

## SOUTH DELTA WATER AGENCY

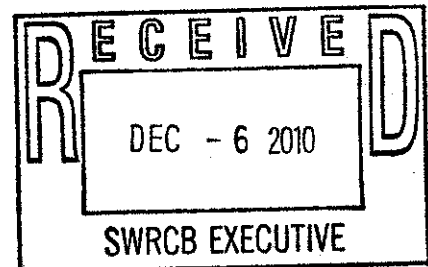
4255 PACIFIC AVENUE, SUITE 2  
STOCKTON, CALIFORNIA 95207  
TELEPHONE (209) 956-0150  
FAX (209) 956-0154  
E-MAIL Jherrlaw@aol.com

**Directors:**

Jerry Robinson, Chairman  
Robert K. Ferguson, Vice-Chairman  
Natalino Bacchetti  
Jack Alvarez  
Mary Hildebrand

**Counsel & Manager:**  
John Herrick

December 6, 2010



**Via E-Mail and Hand Delivery**

Ms. Jeanine Townsend, Clerk to the Board  
State Water Resources Control Board  
Cal/EPA Headquarters  
1001 "I" Street, 1<sup>st</sup> Floor  
Sacramento, CA 95814

**Re: Draft Technical Report on the Scientific Basis for Alternative  
San Joaquin River Flow and Souther Delta Salinity Objectives**

Dear Ms. Townsend:

The following comments are submitted on behalf of the South Delta Water Agency. The SDWA acknowledges the SWRCB's ongoing obligations to develop, amend and implement water quality objectives for the protection of the Sacramento-San Joaquin Delta. However, after developing objectives to protect agricultural beneficial uses in the southern Delta (salinity objectives) over 40 years ago, the SWRCB repeatedly chose to delay implementation of those objectives, and once fully implemented, the SWRCB has allowed numerous violations while declining to enforce them. Obviously, such a history indicates an unwillingness to abide by the law and its own regulations and a clear preference for protecting export interests over in-Delta users. Our agency sincerely hopes that the current efforts are not simply the SWRCB's most recent efforts to further protect exports by finding an excuse to relax current salinity standards.

Inherent in the process are various decisions which determine the manner and direction in which the evaluation of alternative objectives will proceed. Although the Draft Report is clearly (and appropriately) an attempt to separate policy and scientific considerations, a discussion about the choices involved with the scientific processes must be undertaken. For example, the

Ms. Jeanine Townsend, Clerk to the Board

December 6, 2010

Page - 2 -

description of the analyses to be used to evaluate supply impacts focuses only on tributaries and portions of the mainstem, leaving absent recirculation possibilities and contributions from the upper portions of the River. Similarly, the analyses do not discuss other required investigations associated with potential changes to the objectives such as anti-degradation rules/policies. Further, no mention is made of other legal limits and mandates which affect how much flow may be necessary such as Biological Opinions or other federal mandates.

Most importantly, the analyses make no mention of the sources of impacts on beneficial uses. If one party or group is the cause of an adverse impact which is being addressed by a water quality objective, then the law requires that party or parties to mitigate its impacts. Once mitigated, no objective may be necessary, or a much lower one might suffice. For example, the CVP (with the SWP) is the cause of the elevated salinity levels on the San Joaquin, and a contributor to decreased flows during many times. Unless and until the SWRCB quantifies those impacts and requires mitigation (to the extent beneficial uses are adversely impacted) any analysis of alternative flows and salinity standards would seem to be the most inefficient and unfair way to proceed.

The SWRCB and its staff's choices on how to proceed are thus a mixture of policy and science decisions.

With regard to specifics within the Draft Report:

Section 4. The Draft Report makes no mention of the effects of salinity levels on fish migratory patterns. Recent investigations suggest that the high saline waters of the southern Delta may interfere with migrating fish which are seeking to move towards "fresher" flows (or fish that are trying to find their way to the ocean). Any final report or analysis should make reference to this potential effect on beneficial uses and analyze how any alternative might be affected thereby.

Section 4.1 The Draft Report makes no mention of how current standards relate to the ability of other users to consumptively use River water. That is to say, there is no mention of what level of assimilative capacity should exist. If 0.7 EC is needed to protect agricultural uses, then maintaining the water quality at this level means any further downstream use may be a violation of discharge regulations given Regional Board reporting (and mitigation) requirements. Thus maintaining 0.7 EC at Vernalis could mean no agricultural use could occur in the southern Delta.

Section 4.2.1 This Section appears to incorrectly describe water quality objectives. The Draft Report looks at the relationship between Vernalis and the three interior compliance locations. However, the standards apply throughout the channels and the three interior stations are located in (and thus not measuring) the areas of greatest concern (where net flows are lacking and EC is highest). This brings to light another Draft Report mistake. In using regression analyses, the

Report incorrectly identifies the problem. It is well understood that although additional flow on the San Joaquin may be necessary to meet the Vernalis and Brandt Bridge standards, additional flow is not necessarily what is needed to meet the Tracy Blvd. Bridge and Middle River ones. The problem is net flows which are affected by a range of flows at Vernalis but also by local diversions and especially export operations. This is why barriers have been discussed and proposed for 40 years as being necessary to meet the standards.

As time passed, it became apparent that the originally designed barriers might not be sufficient to provide the required net flows, and thus suggestions to raise and lower barrier heights as well as the installation of low lift pumps have been proposed. Regardless of the eventual combination of actions needed to create net flows in all channels, any analysis which focuses solely on changes in Vernalis flows will end up identifying impacts that may be irrelevant if not completely avoidable.

Attempts to establish any salinity objectives face the exact same issue: how can any level of EC be maintained if net flows are not present in each and every channel. The answer is clear and simple. To maintain (and control) any EC level there must be consistent net flows. The proper analysis would then quickly reveal that maintaining 0.7 or 1.0 can be done with no additional water costs within a certain range of Vernalis flows.

Also with regard to the regression analyses, we suggest further review, especially by a peer review be undertaken. Since flows, local diversions and exports vary wildly from year to year, it is not clear how any comparison of Vernalis and the interior compliance stations can yield useful information. When Vernalis flow drops very low (as in 2009) EC in portions of Old River were very high because the salts in that area simply had nowhere to go. This change in concentrations had little to do with Vernalis quality and everything to do with a larger no net flow area being created. Hence the conclusion in 4.2.1 on page 71 (the regression equation represents a reasonable worst case scenario) may be incorrect.

It may be that the regression analysis does take into account changes in flow direction caused by changes in export levels, but it also may be that the analysis is wrong. Changes in exports affect the flow split at the Head of Old River even with the barriers in operation. When more of the flow goes into Old River, more salt enters the south Delta, and thus higher concentrations will follow (the salts do not regularly leave the area).

Section 4.2.2 The Draft Report incorrectly assumes a channel EC of 0.7. It is generally the exception and not the rule for Old River EC to be at or below the standard during most summer months. Further, this section also ignores the requirement that standards be met throughout the channel and not just at the compliance locations. As SDWA has stressed before, City of Tracy, Mountain House and Deuel VI discharges occur at the worst possible places in the southern

Delta. Besides contributing to Old River problems, they certainly affect diversions near their discharges. Beneficial uses are not protected if dilution occurs some place else.

With regard to Deuel, it discharges into Paradise Cut, a dead end channel with little if any dilution available. It is wholly incorrect to label its contribution as minimal to area loads if its effects on Paradise Cut are rarely if ever mitigated.

Section 4.2.2 Mass Balance Analysis. The first paragraph on page 74 is incorrect by stating that "beneficial uses are affected more by long term salinity averages." That may be correct in a very broad sense, but if a farmer diverts water for his first irrigation of the season at a time when a EC levels are high, the adverse impacts are not mitigated by having better quality during a later irrigation. This is especially true for a crop that is more sensitive to salt at germination or during the seedling phase.

Section 4.3.1 SDWA previously commented on both the draft and final versions of the Hoffman report. It is worth noting that the SDWA comment letters, numerous verbal communications and the inputs from Alex Hildebrand and Terry Prichard resulted in *no* changes to Dr. Hoffman's report. It is hard to imagine how personal experiences as well as documented conditions related by SDWA and its representatives can have zero effect on a third party's conclusions regarding salts in the southern Delta.

Attached hereto are the September 14, 2009 SDWA comments to the Hoffman Report. This letter sets forth numerous shortcomings in Dr. Hoffman's conclusions, assumptions and "facts" contained in the report. For example, Dr. Hoffman assumes that the application of irrigation water in the southern Delta results in adequate flushing of salts from the root zone, and that those salts then exist the area. This assumption is simply incorrect. As explained in the attachment, salts in many areas of the southern Delta become trapped just below (and in) the root zone of nearly all crops. Salts that are leached down are simply pushed back up as the shallow ground water rises with each tidal cycle. These salts do not leave the system until very high flows occur in wet years; rather they accumulate in the ground water or the root zone (or both). This condition indicates that a better quality of water is necessary to protect crops, not a worse one as Dr. Hoffman speculates. A significant portion of the area is at or below sea level. To conclude as Dr. Hoffman does that applied salts (in the irrigation water) are being flushed out under these conditions is unsupportable.

Further, Dr. Hoffman does not take into account how known soil permeability conditions prevent adequate leaching. The lack of full understanding in the Report is evidence by Dr. Hoffman's statement at the workshop that typical and necessary farming practices (such as mowing, raking and baling of alfalfa) are "bad management practices."

Dr. Hoffman ignored ongoing, specific, and verifiable damage to crops on Union Island and thus concluded that existing levels of quality were protective. He also assumed that the channel supply during the summer was at the 0.7 EC level set forth in the standard. Even a cursory examination of DWR data shows that to be wrong.

Dr. Hoffman continues to assume that providing protection for certain crops will protect all crops. As stated above, if soil, management practices or other conditions prevent adequate leaching, then the laboratory determined water quality standard for beans may not adequate or protective fo beans or other crops.

The Report also makes unexplained and unsupported statements such as seedling loss of 10% and yield loss of 5% due to high salinity are acceptable. It is difficult to imagine what farmers would concur with this.

Although Dr. Hoffman's Report is a helpful start in evaluating EC tolerances for local agriculture, it is technically deficient in too many aspects to be the basis of any decision to alter existing standards.

Section 5. The Draft Report's description of the approach recommended for evaluating water supply impacts requires more explanation by staff. First, it makes no reference to other existing conditions which affect flows. For example, decreased diversions may not be necessary given the regular transfers of water by upstream entities. Also, such things as HR 2828's requirement that the CVP decrease its reliance on New Melones (for meeting San Joaquin River objectives) will necessarily change the underlying conditions of flow. This statute, like the BO's should significantly change the baseline against which any changes are measured.

Second, the issue of what is the baseline is missing from the Draft Report. It appears to evaluate how various flows (percentages of unimpaired flows) in combination with meeting the current salinity standards the Draft Report results in certain water costs. However those conclusions are misleading. If the current conditions (or baseline) is (for example) 20% of unimpaired flow, then we know how much of that is attributed to salinity standards. However, requiring additional water for flow objectives only affects the amount needed for salinity control if accounting issues prevail. In other words, the results suggest smaller and smaller amounts are needed for salinity standards as more is given to meet flow standards. It is not clear that this approach gives us any useful information. It is just as reasonable to state that the same amount is need to meet the salinity standard under any flow regime, and thus increased requirements for flow objectives have nothing to do with current salinity standards.

These comments regarding accounting of flows are not meant to confuse the issues. It is possible that since the Hoffman Report suggests relaxing the salinity standards, there is an effort

Ms. Jeanine Townsend, Clerk to the Board

December 6, 2010

Page - 6 -

afoot to balance off "decreased" needs for salinity compliance with "increased needs for flow standards. It is not clear how accounting decisions will properly be used to describe impacts.

The Draft Report also makes the usual decision to ignore Friant releases and DMC recirculation as a source of San Joaquin River flow increases. Although the document attempts to clarify that these omissions/decisions are not binding on later analyses, it still reflects an unspoken policy of the SWRCB to avoid affecting exports. This Draft Report could just as easily made assumptions about decreased total exports by supplying additional River flows through recirculation.

It is not clear if the analysis' treatment of decreased diversions (its assumption to address additional flow needs) is correct. Diversions result in the consumptive use of water and the delay or loss of water back to the river. If the modeling assumes a decrease in diversion to offset a needed increase in flow, there must be a number of inputs to preserve the actual net change. It is not a 1:1 situation.

It would appear to be disingenuous to assume for any analysis that by decreasing diversions to take care of increased flow needs there will be no affect on reservoir storage. Clearly, additional flow needs ranging from approximately 500 TAF to 1500 TAF will have significant adverse effects on storage if the flows are derived from the tributaries to the San Joaquin River. It is possible that the lost storage will be recovered in future years, but seems unrealistic to assume greater flow needs will have no effect on storage.

No evaluation is complete or informative unless it shows how any changes in standards will affect River flow in such years as 2009. When the San Joaquin River flow is 500 cfs in July under "normal" conditions it is extremely important to see how a changes will affect this flow. An analysis of decreased downstream flows to provide increased river flows would necessarily affect river flows. The SWRCB seems to be on a course to have no flow in the River at some times.

The SDWA looks forward to participating in this process, and especially giving input to the eventual peer review process.

Very truly yours,



JOHN HERRICK

Enclosure

## **SOUTH DELTA WATER AGENCY**

4255 PACIFIC AVENUE, SUITE 2  
STOCKTON, CALIFORNIA 95207  
TELEPHONE (209) 956-0150  
FAX (209) 956-0154  
E-MAIL Jherlaw@aol.com

**Directors:**

Jerry Robinson, Chairman  
Robert K. Ferguson, Vice-Chairman  
Natalino Bacchetti  
Jack Alvarez  
Mary Hildebrand

**Engineer:**

Alex Hildebrand  
Counsel & Manager:  
John Herrick

September 14, 2009

Via E-Mail [commentletters@waterboards.ca.gov](mailto:commentletters@waterboards.ca.gov)

State Water Resources Control Board  
Division of Water Rights  
P. O. Box 2000  
Sacramento, CA 95812-2000

Re: Crop Salt Tolerance Study Report Comments

Dear Sir/Madam:

The following are the comments of the South Delta Water Agency to Dr. Glenn Hoffman's draft report of July 14, 2009 entitled *Salt Tolerance of Crops in the Sacramento-San Joaquin Delta*. This Report was prepared at the request of the State Water Resources Control Board as part of its review of certain water quality objectives, including the objectives to protect agricultural beneficial uses in the southern Delta.

Generally, the draft Report is a very good start to the process as it includes a comprehensive review of the current state of knowledge and a good evaluation of the various models being, or proposed for use. However, the draft Report is too narrowly focused and needs further work before it can be used a basis for reviewing or supporting changes to the current water quality objectives. These comments will include a discussion of the issues and facts which we believe are not adequately covered in the draft Report, and then specific comments to various sections in it.

Discussion of Inadequately Covered Issues and Conditions

The draft Report narrowly focuses on the salt tolerance of beans as the mechanism by which all southern Delta agriculture will be protected. Such a focus is not warranted due to the specifics of the southern Delta. The beginning point for any evaluation is to determine what is the end goal. Although the draft Report states that it seeks to review the data on impacts to crop productivity from the use of saline water, section 1.3 ends by noting it will "recommend a salinity guideline that could provide full protection of the most salt sensitive crop." The latter does not necessarily equate to the former if other factors affect crop salt tolerance or if the protection of the "most salt sensitive" crop differs significantly from the protections of other crops under varying conditions.

The salinity standard should protect all important South Delta crops, including different varieties of beans, alfalfa, first year asparagus, and tree crops. Each of these has a different planting season, different growing season, different root depth, different consumptive water needs and salt tolerance. Additionally, each crop has a different commercially practical percolative capability to convey applied water through the root zone to achieve adequate leaching fractions. They also have different surface soil temperature needed for germination, and a different range of plant sensitivity to salinity of soil moisture at different stages of growth, etc. The applied water quantity and salinity and timing for each crop must, therefore, first be determined. Only then can it be determined whether the same salinity standard can protect full yield of more than one crop at all times of the year. Experience shows that the needs of different crops will dictate the appropriate salinity standard at different times of the year. One cannot just consider beans which grow from May to September with a shallow root zone, without regard to other crops that have deep root zones and different rates of percolation, and must be irrigated at other times of the year.

Through no fault of Dr. Hoffman, the process that led to the draft Report seems to have been designed to determine the highest in-channel water salinity that would not destroy South Delta agriculture. The draft Report seems to assume that farmers can operate in accordance with an academic determination of what is feasible in field operation. It assumes that farmers need no margin in the salinity standard to allow for uncertainty in the report's analyses, or for problems which are largely ignored in the draft Report. These problems include;

- 1) The achievable leach fraction through and out of the root zone in alfalfa and tree crops depends on the percolative capacity throughout the deep root zone, and on the soaking time which is both available and non-damaging to the crop.
- 2) The existence of stagnant channel reaches whenever the flow into South Delta channels is less than consumptive use of water in the South Delta. No standard can be met in



stagnant reaches, and current monitoring points are not located to detect stagnant channel reaches.

3) The lack of adequate allowance for the fact that seedlings and young crop plants are more salt sensitive than established plants, and that it is typically very difficult to maintain soil moisture of low salinity the seedling root zone.

4) Allowance for the assumption that farmers should accept a reduced percentage of seedling emergence caused by soil moisture salinity. The report makes no analysis of possible abnormal distribution and/or reduced vigor of seedlings that then do emerge. There should be some allowance for the uncertainty this imposes on ultimate crop yield. The issue of the salt effects on emergence and seedling stage should be considered on the ultimate yield reduction, since that is a reality in the field.

Alfalfa not only has a large acreage, but is very important to supply San Joaquin County's many dairies. An examination of the specifics for alfalfa is instructive. Included herewith are three documents supporting the following discussion. They are entitled (i) *Typical Harvest and Irrigation Schedule for Alfalfa During June, July and August*, by Alex Hildebrand (ii) *Impact of San Joaquin River Quality on Crop Yields in the South Delta*, by Dr. Gerald Orlob, and (iii) *Outline of Testimony of Alexander Hildebrand on South Delta Agriculture* also by Mr. Hildebrand.

The Orlob paper includes a review of the data which shows that soils in the southern Delta have a wide range of permeability from rapid (>6 inches per hour) to slow (<0.2 inches per hour). The data shows that approximately 40% of the lands in the area are classified as "slow" permeability. This means that when water is applied, it soaks into and through the soil at a very slow rate; <0.2 inches per hour. Such extremely slow rates hamper the ability to achieve the leaching fractions discussed and assumed in the draft Report.

As set forth in the *Schedule* and in Mr. Hildebrand's draft testimony, the agricultural practices for alfalfa, when combined with the significant variations in soil permeability (both in the area and within individual fields) result in there sometimes being only enough "soaking" time during irrigation to satisfy the consumptive needs of the crop, with no effective leach occurring. Additional irrigation to achieve leaching is not commonly possible in these tight soils as the prolonged presence of the water can and does result in serious damage to the plant roots (such as anoxia and Phytopthera root rot). Hence, the local conditions simply preclude the ability to move enough water through the soils to leach the salts in the soils. To offset this, the salinity of the applied water must therefore be lowered so that the salinity of the soil moisture in the root zone does not rise above the threshold for full crop yield.

The draft Report assumes that a certain quality of water will move through the soil, and that there is sufficient time for it to do so. Since these assumptions are incorrect, the conclusions regarding what water quality is protective of agricultural uses is also incorrect.

A review of Dr. Orlob's paper and Mr. Hildebrand's writings shows that the leaching fraction in this instance is somewhere from 4-10%; well below the 20-25% assumed in the draft Report. In fact, Mr. Hildebrand's own experience using tensiometers on his fields indicates that sometimes no leach fraction is attained at all during summer months. We believe that all of this information has been previously provided to the SWRCB staff and/or Dr. Hoffman. If additional copies are needed, they can be easily provided.

A second issue complicating the ability to leach salts is the local ground water problem where the groundwater rises into the root zone. Although the draft report discusses ground water levels, the discussion does not appear to be completely accurate. The draft Report notes (on pages 46-47) that ground water levels are in most places 3-4 feet or more below the surface. The draft Report incorrectly discusses how crops may be able to use this shallow ground water, and also incorrectly discusses how the most salt-sensitive crops are shallow rooted, and thus not generally affected by the ground water. These are major errors.

In fact, ground water levels vary greatly depending on distance to the neighboring channels, and the relationship to sea level and tidal flows. In portions of the south Delta (northern and northwestern) the land is at and below sea level. Hence, without any ongoing drainage system at work, the ground water will rise to at or above the land surface. In addition, the shallow ground water is also of poor quality, being very saline; many times the current standards. Finally, there is a direct hydrologic connection between the waters in the neighboring channels and the ground water. This means that as the tides ebb and flow, the ground water rises and falls.

The result of these conditions is that salts which need to be leached from the root zone are constantly pushed up and down, in and immediately below the root zone. Here the salts collect and are repeatedly reintroduced into the very zone which needs to be flushed. Although there do not appear to be any published papers on this situation, discussions with area farmers are illustrative and uncontradicted. As the tide comes in, the shallow, poor ground water rises into the zone which needs to be leached of salts. The farmers regularly deal with salts being pushed up into or through the root zone where they are either flushed out with winter irrigation (when and if possible), or pushed away from the shallow roots of row crops through specific changes in irrigation practices. This situation certainly needs further study, but it is clear that "normal" irrigation practices will not result in the leaching of the salts. This problem is prevalent on Union Island, Fabian Tract, and Roberts Island. SDWA can coordinate meetings with Dr. Hoffman and

farmers with experience in these matters. We have already provided a written discussion of this authored by Mr. Hildebrand.

Important to this process is an acknowledgment of the historic water quality of the San Joaquin River. Per the 1980 Report of the Effects of the CVP on the Delta, pre-export project water quality in the San Joaquin River (before it entered the Delta) was always substantially better than the current standard. We are including the appropriate excerpts from that report. This information addresses the potential argument that area farming simply cannot be reasonably protected due to local circumstances. To the contrary, farming flourish for 100 years before the operation of the CVP, and now the SWP, severely impacted River water quality.

The issue of the standard applying throughout the channels, and not just at the current measuring locations is stipulated by the SWRCB and highlighted from the testimony of Chip Salmon (attached hereto), a local farmer.<sup>1</sup> A portion of the fields he manages/farms are irrigated with water from the east end of Grant Line Canal, which is a dead end channel. This channel does not have any net flow, but rather is filled (and to some degree) flushed through tidal action. Even with subsurface tile drainage and up to date practices, Mr. Salmon has and continues to suffer from crop damage to his grapes, walnuts, and of course beans. These permanent and deep rooted crops use significantly more water over a longer growing season than the bean season on which the draft Report focused, and thus indicate that an examination of other times of the year, and other achievable leaching fractions is required.

Mr. Salmon's testimony shows that very significant salt damage results from use of water with a quality in the range of the 700's to 900's EC. Grapes, and especially walnuts are deep rooted, permanent crops. It is clear that adequate leaching of salts from the root zone is not regularly possible using water quality above the current standard. At the very least, additional study is needed to determine the specifics of why these crops are not protected by applied water salinities of 700-900 EC. SDWA can coordinate a meeting with Dr. Hoffman and Mr. Salmon.

With regard to the needs of seedlings, the draft Report discusses and appears to adopt an acceptable percentage of seedling loss (10%; see section 3.2.2). It is not clear why such a significant loss would be the threshold, and further explanation is necessary. The draft Report does not examine effects on ultimate crop yields, which would seem to be a more appropriate yardstick. The draft Report indicates that many local crops at emergence and early growth stages need salinities below the current standard and recommends further study. However, the data

---

<sup>1</sup> Attached hereto is additional testimony including Alex Hildebrand's in a recent CDO hearing. We are also including the transcripts of the direct and cross-examination of Mr. Salmon and Mr. Hildebrand.

clearly indicates that the current standard is insufficient. This conclusion is not adequately high lighted.

Comments to Specific Sections of the draft Report.

- 1.3 Should add "adequate achievable leaching fraction" as an objective.
- 2.2.2 SAR of 2.4 but the Na to Ca is in excess of 3:1 indicating an infiltration problem in FAO 29 Rev 1. Page 60.  $3.2/0.94=3.4$
- 2.3.1 The values listed in Table 2.1 are for surface soils, not the limiting layer in the root zone. Should not the lowest permeability in the profile be used, especially for deep-rooted crops like alfalfa or trees?
- 3.1.2 Beans should not be the only crop taken into consideration when setting a standard which seeks to protect agriculture in general.
- 3.5 With regard to effective rainfall, the soil is not always devoid of vegetation during the winter or off season. Weeds increase the water loss to the atmosphere. Alfalfa and cover crops in orchards certainly have an ET during winter.
- 3.5.2 Table 3.6 deals with average rainfall. We suggest a comparison of the available data for Stockton, Modesto and Tracy for events, weekly and monthly totals be compared to the Table. The draft Report later mentions data from "Tracy-Carbona" area. Why is this data not used here or at least compared to the Table?
- 3.8.1 The report assumes that excess water is applied in some areas and provides runoff and deep percolation. This is not always the case; sometimes portions of the field are under irrigated. Most fields are disced after harvest and have no surface runoff.
- 3.8.2 The draft Report should better describe how it is believed that irrigation efficiencies can impact development of standards. Does this variable require more study?
- 3.10.2 Were some of these experiments conducted in climate controlled greenhouses? If so, how does this affect use of the data?
- 3.12.2 The ground water wells cited do not include areas with the shallowest ground water, and many are in areas which do not use channel water. [DMC water from exports is mostly composed of the fresher cross-Delta flows from the Sacramento River, with only a portion being from the San Joaquin River after it passes through the southern Delta.

Hence DMC quality is virtually always of better quality than that in the southern Delta channels.] As stated above, many ground water areas are subject to regular and significant fluctuations due to the tidal effects. These effects in some areas hold the salts in the soils and frustrate leaching and flushing. CDWA previously provided a DWR study indicating that the area acts as a salt reservoir during the growing season. These salts are trapped between and in the root zone and the shallow ground water.

If a study with 9 wells was deemed insufficient to draw generalizations, why was the 10 well study more reliable?

3.13.1 The draft Report discusses salts dissolved from the soils and added in fertilizers. Are not most "original" or natural salts in the soils long ago removed from 100+ years of irrigation? Are there any studies which indicate or quantify the amounts of salts added by fertilizers as compared to the salt load introduced by export operations?

3.13.2 Given the lack of confidence in the *Chilcott, Montoya, and Meyer* data, can South Delta leaching fractions be estimated with any degree of confidence? The *Chilcott* data (Table 3.18) appears to come mostly from wells in areas which receive DMC water, and which are not dependent on in-channel quality. In addition, they are mostly in the area with the lowest ground water, and thus not subject to the problem of tidal influenced ground water fluctuations. Hence, this data cannot be used to calculate leaching fractions for the pertinent areas of the southern Delta.

It is doubtful that the *Montoya* report of 2007 can be used for any purposes associated with Dr. Hoffman's review. The report is an attempt to identify the "sources" of salts in the southern Delta channels, but makes no mention or analysis of the salt loads or concentrations entering the system from the San Joaquin River. It attempts to identify agricultural discharges as "sources" of salt load and concentration, when in fact virtually all of the salt originated from the activities of the CVP in upstream areas.

More importantly, the report is a synthesis of old information and is not current or reliable. It estimates agricultural drainage from the area based on 50 year old data, not using current DWR modeling of the amounts. Even that old data is based on limited power data and cannot be seriously considered accurate for any purposes. With regard to the salinity data, the report relies exclusively on a Central Valley Regional Water Quality Control Board study during 1986-87. Most of the data is from an 18 month period, with minimums, maximums and median numbers given for EC. There is no explanation of associated irrigation, drainage, rainfall or other conditions which would indicate whether the numbers given are typical or representative of general conditions in the area. Without confirming, it appears that the period of data covers the time frame between a wet year

and the beginning of the 6 year drought. Important for our purposes, the draft Report of Dr. Hoffman uses these numbers to calculate an average drainage EC, and from that, average leach fractions. This data cannot be used for such purposes as it does not show the quality of water which has leached a field. In addition, drainage water quality is extremely dependent on location, source of applied water, and ground water depth. Some of the areas/drains cited would include none of the water which percolates down to the ground water. This of course would mean the drainage water is mostly excess applied water, and again would not allow one to calculate a leaching fraction. Without specific diversion/drainage/ground water data, leaching information simply cannot be calculated.

The draft Report mentions leaching fractions from 0.05 to 0.10, to 0.15 or greater. However, the Report then uses the higher end of the ranges in later calculations of needed water quality.

#### Modeling

The modeling analysis suggests that further workshops are necessary before considering the use of the dynamic models over the static ones. It is important to note that input for any of these models is the key. For example, the *Letey* model predicted that the standards could be raised to 1000 EC. However, that prediction was based on achieving a leach fraction well above those referenced immediately above, or suggested by the discussions above.

We hope this information and our offer to coordinate further meeting between Dr. Hoffman and local farmers will result in a more comprehensive evaluation of what is needed to protect southern Delta agriculture. The draft Report, and ultimately any decision regarding the SWRCB's review of standards must recognize that the existing conditions in the area simply do not allow adequate leaching of soils containing the introduced salts when the applied water has an EC above the current standard of 700 EC. Please feel free to contact us regarding the scheduling of additional meetings.

Very truly yours,

  
JOHN HERRICK

**Attachment to SDWA Comments**

Typical Harvest and Irrigation Schedule for Alfalfa During June, July, and August

Impact of San Joaquin River Quality on Crop Yields in the South Delta by G. T. Orlob

Outline of Testimony of Alexander Hildebrand on South Delta Agriculture

Testimony of Alex Hildebrand Hearing on Proposed Cease and Desist Order to DWR and USBR

Testimony of William "Chip" Salmon

Excerpts from November 7, 2005, Hearing Transcripts

Excerpts from November 17, 2005, Hearing Transcripts

Excerpts from November 18, 2005, Hearing Transcripts

Excerpts from November 21, 2005, Hearing Transcripts

Portions of Report on the Effects of the CVP Upon the Southern Delta Water Supply  
Sacramento-San Joaquin River Delta, California.