of uniform texture between replicates at a site, or between sites. Data on the percent sand, silt, and clay of each replicate sample are provided in Table 3-12.

KDSA Page 3-31. Section 3.6.

Response: Monitoring programs conducted by Tranquillity ID and James ID are summarized in Sections 3.6.4 and 3.6.5, respectively. Only surface water quality and flow data from these areas were evaluated for the draft EIS.

KDSA Page 3-31. Section 3.6.1.1.

Response: The sumps periodically discharge to the DMC. Reclamation is evaluating other means of disposing of the sump water. The text has been edited to reflect this.

KDSA Page 3-31. Section 3.6.1.3.

Response: The word "continuous" has been deleted.

KDSA Page 3-32.

Response: Section 3.3.1.4, San Joaquin River, has been expanded to indicate that some of the water diverted by the SJREC from the northern Pool eventually drains back to the San Joaquin River below Bear Creek.

KDSA Page 3-32. Section 3.6.2.1.

Response: The sampling station is the CCID Main Canal. This clarification has been added to the final EIS.

KDSA Page 3-33.

Response: Discharges to the Pool south of Whitesbridge Road were not evaluated for the EIS. None of the MPG wells discharge to the Pool south of Whitesbridge Road.

KDSA Page 3-34. Section 3.7.1.2.

Response: Discharges to the Pool south of Whitesbridge Road were not evaluated for the EIS. None of the MPG wells discharge to the Pool south of Whitesbridge Road.

KDSA Table 3-1.

Response: The evapotranspiration data are given as reference evapotranspiration (ET_0). Reference evapotranspiration is defined as "the rate of evapotranspiration from tall, cool-season green-grass of uniform height (4 to 6 inches), completely shading the ground, and not short of water" (CIMIS 2000). Potential evapotranspiration varies according to crop and may be more or less than the reference evapotranspiration.

KDSA Table 3-2.

Response: The table provides a summary of the key components of the water budget for the Pool during the irrigation season. A detailed water budget can be found in the Annual Reports on the monitoring program. The difference between inflows and outflows from the northern or southern Pool represents the calculated flow to the south across Transect A-A'. The water budget for the entire Pool balances each year.

KDSA Table 3-3.

Response: Correction made.

KDSA Table 3-4.

Response: Other criteria are often more restrictive than the irrigation water quality criteria. The discussions in the text use comparisons to the most restrictive water quality criterion, unless a specific beneficial use is being considered.

KDSA Table 3-7.

Response: Change made.

KDSA Table 3-9.

Response: All analyses for trace elements are reported as total concentrations in sediment on a dry weight basis. pH is determined on a 1:1 sediment to water mixture. EC is determined on a saturated paste of the sediment. The footnote has been clarified.

KDSA Figure 3-1.

Response: Figure 3-1 is a bar chart of hydrologic year classifications.

KDSA Figure 3-5.

Response: The graph contains no shading. The difference noted in the comment is due to the frequency of water budget calculations. The water budget was calculated on a weekly basis in 1999. Since January 2000, the water budget has been calculated on a daily basis.

KDSA Figure 3-6.

Response: Figure 3-6 clearly depicts the location of the surface water sampling locations.

KDSA Figure 3-10.

Response: The Annual Reports do not contain regional groundwater elevation contour maps. The contour map shown on this figure was obtained from DWR's web site and is presented without edits. The map shows the groundwater elevations in western Madera County and surrounding areas. The intent of this map is to provide the reader with an understanding of regional groundwater conditions in Madera and northern Fresno counties as a basis for the discussion of MPG water level impacts.

KDSA Figure 3-11.

Response: Figure 3-6 shows the locations of surface water sampling stations. Figure 3-11 shows the locations of sediment sampling stations. Due to insertion of additional figures in Section 3, this figure is identified as Figure 3-13 in the final EIS.

KDSA Figure 3-12.

Response: Boron is spelled correctly on the figure and caption.

KDSA Page 4-3. First paragraph.

Response: The effect of San Joaquin River flows on groundwater levels and quality are discussed elsewhere in the draft EIS. See Sections 3.3, 3.4, and 4.1

KDSA Page 4-3. Second paragraph.

Response: The maximum drawdown due to MPG deep zone transfer pumping is predicted to occur at the end of May. The maximum drawdown due to all deep zone pumping is predicted to occur in July or August. The text has been clarified in the final EIS.

KDSA Table 3-3.

Response: Corrections made.

KDSA Page 4-4. Section 4.1.1.2.

Response: This paragraph has been revised to reflect the most recent water level data. Although residual drawdowns have occurred in some areas, full recovery occurred in the shallow MPG wells along the Fresno Slough after the 2002 irrigation season.

Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for additional discussion of overdraft.

KDSA Page 4-4. Second to last paragraph.

Response: Extraction of groundwater by the MPG and others upgradient of Madera County may result in some reduction of recharge that would have occurred otherwise. However, overdraft in Madera County is primarily due to pumpage by entities in Madera County exceeding the safe yield of the aquifer in that area. The majority of the recharge to this portion of Madera County is from the San Joaquin River and areas to the east of the overdrafted area, not from the Mendota Pool.

Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for additional discussion of overdraft.

KDSA Page 4-4. Last paragraph, fourth sentence.

Response: The loss of surface water recharge to groundwater due to MPG transfer pumping would not be expected to have a measurable effect on overdraft in Madera County. See above response to the KDSA comment on page ES-12 (page F-80).

KDSA Page 4-5. First line.

Response: The hydraulic gradient is a function of the transmissivity and the flow rate. Although the deep aquifer beneath this reach of the San Joaquin River has a high transmissivity, there is no evidence to suggest that it is significantly higher than in areas further east such as Gravelly Ford where the gradient is much steeper. Therefore, it is assumed that the flatter gradient indicates less flow to the northeast in the vicinity of the River upstream of Mendota Dam.

KDSA Page 4-5. First paragraph.

Response: The last two sentences refer to continued flow beneath the River north of FWD during periods when the FWD wells are pumping. The analysis is supported by data contained in the 2000 and 2001 Annual Reports and the draft 2002 Annual Report. Although there may be localized cones of depression that extend beneath the River in the vicinity of pumping wells located near the River, the overall direction of groundwater flow is still to the northeast. No change was made.

KDSA Page 4-5. Second paragraph.

Response: This paragraph states the conclusion of the analysis, and therefore should not be deleted. Supporting data for the statements made in this paragraph are provided in the preceding paragraphs. No change was made.

KDSA Page 4-5. Third paragraph.

Response: The results of the groundwater level monitoring program are, and will continue to be, reviewed on an annual basis by consultants to SJREC, NLF, and MPG. These consultants will make a determination as to the amount of water level recovery and whether overdraft is occurring.

The subsequent MPG pumping program will be adjusted to minimize further impacts and avoid overdraft as stated in the design constraints in Section 2.1.1.3. These adjustments could include reductions in shallow and deep zone pumping if appropriate. This adaptive management process, not the monitoring program itself, will ensure that long-term overdraft does not occur as a result of MPG transfer pumping. The text of the final EIS has been revised to clarify these points.

KDSA Page 4-5. Section 4.1.2.1.

Response: Under this alternative, there would be no action by Reclamation (i.e., no exchange), and mitigation measures proposed in the draft EIS would not apply. The decision as to which wells to pump would be left to the MPG or the individual well owners. Whether the provisions in the Settlement Agreement would still apply would need to be evaluated by the signatories of the Agreement.

KDSA Page 4-5. Last paragraph, first line.

Response: Change made.

KDSA Page 4-6. Second paragraph, first line.

Response: The referenced paragraph has been edited to include this information. Any additional overdraft in Madera County resulting from this alternative would be small and would still be considered less-than-significant.

KDSA Page 4-7. Second paragraph, first line.

Response: The paragraph states that overdraft in western Madera County is indicated by steadily declining groundwater levels in wells monitored by Reclamation and DWR. This analysis was based on review of long-term water level hydrographs. The cones of depression shown on groundwater elevation contour maps indicate the general location of the overdrafted areas but were not used as the criteria for overdraft. Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for additional discussion of overdraft.

KDSA Page 4-7. Second paragraph, last sentence.

Response: The analysis conducted for the EIS indicates that MPG transfer pumping does not have a measurable effect on groundwater conditions in the overdrafted portions of Madera County and would not be expected to result in increases in the residual drawdowns. This is based in part on review of long-term hydrographs of wells in the overdrafted area, which have shown no response to MPG pumping since 1989.

As discussed in response to the KDSA comment on page ES-12 (page F-80), only a fraction of the water pumped for the proposed action would otherwise provide recharge to overdrafted areas of Madera County. The primary causes of overdraft in this area are excessive agricultural and municipal pumping within Madera County and limited surface water recharge. Please see the detailed response to SJREC Specific Comment paragraph 2 (page F-69) for additional discussion of overdraft.

KDSA Page 4-8. Last paragraph, second sentence.

Response: The comment is correct. The text "above the Corcoran Clay" has been added after "subsidence" in this sentence.

KDSA Page 4-9. Section 4.2.2.

Response: No change was made to the title of the "New Well Construction" alternative. This alternative is defined in Section 2.1.2.1, which clearly states that the new wells would be pumped to provide irrigation water. Figure 1-2 indicates that a substantial portion of MPG lands in WWD are located near the Aqueduct.

KDSA Page 4-10. Section 4.2.4.

Response: At the time that the draft EIS was being prepared, the new City wells had been installed, but the pipeline was still under construction. The text has been edited in response to comments from the City of Mendota.

KDSA Page 4-10. Second paragraph, line 3.

Response: No change made. The subsidence criterion is based on the amount of subsidence estimated to be caused by MPG transfer pumping. This estimate is based on inelastic compaction above the Corcoran Clay measured at the two extensometers in the Mendota area combined with groundwater model results. Estimates of the total subsidence, including that caused by pumping below the Corcoran Clay, is not necessary for this evaluation. Subsidence occurring in the shallow zone would be included in the data collected by the extensometers, because both extensometers measure all compaction occurring above the Corcoran Clay.

KDSA Page 4-10. Section 4.3, last sentence.

Response: The primary cause of groundwater quality degradation in the Mendota area is movement of the saline front due to the combined effects of regional groundwater flow conditions and local pumping northeast of the front. The text of the final EIS has been modified to reflect this.

KDSA Page 4-11. First paragraph.

Response: MPG pumping is not considered to be a major cause of historical degradation at the City of Mendota wells. See the response to KDSA comment on page ES-7 (page F-79).

KDSA Page 4-12. Second paragraph.

Response: The comment is correct in stating that monitoring does not ensure that groundwater quality degradation will not occur. However, monitoring can detect changes in groundwater quality and allow corrective actions to be implemented to reduce the rate of degradation. The existing groundwater quality data indicate that the trace elements are presently below applicable water quality standards. The monitoring program will continue to track the concentrations of these elements in groundwater. Should the concentrations of these elements begin to climb to levels that could result in future exceedance of water quality standards, then corrective actions would be implemented to preclude this occurrence.

KDSA Page 4-12. Last paragraph.

Response: The CCC is a member agency of the SJREC. Consultants to the MPG request and evaluate water quality data from CCC at the end of each year. None of the data provided to date indicate that degradation is occurring in these wells. If CCC has additional water quality data for its wells, they should be provided to the MPG for analysis and inclusion in future annual reports.

KDSA Page 4-13.

Response: The four year model calibration period was selected for several reasons:

1) Water quality data for MPG wells are extremely limited prior to the start of the current monitoring program in 1999.
2) The simulation period for the current groundwater flow model began in 1999. Monthly pumpage data are not available for many wells prior to this period.
3) The groundwater degradation rate at most wells in the Mendota area has been slower in recent years than during the drought period of the late 1980s and early 1990s. Current degradation rates are a better predictor of future degradation than historical rates.
4) The purpose of the model is to predict future degradation, not to determine the causes of historical degradation. The latter would be a more difficult task given the general lack of pumpage, water level, and water quality data during the historical period.

KDSA Page 4-14. First full paragraph.

Response: Comment noted. Although there is evidence that the southern FWD wells may be affected by groundwater contamination moving north from Spreckels Sugar Co., the resulting degradation has so far been small. The degradation rate is difficult to determine due to the lack of historical data for these wells and the variability observed in recent sample results.

KDSA Page 4-15. Item 3, line 2.

Response: Comment noted. No change was made. There are no data available to quantify the percentage of seepage from the Pool that is extracted by MPG wells.

KDSA Page 4-15. Item 3.

Response: Comment noted. Seepage from the Pool does provide recharge to the deep zone, although the amount is limited due to the presence of shallow clay layers such as the A-clay in the vicinity of the Pool. Whether the A-clay is present in the eastern portion of FWD is unclear, but drillers' logs for all of the FWD wells indicate the presence of several clay layers above the perforated intervals of the wells. Seepage from the San Joaquin River arm of the Pool provides recharge to the Madera area, but the effect of seepage from the Fresno Slough arm is minimal.

KDSA Page 4-16. Third full paragraph, fourth line.

Response: The statement refers to all pumping simulated with the shallow zone model. These simulations only included MPG pumpage, because all other water-supply pumpage in the study area is deep. Simulations conducted with the deep zone model included pumping by both MPG and non-MPG wells. This has been clarified in the text of the final EIS, and "MPG" was added to the title of Table 4-2.

KDSA Page 4-16. Last sentence.

Response: This prediction does not imply that there is no recharge to the deep aquifer. The groundwater quality model results indicate that movement of the saline front due to the regional gradient has a greater effect on groundwater quality at wells west of the Fresno Slough than recharge from the Pool. This means that water quality improvements in these wells would not occur even in the absence of MPG pumping. The City of Mendota and Spreckels Sugar Co. wells east of the Slough receive some recharge from the San Joaquin River arm of the Pool and are not affected by the saline front.

KDSA Page 4-16. Last paragraph, second line.

Response: This has been clarified in the final EIS. The "all" refers to the average for the shallow MPG wells included in the simulation.

KDSA Page 4-17. Second full paragraph.

Response: After the conclusion of the proposed action, the deep MPG wells along the Fresno Slough would likely be abandoned (sealed) to prevent downward flow within the well structures. The remaining shallow wells with acceptable water quality would be used exclusively for adjacent use. Reduced pumping and increased recharge from the Pool would cause deep zone water levels to recover in this area. This would greatly reduce the gradient for downward flow through the A-clay in this area and also reduce the gradient for horizontal flow from the west. The increased recharge would improve water quality, and higher water levels in the deep aquifer would help to prevent the saline front from moving beneath the Slough and causing degradation in wells east of the Slough.

KDSA Page 4-18. First full paragraph.

Response: There are no data to suggest that MPG pumping will have an effect on water quality at the new City wells. The new City wells are located approximately one mile northeast of the closest MPG wells west of the Fresno Slough. They are closest to the Baker Farming wells in FWD, which have very good water quality and have not shown signs of degradation. Both the new City wells and the Baker wells benefit from recharge from the San Joaquin River arm of the Pool.

KDSA Page 4-18. Second full paragraph.

Response: The reference indicated in this comment was not provided. Other USGS reports have described the Corcoran Clay as “relatively impervious” and indicated that vertical permeabilities calculated from laboratory tests were low, ranging from 4×10^{-5} to 6×10^{-6} gallon per day per square foot (Bull and Miller, 1975). The text has been edited to reflect the uncertainty that apparently exists concerning vertical flow through the Corcoran Clay. Furthermore, less than 25 percent (about 11,000 acres) of MPG lands are located in the drainage impacted areas.

KDSA Page 4-19. First full paragraph.

Response: Although the majority of the salinity referenced in this paragraph is considered to be naturally occurring, agricultural drainage has also been a significant factor. The text was edited to remove the reference to “naturally occurring”.

KDSA Page 4-19. Third full paragraph, last sentence.

Response: Depending on the total amount of water that infiltrates from the ponds, five percent could have a substantial effect on water quality. Because some blending of recharged water and native groundwater would occur, the amount of recharged water remaining in the aquifer will be greater than five percent. This information has been added to the text of this paragraph.

KDSA Page 4-20. First paragraph.

Response: The purpose of this paragraph is to explain what pumpage was included in the groundwater model simulations. The comment is correct that the total estimated pumpage in the study area (143,600 acre-feet) includes pumpage estimated to occur below the Corcoran Clay. The estimated non-MPG pumpage above the Corcoran Clay in the study area in 2001 was 121,900 acre-feet. This paragraph has been corrected in the final EIS.

KDSA Page 4-20. Second paragraph.

Response: Shallow MPG wells along the Fresno Slough are the only known production wells perforated in the shallow zone in the study area.

KDSA Page 4-20. Last paragraph, third line.

Response: It is true that the position of a well relative to the saline front would influence the rate and magnitude of water quality degradation. The well locations are one of the inputs to the groundwater flow model used to determine gradients for the groundwater quality model. The referenced statement refers to regional conditions rather than degradation at specific wells.

KDSA Table 4-3.

Response: As discussed in Section 4.3.1.1, wells located east of the Fresno Slough in FWD and wells in the southern portion of NLF and CCC (including BB Limited) have shown no indication of historical water quality degradation. These wells have the best water quality in the study area due to geologic conditions and recharge from the San Joaquin River. Without evidence of past degradation, there is no basis upon which to develop a model to predict future degradation. Wells in this area are included in the water quality monitoring program.

KDSA Page D-1. First paragraph, line 12.

Response: The study area for all potential groundwater level impacts of the proposed action is the expanded study area shown on Figure 1-3.

KDSA Page D-1. Last four sentences.

Response: The water quality targets discussed in this section are surface water quality targets established by CDFG or RWQCB for water delivered to the MWA, not groundwater quality goals. There are no applicable groundwater quality objectives with which to compare observed groundwater concentrations. Therefore, surface water concentrations at the point of compliance (i.e., the MWA) are estimated and compared to applicable water quality objectives.

KDSA Page D-1. Last paragraph, last sentence.

Response: The statement is correct based on the historical data. MPG transfer pumping has occurred since 1989. Unless the data show some historical groundwater quality degradation, there is no basis for development of a model to predict future degradation. There is some evidence that groundwater contamination moving north from Spreckels Sugar Co. may be starting to degrade water quality at the southern FWD wells. Otherwise, no degradation in deep MPG wells east of the Fresno Slough has been documented since MPG transfer pumping began.

KDSA Figure D-1.

Response: Figure D-1 depicts the interactive application of the groundwater and surface water quality models for the design of pumping programs for each year of the 10-year program. Surface water quality in the Mendota Pool is the only factor against which model results are evaluated, but it is not the only design constraint used to develop the annual MPG transfer pumping programs. The Settlement Agreement contains several other constraints used in the development of the annual pumping programs. These include annual limits on shallow and deep zone MPG transfer pumpage, limits on pumpage for adjacent use, and restrictions on the timing of deep zone transfer pumpage. Additional constraints added after the Agreement was signed include the TDS and selenium criteria for individual wells.

Other constraints on MPG transfer pumpage, including overdraft and subsidence, are also specified in the Settlement Agreement. These are considered when data from the monitoring program are evaluated at the end of each year, but are not simulated with the models. The subsidence criterion (<0.005 foot of average annual inelastic compaction due to MPG transfer pumping) was the primary basis for the annual limit on deep zone transfer pumpage (12,000 acre-feet), as discussed in the Phase II Report (KDSA and LSCE, 2000b).

KDSA Table D-1.

Response: Table D-1 was not intended to be printed in color. This table will be printed in black and white in the final EIS.

KDSA Page D-2. Second full paragraph.

Response: The study area for all potential groundwater level impacts due to the proposed action is the expanded study area shown on Figure 1-3.

KDSA Page D-2. Last paragraph.

Response: The statement in the draft EIS is correct for the Fresno Slough branch of the Pool north of Whitesbridge Road where the shallow MPG wells that were simulated with the model are located.

KDSA Page D-3.

Response: Groundwater quality data evaluated in the draft EIS do not show degradation in the southern portions of the CCC or NLF. This is the only area north of the San Joaquin River that is close enough to the MPG wells to potentially be affected by MPG transfer pumping. Because no historical degradation has been documented in this area, there is no basis upon which to develop a model to predict future degradation. Any historical degradation that may have occurred in the northern portions of CCC or NLF would be unrelated to MPG pumping.

KDSA Page D-3. **Third full paragraph, first sentence**.

Response: Although agricultural drainage has contributed to the high salinity of groundwater west of the Slough, most of the salinity is naturally occurring. The cause of the regional gradient for groundwater flow to the northeast is not discussed in this paragraph and is not relevant to the conceptualization of the groundwater quality models. Both the shallow and deep aquifers above the Corcoran Clay are modeled.

KDSA Page D-4. First paragraph, last sentence.

Response: The presence of an unsaturated zone beneath the Fresno Slough branch of the Pool since at least the late 1980s was documented by Woodward-Clyde Consultants (1994) and confirmed by water level data collected for the MPG monitoring program since 1999 (see Section 3.4.2.3).

KDSA Page D-6.

Response: The content of the groundwater quality model is fully disclosed in Section D.3, including the derivation of equations containing the seepage factors. Definition of the seepage factors are given, their relevance to the equation is explained, the meaning of their numerical values is explained, and the estimated numerical values are provided in Tables D-3 and D-4. Because these seepage factors are not measured values, they were adjusted during the model calibration process to improve the match between measured and simulated TDS concentrations.

The overall seepage factors are close to one (a value of one indicates no dilution, as noted in Section D-3) because the model is much more sensitive to the overall seepage factor than to the incremental seepage factor, which is apparent from equation 10, page D-6.

KDSA Page D-7. Hydraulic gradients.

Response: Historical water level rises to the west of the study area have contributed to the northeasterly regional hydraulic gradient that currently exists in the Mendota area. Although these have had a much smaller effect on the regional gradient than the drawdowns in Madera County, this factor has been added to page D-7 in the final EIS.

KDSA Page D-7. Last paragraph

Response: The concentration gradients are shown on Tables D-3 and D-4. A reference to these tables has been added to page D-7 in the final EIS.

KDSA Page D-8. First paragraph.

Response: The comment is correct. Well construction differences and casing damage are possible causes of water quality variations among nearby wells. These potential factors have been added to page D-8 of the final EIS. In general, these factors have a relatively minor effect on water quality degradation compared to geographical location of the wells relative to the saline front and the Mendota Pool.

KDSA Page D-8. Second paragraph.

Response: The 1999 TDS concentration contour map is not necessary to the discussion of initial concentrations used in the model. The 1999-2002 period was selected as the model calibration period because of the availability of water quality data. Prior to initiation of the monitoring program in 1999, data were limited for most of the MPG wells. The purpose of the model is to predict future water quality, not to determine the cause of historical degradation. The relative effect of MPG pumping prior to the start of the calibration period is not relevant to the calibration or predictive capability of the model.

The 2001 EC contour map referenced as Figure 3-12 was left out of the draft EIS. Updated contour maps are now available from the draft 2002 Annual Report. These maps show 2002 TDS concentrations and these have been included in the final EIS as Figures 3-11 (shallow zone) and 3-12 (deep zone).

KDSA Page D-9.

Response: The fact that seepage factors are necessary to calibrate the model, particularly for the shallow wells, provides additional evidence that Pool seepage is occurring and has an effect on water quality in wells near the Pool. Smaller seepage factors indicate more dilution of the native groundwater due to this seepage. The seepage factors provide an indication of the relative magnitude of Pool seepage. However, they cannot be used to quantify the overall rate of Pool seepage.

KDSA Table D-3.

Response: The definition of the overall seepage factor (page D-6) indicates that it acts on the monthly calculated total TDS concentrations. Because the seepage factors are based on simulation of water quality at individual wells, there is no direct relationship between them and the estimate of overall Pool seepage discussed in the Phase I report (KDSA and LSCE, 2000a). The Pool seepage estimate has been useful in water budget calculations but cannot be used to model the spatial variability of salinity observed in individual wells.

KDSA Figure D-3.

Response: As stated on page D-8 of the draft EIS, the focus of the calibration was on prediction of long-term water quality trends rather than short-term fluctuations. Data for individual wells were limited in many cases, including well TL-4C, which only had data for a one-year period (June 2001 to June 2002). For wells with limited data, the simulated degradation rate was based primarily on other wells in the cluster that had longer periods of record. Well TL-4A, which had a three-year period of record (1999-2001) was used as the primary calibration well for this cluster, as explained on page D-9. It is very unlikely that the short-term TDS increase observed in well TL-4C is representative of long-term degradation trends at this location in view of water quality data from other nearby wells, which indicate smaller degradation rates. Data from Fordel well M-2 illustrates the problem of short-term TDS increases. If this well's calibration had been based only on its 1999-2000 data, long-term degradation would be greatly overpredicted. In this case, a balance between more recent (2001-2002) trends and the earlier trends was required.

In general, the model calibration for each well requires a balance between processes at individual wells and overall trends for all wells in the cluster. The modeling of representative long-term TDS trends was always given priority. There was no attempt to match short-term TDS changes, which can be highly variable.

KDSA Figure D-5.

Response: See above response to KDSA comment regarding Figure D-3 (page F-101).

KDSA Figure D-6.

Response: See above response to KDSA comment regarding Figure D-3 (page F-101).

KDSA Figure D-8.

Response: See above response to KDSA comment regarding Figure D-3 (page F-101).

KDSA Figure D-9.

Response: In the discussion of the model calibration (page D-9), it is stated that the same color code was used for measured TDS concentrations (symbols) and modeled concentrations (solid lines). Following this convention, the black open circles on Figure D-9 represent TDS concentrations in samples from well CW-2. Open circles were used because solid black circles would have been difficult to see during periods when the data are closely clustered, such as August 2002. Open circles were used similarly on other figures to enhance the legibility of the data.

KDSA Page D-10.

Response: Initial and simulated TDS concentrations for the four Fordel wells and one Terra Linda well considered to be affected by wastewater from the WWTF are shown on Table D-3. The effect of this seepage is not simulated separately but is included in the overall simulation of TDS concentrations resulting from all factors.

KDSA Page D-11.

Response: Initial and simulated TDS concentrations for the three Coelho West wells considered to be affected by wastewater from Spreckels Sugar Co. are shown on Table D-3. The effect of this seepage is not simulated separately but is included in the overall simulation of TDS concentrations resulting from all factors.

KDSA Figure D-11.

Response: See above response to KDSA comment regarding Figure D-3 (page F-101).

KDSA Figure D-12.

Response: See above response to KDSA comment regarding Figure D-3 (page F-101).

KDSA Figure D-15.

Response: The black circles on Figure D-9 represent TDS concentrations in samples from well CGH-7. See above response to comment on Figure D-9 (page F-102).

KDSA Page D-12. First paragraph.

Response: For purposes of model calibration, the causes of historical degradation prior to 1999 are not relevant. The only purpose of the model is to predict future water quality degradation due to the proposed action.

KDSA Page D-13. Third paragraph, second to last line.

Response: The causes of historical degradation prior to 1999 are not relevant to the model. The locations of all wells simulated with the model are input parameters for the groundwater flow model, but the location and movement of the saline front is not modeled explicitly.

KDSA Page D-14. Last full paragraph.

Response: Boron concentrations are calculated monthly in the same manner as TDS concentrations. The predicted boron concentration increase (0.04 mg/L) is an average monthly value for the months when MPG transfer pumping was scheduled to occur.

KDSA Table D-7.

Response: Spelling errors in these table headings have been corrected in the final EIS.

KDSA Page D-16.

Response: Water quality and flow data from the CCC canal intake have been obtained annually since 1999 and were evaluated for the EIS. The mixing model for the San Joaquin River branch of the Pool includes these data.

SAN JOAQUIN RIVER EXCHANGE CONTRACTORS WATER AUTHORITY
CCID • CCC
FCWD • SLCC

Consisting of 240,000 acres on the Westside of the San Joaquin Valley

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February 10, 2004

Ms. Sheryl Carter
U.S. Bureau of Reclamation
1243 N Street
Fresno, CA 93721-1813

RE: ***Mendota Pool Group Draft EIS***

Dear Sheryl:

Representatives of the San Joaquin River Exchange Contractors Water Authority (Exchange Contractors) and Newhall Land and Farming met last month to discuss the Mendota Pool Group's response to our comments on the Mendota Pool Groups 10-year Draft Environmental Impact Statement (EIS). As a result of the meeting, we are submitting the attached memorandum from Mr. Kenneth Schmidt. We request that you include a response to these comments in the Final EIS.

As always, please contact me if you have any questions or comments.

Sincerely,

Steve Chedester

Enclosure

cc: SJRECWA members, w/enc.
Mr. John Frye, Newhall Land & Farming, w/enc.
Paul Minasian, Esq., w/enc.
Mr. William Luce, USBR, w/enc.
Mr. William Pipes, MPG, w/enc.
Mr. Steve Ottemoeller, Madera Irrigation District, w/enc.
Mr. Denis Prosperi, w/enc.

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S.J.R.E.C.W.A.

MEMO

To: S. Chedester, SJRECWA
R. Catania, Newhall L&F

From: Ken Schmidt

Date: February 6, 2004

Topic: MPG 10-Year DEIS Draft
Response to Comments

1. Although the draft response clarifies a number of issues, several important issues were not addressed. One of the most important is the lack of mitigation of the interception of good quality recharge, much of which would otherwise move into Madera County. This is a highly significant long-term impact on groundwater beneath the Columbia Canal Co. and Newhall L&F.

2. Water levels are declining in the area, and are not indicated to have been stable, except in some wells near or adjacent to sources of recharge. January 2004 water-level measurements indicate continuing declines, even without MPG transfer pumping. This and previous declines are an indication of groundwater over- draft. Adding to this overdraft in a critically overdrafted basin wasn't addressed or mitigated in the DEIS or the draft responses to comments.

3. The response suggests that pool seepage is only a small part of the water pumped from MPG wells, but this conclusion was not substantiated, and is not supported by actual hydrogeologic data. Both water-level elevations and groundwater quality unequivocally indicate that much of the water pumped by MPG wells is from pool seepage. Recharge from this seepage would have otherwise been available to other pumpers in the area.

4. There is clear evidence that the shallow groundwater along the San Joaquin River branch of the pool is hydraulically connected to water in the pool. The response indicates this that is insignificant, citing out-of-date general reports, as opposed to using actual monitoring data and elevations (such as for the Newhall L&F shallow monitor wells). Even if the MPG wells in this area are deep, this still increases seepage, due to increased downward head gradients. There is no indication that the A-clay is impermeable, rather it functions as a "leaky" confining bed, and is locally missing.

Response to Comments from San Joaquin River Exchange Contractors Water Authority, second letter

Due to the extensive comments received from the San Joaquin River Exchange Contractors Water Authority (SJREC) on the draft EIS, Reclamation provided the draft responses to SJREC comments for their review. SJREC provided further comments on February 10, 2004. Responses to this second set of comments from the SJREC are provided below.

Comment 1

Response: Please see responses to SJREC comment Paragraph 3, bullet 3 (page F-66).

It is clear that shallow MPG wells along the Fresno Slough branch of the Pool intercept a portion of the seepage from Pool. In the absence of MPG pumping, the majority of this water would tend to move eastwards toward FWD and Spreckels Sugar Co. This water would not flow to the northeast toward CCC and NLF because there is no gradient for shallow groundwater flow beneath the San Joaquin River. All shallow groundwater elevation contours maps contained in the 2000 through 2002 MPG annual reports (LSCE and KDSA, 2001, 2002, and 2003) show a groundwater ridge beneath the San Joaquin River and the San Joaquin River branch of the Pool. The gradient for shallow groundwater flow is away from this ridge in both directions. North of the river, the gradient for flow is to the northeast; south of the river, the gradient is to the southwest.

There is also a downward gradient in the Mendota area because most production wells are deep. This causes some of the seepage from the Pool to move downward to the deep zone. It would then be able to flow northeast beneath the river into Madera County. The amount of vertical flow is relatively small, as indicated by highly confined conditions in most deep wells. Water level data from nearby shallow and deep wells are available for USGS, Spreckels Sugar Co., and NLF monitoring wells. Hydrographs of these wells show that clay layers such as the A-clay act as effective confining layers, which limit vertical flow from the shallow to the deep zone. The amount of Pool seepage that would be expected to reach CCC and NLF wells via this mechanism (vertical flow to the deep zone followed by horizontal flow beneath the San Joaquin River) is small. This is not considered a significant impact to water quality in CCC and NLF.

The majority of the recharge that flows to wells in the CCC and NLF service areas is from the San Joaquin River and the San Joaquin River branch of the Pool. MPG transfer pumping does not intercept a significant portion of this recharge because there are no shallow wells near the river.

Comment 2

Response: Please see response to SJREC Specific Comments, Paragraph 2 (page F-69).

Overdraft occurring within the study area is discussed in Section 3.4.2.4 of the Final EIS. Overdraft has primarily occurred east of the Chowchilla Bypass in Madera County, as indicated by steadily declining groundwater levels in wells monitored historically by Reclamation and DWR. Although the determination of overdraft conditions requires a longer period of record than is available for most wells, water level data collected by the MPG since 1999 indicate that declining groundwater levels have also been occurring west and south of the historically overdrafted areas in Madera County.

Many deep wells in the NLF and CCC service areas have experienced residual drawdowns in recent years, and the potential for overdraft in this area appears to be high. Some wells south of the River in FWD have also experienced residual drawdowns since 1999. As noted in the comment, groundwater levels in many wells continued to decline in 2003 in the absence of MPG transfer pumping. Only wells west of the Fresno Slough and the San Joaquin River have exhibited full recovery since the MPG monitoring program began.

It is clear from the 2003 water level data that MPG transfer pumping is not the cause of overdraft in the Mendota area. The two primary causes of overdraft are lack of flow in the San Joaquin River and pumping in Madera County in excess of the sustainable yield. Even though flow in the San Joaquin River downstream of Gravelly Ford has been greatly reduced since the construction of Friant Dam in 1944, it is still a primary source of recharge in the area. Water level data collected since 1999 indicate that groundwater levels were significantly higher during years where the San Joaquin River flowed to the Mendota Pool (1999-2000) than in years when there was little or no flow (2001-2003).

The portion of the study area north of the San Joaquin River, with the exception of CCC, has limited surface water rights and relies almost exclusively on groundwater. Groundwater extraction by CCC and NLF totaled approximately 38,000 acre-feet in 2003. In Aliso Water District and other areas east of the Chowchilla Bypass where the largest amount of overdraft has occurred historically, groundwater pumping has increased in recent years due to changes in cropping patterns. For all of Madera County, agricultural and urban pumpage estimated by DWR in Bulletin 118 for 2003 are approximately 551,000 acre-feet per year and 15,000 acre-feet per year, respectively. The sum of natural and applied water recharge is estimated to be 425,000 acre-feet per year, which leaves a deficit of approximately 141,000 acre-feet per year.

The 2003 water level data confirm that MPG transfer pumping is not the cause of overdraft in Madera County. Mitigation measures contained in the Settlement Agreement and the EIS require the MPG to reduce transfer pumping should it be determined that the transfer pumping is causing overdraft.

Comment 3

Response: Please see response to SJREC Specific Comments, ES-12 (page F-80).

Interception of seepage from the Pool by MPG wells is included in the groundwater quality model discussed in Section 4.3 and Appendix D of the EIS. The project team has reviewed the available groundwater level and quality data to determine whether there is any clear evidence that "much of the water pumped by MPG wells is from pool seepage" as stated in the comment. The results of those analyses are described below.

The MPG has monitored groundwater levels in approximately 70 wells since 1999, and the data are summarized on hydrographs contained in the MPG annual reports. The data do not show a significant correlation between groundwater levels in the wells and their proximity to the Pool. Since 1999, water levels have declined in most wells east of the Fresno Slough. These declines correlate with proximity of the wells to the overdrafted portions of Madera County rather than proximity to the Pool.

During the same period, groundwater levels have been relatively stable in almost all wells west of the Fresno Slough. Hydrographs of shallow wells near the slough, which would benefit the most from Pool seepage, are similar to those of shallow wells located further from the slough. Deep wells west of the slough also show generally stable water levels even though they receive much less surface water recharge than shallow wells.

The results of the groundwater quality model discussed in Section 4.3 and Appendix D indicate that only a small percentage of the water pumped by deep MPG wells originates as seepage from the Pool. This is due primarily to the presence of clay layers such as the A-clay, which limit the amount of vertical flow to these wells. The model results show that a percentage of the water pumped by shallow MPG wells originates as Pool seepage, but this has not been quantified.

In order to evaluate the effect of Pool seepage on water pumped by shallow MPG wells, water quality data collected from shallow wells along the Fresno Slough were compared with surface water quality in the slough. Concentrations of the major cations (sodium, calcium, and magnesium) and anions (chloride, sulfate, and bicarbonate) that comprise most of the total dissolved solids in both surface and groundwater were compared for this analysis. There was little spatial variation in the composition of the surface water samples collected from different locations in the Pool, but there was considerable temporal variation in the samples. This was expected since the TDS concentration of samples collected at the DMC terminus in 2003 ranged from 144 to 482 mg/L, with an average concentration of about 300 mg/L. Samples collected in October were closest to the mean and were used for comparison with the groundwater samples. Sodium is the dominant cation, and chloride and bicarbonate are the dominant anions in the surface water samples.

There is considerable spatial variability in groundwater quality from the shallow MPG wells west of the Fresno Slough. Wells closest to the slough benefit more from Pool seepage and have the best quality. Samples from these wells are more similar in composition to the surface water samples than wells further away but contain more sodium, more sulfate, and less bicarbonate than the surface water. TDS concentrations in all groundwater samples were considerably higher than in surface water.

Shallow wells further from the Fresno Slough receive less seepage and are more strongly affected by the saline front, which is moving toward the slough from the west. Samples collected from monitoring wells located within the saline front show that sodium is the dominant cation and is present in large concentrations. Chloride and sulfate are the dominant anions and are present in approximately equal proportions. Samples from MPG wells located more than 200 feet away from the Pool are similar in composition to the saline front, except that sulfate comprises a smaller percentage of the dissolved minerals. TDS concentrations in these wells are intermediate between those of the saline front and those of wells near the Pool.

The water quality data show that there is considerable variation in the amount of Pool seepage pumped by MPG wells. Shallow wells located close to the Pool appear to be influenced by Pool seepage, but the amount of seepage pumped by shallow wells located more than 200 feet away from the Pool and by deep wells appears to be relatively small. Overall, more of the water pumped by MPG wells is derived from horizontal flow within the screened interval of the wells than vertical flow that originates as seepage from the Pool.

Comment 4

Response: It is unclear which response is referenced by this comment. However, the hydraulic connection between surface and groundwater is discussed in Section 3.4.2.3 of the EIS. The fact that water level data from shallow NLF monitoring wells indicate a direct connection between surface and groundwater along the San Joaquin River branch of the Pool is clearly stated in this section.

As also discussed in Section 3.4.2.3, the amount of increased seepage from the Pool due to deep zone pumping in FWD is expected to be small. Water level data from shallow and deep wells indicate unconfined conditions in the shallow monitoring wells and confined conditions in the deep production wells. Drillers' logs show several clay layers, including the A-clay, above the screened intervals of the FWD wells. Although these layers are not impermeable, they act as effective confining layers. As noted in the comment, some vertical leakage to the deep zone is expected, but the data do not suggest that the amount of leakage would be large enough to cause a significant increase in seepage from the Pool.