CV-SALTS Technical Advisory Committee Meeting

When: Thursday, September 12, 2013 from 1:00 to 3:00 PM
Location: Teleconference
Conference #: (218) 339-4600 Participant Code: 927571#

Agenda

1. Welcome and Introductions
   Approve action notes from August 14, 2013

2. City of Live Oak Site-Specific Salinity Study Work Plan, Revised Letter for TAC Approval – Richard Meyerhoff - 10 minutes
   - Letter (with track changes), Letter (clean)
   - Attachment (with track changes), Attachment (clean)

3. City of Dixon, Site-Specific Boron Objective Study Work Plan – Richard Meyerhoff and Joe DiGiorgio (Stantec) - 30 minutes

4. SSALTS Project Update/Discussion – Roger Reynolds and Tom Quasebarth, CDM Smith – 30 minutes
   - SSALTS Task 1-4
   - Table Handout (11 X 17) - Table Handout (8 X 11)

5. Lower San Joaquin River Committee – Project Update, Michael Johnson – 15 minutes

6. Other CV-SALTS Project/Contract Updates – As needed Status Updates - 10 minutes
   a) ICM Report
   b) Phase II Conceptual Model
   c) GIS Services
   d) Agricultural Zone Mapping
   e) Aquatic Life Study
   f) Tulare Lake MUN Archetype

7. MUN POTW Archetype - Jeanne Chilcott – 5 minutes
   - TAC MUN Contract Award

8. Next Meeting/Call Preliminary Date: October 15, 1 – 3 pm

One or more Central Valley Regional Water Quality Control Board members may attend.
CV-SALTS Technical Advisory Committee Meeting ACTION NOTES

Convened: Wednesday, August 14, 2013 from 1:00 to 3:00 PM
Participants: Nigel Quinn (Chair), Karen Ashby, Barb Dalgish, Debbie Webster, Joel Herr, Vicki Kretsinger, Richard Meyerhoff, Roger Reynolds, Bruce Houdesheldt, Mike Johnson, Diane Barclay, Dylan Boyle, Tom Grovhoug

Agenda

Item 1: Welcome & Introductions
- Roger Reynolds moved to approve, and Mike Johnson seconded, and by general acclamation the Meeting Action Notes from June 19th were approved.

Item 2: City of Live Oak Site-Specific Study Work Plan, Letter with Recommendations for TAC Approval
- After discussion, Roger Reynolds moved, and Mike Johnson seconded, and by general acclamation the letter with recommendations was approved, and will be forwarded to the Executive Committee for review and approval at the August 15th Policy Session.

Item 3: ICM Report: Discussion of Key Findings and Technical Issues
- Karen Ashby provided an introduction to the discussion. Per Karen, most comments received have been addressed. John Dickey is still working on a couple of appendices that will be added. The LWA team is currently focusing on doing a final cleanup and will then conduct a full technical edit.
- Vicki Kretsinger led the discussion on the Key Findings and Technical Issues.
- Per Richard Meyerhoff, once all comments are addressed and technical edit complete, the Final ICM Report and Comment/Response (C/R) summary will be submitted to the Project Committee for a final review.

Item 4: Phase II Conceptual Model Draft Scope of Work
- Richard Meyerhoff presented the draft Scope of Work. The Scope of Work was based on recommendations received from the Executive Committee at the 6/20 Policy Session.
  - In response to comments from Roger Reynolds and Nigel Quinn on the possible development of a Management Zone Archetype for salts, Richard will put in a placeholder for a west side archetype.
  - In response to Debbie Webster’s inquiry about out-of-valley-floor areas, Richard indicated that would be added to the bulleted list of items on page 7 of the scope.
  - Nigel inquired as to how the database will be made available as a resource for future access. Richard indicated that should be incorporated into Task 2.
  - Additional comments should be forwarded to Richard NLT Wednesday, August 21.
- Per Richard, San Joaquin Valley Drainage Authority has distributed a letter of interest for proposals on Phase II. The timeline going forward will depend on the number of respondents. If only one team is interested an RFQ will not be necessary and the process can move directly to the workplan phase.

Item 5: Other CV-SALTS Project/Contract Updates
- The following written project updates were provided:
  - Technical Project Status Updates – Richard Meyerhoff
  - MUN POTW Project – Jeanne Chilcott
  - Additional Technical Project highlights from Richard:
    - GIS Services – Final Task 4 Report expected 8/14 from Sevim Onsoy, will be sent to Project Committee for review.
    - Ag Zone Mapping – Richard and Daniel Cozad have been providing internal comments; latest version was received Monday, August 12. If all comments have been addressed will go to Project Committee this week.
Item 5: Other CV-SALTS Project/Contract Updates – (continued)
  ▪ Aquatic Life Study – Comments received from Dennis Westcot on 8/11 have been forwarded to Dr. Buchwalter.
    o SSALTS – Roger Reynolds provided an update. The project team is still moving forward on responding to comments received on Task 1.3. Next step will be preparation of Draft Phase 1 Report for review.
    ▪ Nigel Quinn requested that an SSALTS Status Report be included as a regular agenda item on the next TAC agenda, to include: a review of tasks, delineation of areas, and discussions on tie-in with ICM work.

Item 6: Next Meeting/Call
  • The next Technical Advisory Committee Meeting is tentatively set for September 12th, from 1-3 PM.
CENTRAL VALLEY SALINITY ALTERNATIVES FOR LONG-TERM SUSTAINABILITY (CV-SALTS) TECHNICAL ADVISORY COMMITTEE RECOMMENDATIONS REGARDING THE CITY OF LIVE OAK’S SITE-SPECIFIC SALINITY STUDY WORKPLAN (ORDER No. R5-2011-0034)

On May 17, 2013, the CV-SALTS Technical Advisory Committee (TAC) reviewed and discussed the Site-Specific Salinity Study Work Plan and Time Schedule submitted under Order No. R5-2011-0034, as it related to ongoing CV-SALTS evaluations to determine appropriate salinity water quality objectives to protect agricultural supply water. A summary of key discussion points and recommendations are provided below with more detail noted in Attachment 1.

- **Selection of Study Area:** Use of the Vicinity Basis method appears appropriate provided cropping patterns are compared with the Local Basis study area as proposed.
- **Selection of Most Sensitive Crop:** More detailed information on the cropping pattern for the 900-acre Vicinity Area should be provided
- **Effective precipitation:** Clarify basis for estimating “normal” effective precipitation
- **Leaching Requirement:** The factor used is extremely conservative and provides a significant margin of safety

Additional discussion revolved around the focus of the Workplan on the use of an annual average of the water quality data to evaluate compliance with a water quality objective or effluent limitation to protect irrigated agriculture. Given the seasonal nature of crop irrigation, shorter averaging periods may be appropriate. **While a final policy recommendation regarding this issue will be developed by the CV-SALTS Executive Committee, TAC discussions have included monthly, 30-day rolling, and seasonal and annual averaging as potential options.** The TAC will provide a conduct-technical recommendation evaluation of averaging periods as they may apply to protection of the AGR beneficial use. Their recommendation-findings from this evaluation will be provided in a subsequent letter.

In summary, the Committee recommends that the City of Live Oak provide additional information as noted above before a determination that an EC of 1,100 umhos/cm is fully protective of the AGR beneficial use in the area potentially impacted by the City’s effluent. **In addition, the Committee will provide a technical recommendation regarding averaging periods in the near future.**

Sincerely,
Parry Klassen  
Chair, CV-SALTS Executive Committee  

Nigel T. Quinn  
Co-Chair, CV-SALTS TAC  

Cc: Ken Landau, Central Valley Regional Water Quality Control Board  
Jeanne Chilcott, Central Valley Regional Water Quality Control Board
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In summary, the Committee recommends that the City of Live Oak provide additional information as noted above before a determination that an EC of 1,100 umhos/cm is fully protective of the AGR beneficial use in the area potentially impacted by the City’s effluent. In addition, the Committee will provide a technical recommendation regarding averaging periods in the near future.

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Attachment 1  
CV-SALTS Technical Committee Comments and Recommendations  
Site-Specific Salinity Study Workplan and Time Schedule  
City of Live Oak: Order No. R5-2011-0034  
Reviewed May 17, 2013

**Background:** The City of Live Oak (City) is a small economically disadvantaged community with a population of 8,500. The annual average EC of effluent discharged from the City’s new tertiary treatment plant (826 umhos/cm) exceeds the 700 umhos/cm trigger specified in their Order. Per the Order’s requirements, the City submitted a workplan to evaluate salinity concentrations needed to protect agriculture irrigation supply (AGR) in areas that may be impacted by the effluent. The effluent currently flows into Reclamation District 777 Lateral Drain No. 2 prior to Lateral Drain No. 1 which in turn flows into the East Interceptor Canal and then to the Wadsworth Canal before ultimate discharge to the Sutter Bypass. Based on the initial workplan findings, the City concludes that the annual average effluent EC of 1,100 umhos/cm is protective of the AGR beneficial use and has requested that any additional work be reduced or eliminated.

Central Valley Water Board staff received the workplan on 13 March 2013 and requested input from the CV-SALTS Technical Committee on adequacy of the plan and findings.

**Workplan Summary:** As part of the workplan, the City proposed a recommended study area to represent the area that may be impacted by the effluent and evaluated permitted and actual diversions from the two laterals for agricultural irrigation, the areas’s 2004 Crop Survey and the Western Fertilizing Handbook to determine cropping patterns and most salinity sensitive crop. The workplan also conducted a very preliminary “example determination of site-specific agricultural water quality objectives” using both the 40-30-20-10 (arithmetic) model and exponential model with the following inputs: a 244-day growing season, annual crop ET of 34.88 in., monthly average ET from bare soil at 0.7 in. per month; effective precipitation of 14.68 in. (assumed for normal irrigation season); leaching fractions of 0.07 and 0.10; and supply water at both 826-umhos/cm (2012 average effluent concentration) and 1,100-umhos/cm (final permit effluent limitation). The following notes the CV-SALTS Technical Committee comments/recommendation on some of the assumptions and estimates used in the workplan.

**Selection of Study Area:** The workplan notes three potential basis for study area selection: Vicinity; Use; and Local. The proposed area is Vicinity based (900-acres directly adjacent to the lateral drains for 1.25 miles downstream of the effluent discharge) with a cursory review of the Local area (approximately 7,780-acres of which 6,420 were surveyed as agriculture in DWR’s 2004 crop survey). If the effluent was evenly distributed over the 900-acres for 6-months, it would provide approximately 10-inches.

**TAC Comment:** A map of study area represented by the Vicinity Basis method is needed; however, selection of this method for delineating the study area appears to provide an adequate “worst-case” area for reviewing potential effluent impacts. The TAC concurs with the inclusion of a process that compares the cropping pattern represented by the Vicinity Basis method with the Local Based study area.

**Selection of Most Sensitive Crop:** The City used the DWR’s 2004 crop survey and 1995 Western Fertilizer Handbook to determine that plums (prunes) were the most salt sensitive crop grown in the area. The workplan provided a very generalized table of percentages of crop types (fruits/nuts; rice; field crops; etc.) in Table 1. Current evaluations conducted as part of the CV-SALTS AGR Zone Study are evaluating cropping patterns over a five to 10-year period and specifically identifying crops that make up 95% of the agricultural production.

**TAC Recommendation:** Since selection of the most sensitive crop is the most critical element of any evaluation, more detailed information on the cropping pattern for the 900-acre Vicinity area should be provided—by specific crop percentage over at least the last five years rather than relying only on data from 2004. Current information
does not clarify whether the Vicinity Basis study area is primarily orchard or whether it currently rotates cropping patterns. Some of this information may have been collected for CV-SALTS as background for the Central Valley AGR Mapping Zone study.

Effective Precipitation: The City used mean monthly precipitation from the Marysville COOP station and estimated 25% of the rainfall as runoff, with adjustments for the non-growing season and annual crop ET and 0.7 in/mo. bare soil ET. While the methodology was clear, it was not clear whether the numbers cited are from one year, average of multiple years, or some other calculation of a “normal” rainfall year.

TAC Recommendation: Clarify basis for estimating “normal” effective precipitation.

Leaching Fraction: The City uses the published leaching requirement of the crop (7%) and a slight adjustment to 10% as inputs for both the arithmetic and exponential models.

TAC Comment: Use of the leaching requirement of the crop is an extremely conservative input and likely does not represent actual water management capabilities of the local growers (unless they are using a highly managed drip or micro-sprinkler system). The City should have the option to consider identifying typical irrigation methods in the Vicinity Basis study area and determining whether the 15% leaching fraction currently being considered as a default by CV-SALTS more accurately represents anticipated practices.

Annual Averaging: The document focuses on annual average EC concentrations.

TAC Comment: The focus on use of an annual average of the water quality data for evaluating compliance with a water quality objective or effluent limitation likely is an artifact of the wording of the overall effluent limitation as an annual average. Protection of the AGR use has also been evaluated using monthly water quality data or 30-day rolling average concentration data (e.g., Vernalis objective in the Lower San Joaquin River). These shorter averaging periods take into account the seasonal nature of crop irrigation. Given the importance of this issue, the TAC will conduct a technical discussion evaluation of averaging periods and provide to prepare a recommendation for use of averaging periods to ensure protection of the AGR beneficial use. It is recommended that the project proponent participate in this discussion evaluation. The final recommendation findings from this evaluation will be provided to the Central Valley Water Board in a subsequent letter. The permit itself contains the following wording:

Salinity/EC Site-Specific Study. If, after one year following construction of the tertiary Facility, the effluent EC level is greater than 200 μmhos/cm for the annual average EC discharge, the Discharger shall complete and submit to the Central Valley Water Board a report on the results of a site-specific investigation of appropriate EC levels to protect the beneficial uses of the receiving water (i.e., AGR and MUN). For protection of the AGR beneficial use the study must consider how climate, soil chemistry, background water quality (surface water and groundwater), rainfall, and flooding affect salinity (EC) requirements necessary to protect the AGR beneficial use. The study shall include, at minimum, the following:
- The most salt-sensitive crops in areas irrigated with Reclamation District 777, Lateral Drain No. 1 or Lateral Drain No. 2 waters in the vicinity of the discharge under reasonable worst-case conditions.
- The sodium adsorption ratio of soils in the affected area.
- The alkalinity of soils to whether site specific conditions would reduce fluoride impacts.
- The effects of rainfall and flood-induced leaching; and
- The background receiving water quality.

Based on these factors, as well as economic and environmental impacts (such as increased irrigation water usage, groundwater hydraulics and degraded water quality), the study shall recommend site-specific numeric values for EC that provide reasonable protection for the agricultural supply use designation in the receiving water.

Ultimately, protection of AGR may be better met utilizing a monthly, 30-day rolling or seasonal average; however, an annual average may be appropriate as well. Selection of an appropriate averaging period for protection of the AGR beneficial use is an ongoing subject of discussion by the CV-SALTS Executive Committee. It is recommended that the project proponents monitor the ongoing CV-SALTS discussions in this area.
Attachment 1
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Site-Specific Salinity Study Workplan and Time Schedule
City of Live Oak: Order No. R5-2011-0034
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1.0 INTRODUCTION

The City of Dixon Wastewater Treatment Facility (WWTF) treats municipal wastewater produced in the City of Dixon in Solano County, CA. The potable water supply for the City is comprised of groundwater that is generally considered mineral rich and hard, resulting in widespread water softening in the area. The natural occurring and softener salts as well as salt additions attributed to public use are currently concentrated in the City’s wastewater due to the significant evaporative losses associated with pond treatment. This has historically resulted in the potential for salinity related impacts to the local groundwater from the land discharge disposal of the effluent from the WWTF.

The WWTF is located south of the City of Dixon in a largely agricultural area, and disposes of its wastewater through discharge to slow rate evaporation and percolation basins. Historically, they have also used the WWTF effluent for irrigation; however, irrigation with effluent has ceased due to the significant increase in salinity of percolated water associated with that practice. Although salt loads are relatively unaffected by the historic, current, and proposed future treatment and disposal operations, the salinity load will be dramatically lessened (i.e. halved) by best practicable treatment and control (BPTC) improvements that target the dominant driver, or source, of salinity: evaporative losses of water.

The most sensitive constituents of concern for the City of Dixon are sodium, chloride, and boron with respect to their effects on the agricultural beneficial use of the groundwater resources. A summary of the relevant water quality for these constituents for the WWTF is presented in the following table:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Potable Water</th>
<th>Raw Wastewater</th>
<th>Proposed Project Discharge</th>
<th>Future Project Discharge</th>
<th>Currently Proposed Site Specific Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>55</td>
<td>140</td>
<td>170</td>
<td>200</td>
<td>190</td>
</tr>
<tr>
<td>Chloride</td>
<td>15</td>
<td>110</td>
<td>130</td>
<td>160</td>
<td>180</td>
</tr>
<tr>
<td>Boron</td>
<td>0.50</td>
<td>0.67</td>
<td>0.80</td>
<td>1.0</td>
<td>0.70c</td>
</tr>
</tbody>
</table>

a- Planning values, to account for long term degradation of water supply and mandated water conservation.
b- Based on background water quality data from a network of first recoverable groundwater monitoring wells and statistical analyses.
c- Local Background value approx. 0.6 mg/L, default agricultural WQO noted.
The receiving water of concern is the shallow groundwater including its potential to affect the deeper production aquifer. The beneficial use of the aquifer for agricultural irrigation provides the most stringent default water quality objectives for salinity related constituents. For all constituents of concern except boron, the background water quality provides a basis for a site-specific discharge limit that is attainable through BPTC. For boron there is a need to justify a higher limit than the default agricultural water quality objective to ensure compliance with a site specific discharge limit. The purpose of this work plan is to identify a study method to determine such a site specific boron objective in the vicinity affected by the WWTP’s discharge.

2.0 STUDY AREA

The study area should be comprised of an area that could reasonably be expected to use groundwater affected by effluent from the WWTP. To this end, the Regional Board staff has recommended the study area encompass a 1 mile extent around the WWTP and its disposal areas. This study area is depicted in Figure 1.

Note: While there may be complex hydrogeologic flow paths depending on the heterogeneity of the soils and local pumping and surface water irrigation practices, it is generally expected the most likely directly affected production aquifers would be located on the down gradient (SE) direction from the WWTF.

Excluding the area covered by the WWTF, this results in a local study area of approximately 6,800 acres, which would have an annual crop demand of approximately 10,000 million gallons based on annual average reference evapotranspiration from the Dixon CIMIS station. The amount of irrigation water applied is likely much greater than this volume due to irrigation efficiency and salinity management (i.e. leaching fraction), and the percolated volume from crop irrigation could be as high as approximately 3,000 million gallons. In contrast, the future project discharge will result in approximately 350 - 700 million gallons of effluent percolating into the groundwater, under existing and general plan build-out conditions. Since the effluent has the potential to fulfill less than 10 percent of the study area’s crop demand, this local study area appears conservatively large enough to address significant impacts from the WWTF’s discharge. Furthermore, local irrigation has a greater potential (i.e. more than four times that of effluent) to control groundwater quality than the WWTF’s discharge.

However, to address the issue of not knowing the exact areas that the WWTF discharge will effect, the work plan, in addition to crops grown in this local study area, will also address concerns from the Dixon Resource Conservation District (RCD) regarding impacts to the “million dollar crops” listed in their Long Range Plan, that have historically been grown down gradient of the WWTF. The “million dollar crops” list is actually based on the value of crops generated in the entire County during 1999 and 2000, and some of the crops may not be grown in the RCD and/or in the vicinity down gradient of the WWTF.
Figure 1  Study Area based on one mile buffer around wastewater treatment and disposal facilities.
3.0 AVAILABLE INFORMATION SOURCES

The site specific boron water quality objective for agricultural use should be based on agricultural practices, available irrigation source water quality, existing soil conditions, and climate. These are the same factors that have played a pivotal role in shaping the types of agriculture occurring in a region, since the crops growing in an area have been selected over time based on suitable performance in the environmental conditions given available agricultural technologies to control those environmental conditions. This section addresses sources of information that will be used to evaluate the susceptibility of crops grown in the study area to impairment from boron.

3.1 Agricultural Practices

City staff has conducted a comprehensive survey of the parcels within 1 mile of the WWTP that includes current crop(s) and planned future crops, irrigation method and source, and general drainage patterns. Additional crop types of regional significance have been compiled by the Dixon RCD and Solano County. The California Department of Water Resources (DWR) conducted land use surveys of Solano County in 1994 and 2003, which identified crops grown and irrigation methods in individual fields during those years. These sources of information will be used to document agricultural practices in the area.

Other pertinent agriculture practices which help reduce impacts from salt, and therefore boron, include artificial drainage, adjustments to leaching fraction, soil amendments, and supplemental (i.e. higher quality) irrigation water, if available. These practices are more difficult to characterize and quantify, primarily due to individual farmers experience with, and application of, these practices. Generally, the best source of this information is from discussions with local Cooperative Extension agents, resource conservation districts, and/or irrigation districts. Therefore, the study will solicit such input from the Dixon RCD.

3.2 Water Quality

The irrigation water quality is a major factor in crop selection as well as determining the extent of salinity management necessary, since long term productivity requires matching crop needs to available resources. Irrigation water in the study area appears to be a mixture of several sources. Relatively high quality surface water from Lake Berryessa is supplied by Solano Irrigation District (SID) in areas up gradient of the WWTF, this supply is augmented by local groundwater and control of previously used drainage water. In the vicinity of and down gradient from the WWTF the irrigation supply is largely individual wells and some reuse from the Dixon drainage system operated by Dixon RCD. Water in the drainage canals includes SID tail water with increasing amounts of local groundwater and previously used drainage water as one proceeds down gradient.

The average quality of the irrigation water near the WWTF is currently unknown. Most farms use groundwater for irrigation supply, although there is significant recapture of tail water in the area. Recent studies have shown the shallow groundwater to be highly variable near the WWTP, and
the agricultural well water also exhibits significant variability, although they have not been as extensively characterized. Available SID reports and the available groundwater reports will be reviewed to identify irrigation water quality in the area. We will also obtain water quality information that may be provided by the local farmers.

### 3.3 Soils

The ability to manage salts in crop production is dependent on the types of soils found in an area. Some soils are naturally salt affected and are of limited productivity even under intense management, while others can become anthropogenically salt affected and require varying degrees of management based on individual physical and chemical properties of the soils. An understanding of natural soil conditions as well as the susceptibility of soils to degradation by the accumulation of salts is an essential component in establishing salt related water quality objectives and the associated salinity management necessary for that water quality. The Soil Survey of Solano County prepared by the Soil Conservation Service (NRCS) in 1977 provides the most comprehensive assessment of soils in the area and will be used to identify soil types and salinity management related aspects of those soils.

In addition to typical salinity management concerns, soil properties can affect the amount of boron in solution and available to plants. Boron adsorption capacity varies with soil pH, texture, mineralogy, and organic matter content, and a portion of the adsorbed boron resists desorption in some soils (Gupta et al, 1985). Additionally, the presence of calcium, nitrogen, and potassium can affect plant uptake as well as expression of boron deficiency and toxicity symptoms. Available literature will be reviewed to assess, at least qualitatively, the ability of area soils to buffer the concentration of boron in the soil solution and ameliorate detrimental effects on crops.

### 3.4 Climate

Similar to other salinity parameters, climatic factors affect boron toxicity, generally through the inducement of moisture stress. Ferreyra et al. (1997) partially attributed a milder climate in Chile to greater crop yields than predicted by salinity and boron thresholds developed largely at the USDA Agricultural Research Station (Salinity Lab) in Riverside, CA. In addition, the contribution of seasonal rainfall to irrigation demand and/or flushing of salts from the root zone affect the amount of applied boron that is retained in the soil. Local climatic data will be reviewed and used to assess boron loading and where applicable any discrepancies with reported tolerance studies. Average year rainfall amounts will be used to calculate loading and/or leaching of boron.

Flooding is generally tied to climate and controlled by topography. The potential for flooding in the area will be reviewed to determine if substantial volumes of stormwater are contributing to irrigation demand and/or flushing the soils.
4.0 CROP BORON TOLERANCE

Although the study will attempt to identify additional information on boron tolerance, this subject is the primary determinant of an agricultural based water quality objective and warrants further discussion. Unfortunately, there is not a multitude of crop response data for boron, and direct yield relationships have only been developed for a few crops. Most of the published boron tolerance of crops is based on research done by Frank Eaton in the 1930’s and 1940’s. The occurrence of boron in irrigation water and occurrence of crop toxicity in the San Joaquin Valley were presented in Eaton, 1935 along with a relative rating of various crops based on boron tolerance. The experiments consisted of growing the crops in sand columns irrigated with solutions containing various levels of boron, and primarily noting visible toxicity symptoms. Since visible symptoms of toxicity do not always correlate to a reduction in yield, Eaton’s rating, which forms the basis for boron tolerance data presented by Ayers and Westcot (1976) in the FAO Irrigation and Drainage Paper 29, does not relate directly to yield. Similarly, E.V. Maas (1990) relies on Eaton’s ratings for crops where additional studies have not been conducted; however, in the cases where additional studies have been conducted, several do not relate directly to yield. The available information for boron tolerance adapted from E.V. Maas (1990) for crops grown, or potentially grown, in the area is presented in Table 2.

The limiting thresholds appear to be for orchards (e.g. fruit and nuts) and grapes; however, these crops have not been typically grown in the local area historically. Of the prevalent crops identified as being grown within one (1) mile of the WWTP, sunflower and wheat appear to have limiting thresholds of 0.75 to 1 mg/l, and only the wheat yield response to boron has been studied sufficiently to allow for calculation of yield at increasing boron concentrations. Although pasture has limited information available, it is assumed that pasture would not be less tolerant than wheat, since grass species diversity in a pasture is based on adaptation to the environmental conditions, and boron concentrates in the leaf tips, which are continuously removed in a pasture.

Alongside the lack of a direct yield relationship for most crops, there is significant genetic variability in boron tolerance. This has largely played out in the selection of rootstocks for citrus and stone fruits that limit boron uptake in regions where boron toxicity is anticipated. Additionally, some wheat and sunflower cultivars are more tolerant than others and the thresholds listed in Table 2. Moreover, there are regions where boron is naturally elevated and agriculture production continues, suggesting some of these boron thresholds may be more stringent than necessary to protect the beneficial use.
Table 2. Boron Tolerance of Crops Potentially Grown Near the City of Dixon’s WWTP.
(tolerance data adapted from E.V. Maas, 1990)

<table>
<thead>
<tr>
<th>Crop</th>
<th>$Million Crop&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Area of Crop Survey&lt;sup&gt;b&lt;/sup&gt; (%)</th>
<th>Threshold (mg/L)</th>
<th>Slope (% per mg/L)</th>
<th>95% Yield (mg/L)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>Y</td>
<td>35.5</td>
<td>4 to 6</td>
<td>NA</td>
<td>NA</td>
<td>- Based on other <em>Prunus</em> species.</td>
</tr>
<tr>
<td>Almonds</td>
<td>N</td>
<td>1.7</td>
<td>0.5 to 0.75</td>
<td>NA</td>
<td>NA</td>
<td>- Almond root stocks are more tolerant than other <em>Prunus</em> species</td>
</tr>
<tr>
<td>Beans</td>
<td>Y</td>
<td>--</td>
<td>0.75 to 1.0</td>
<td>NA</td>
<td>NA</td>
<td>- Based on Mung, Kidney and Lima.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Snap beans have a yield response with threshold of 1 mg/l and 95 % yield of 1.4 mg/l.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Based on area of field crops, beans could potentially be grown w/in 1 mile of WWTP</td>
</tr>
<tr>
<td>Corn</td>
<td>Y</td>
<td>18.4</td>
<td>2 to 4</td>
<td>NA</td>
<td>NA</td>
<td>- Most vineyards are in North West part of Solano County.</td>
</tr>
<tr>
<td>Grapes</td>
<td>Y</td>
<td>2.3</td>
<td>0.5 to 0.75</td>
<td>NA</td>
<td>NA</td>
<td>- Eaton 1935, listed pears as sensitive similar to plum (0.5 to 0.75 mg/L)</td>
</tr>
<tr>
<td>Pasture (Range and Irrigated)</td>
<td>Y</td>
<td>20.9</td>
<td>no info</td>
<td></td>
<td></td>
<td>- Available info on pasture species indicates MT (threshold &gt; 2mg/L).</td>
</tr>
<tr>
<td>Pears</td>
<td>Y</td>
<td>--</td>
<td>--</td>
<td>Not presented</td>
<td></td>
<td>- Eaton 1935, listed pears as sensitive similar to plum (0.5 to 0.75 mg/L)</td>
</tr>
<tr>
<td>Prunes</td>
<td>Y</td>
<td>--</td>
<td>0.5 to 0.75</td>
<td>NA</td>
<td>NA</td>
<td>- Based on Sorghum</td>
</tr>
<tr>
<td>Safflower</td>
<td>Y</td>
<td>--</td>
<td>--</td>
<td>no info</td>
<td></td>
<td>- Eaton, 1935 listed native sunflowers as the most semi tolerant (2 to 4 mg/L)</td>
</tr>
<tr>
<td>Sudan Grass</td>
<td>Y</td>
<td>5.9</td>
<td>7.4</td>
<td>4.7</td>
<td>8.5</td>
<td>- Based on Sorghum</td>
</tr>
<tr>
<td>Sunflower</td>
<td>N</td>
<td>15.1</td>
<td>0.75 to 1.0</td>
<td>NA</td>
<td>NA</td>
<td>- Eaton, 1935 listed native sunflowers as the most semi tolerant (2 to 4 mg/L)</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>Y</td>
<td>14.6</td>
<td>5.7</td>
<td>3.4</td>
<td>7.2</td>
<td>- Based on Sorghum</td>
</tr>
<tr>
<td>Walnuts</td>
<td>Y</td>
<td>--</td>
<td>0.5 to 0.75</td>
<td>NA</td>
<td>NA</td>
<td>- Based on Sorghum</td>
</tr>
<tr>
<td>Wheat (dry and irrigated)</td>
<td>Y</td>
<td>12.3</td>
<td>0.75 to 1.0</td>
<td>3.3</td>
<td>2.27</td>
<td>- 95 % yield based on 0.75 mg/L threshold</td>
</tr>
</tbody>
</table>

<sup>a</sup> Dixon RCD list of million dollar crops is based on entire Solano County data from 1999 and 2000. Nursery Stock and Livestock were excluded from this table.

<sup>b</sup> From the City’s Survey of fields within 1 mile of WWTP, includes future crop types and double cropping which causes the same acreage to be counted for multiple crops.
5.0 DETERMINATION OF SITE-SPECIFIC AGRICULTURAL WATER QUALITY OBJECTIVES AND EFFLUENT LIMITATIONS

The first step in establishing a site specific agricultural water quality goal for boron is to identify significant (e.g. greater than five percent of study area) crop types in the study area. This will largely be derived from the City’s survey of the fields within one mile of wastewater treatment and disposal facilities. Crops of regional significance will be addressed primarily through a review of DWR crop survey data in the down gradient vicinity of the treatment plant. Where additional crops are identified as being significant from the crop surveys, they will be added to the list of crops. Available boron tolerance thresholds will be used to rank the significant crops by tolerance, and the most sensitive crop will be selected as the limiting crop. Based on varying agriculture practices and growing seasons, multiple crops may be selected to identify water quality objectives.

The second step includes establishing an acceptable crop productivity metric to strive for, which in recent site specific salinity objective studies has been expressed as the point on the yield response curve associated with maintaining a 95 percent yield. As discussed in Section 4, this yield metric is only directly ascertainable for a few crops given the current state of knowledge. Where a yield response curve has not been developed, other criteria will need to be used to establish an acceptable boron threshold.

One potential method would be to establish an arbitrary 95 percent yield concentration. Review of available crop response curves indicates relatively gradual slopes, where less than a five percent reduction in yield is associated with each milligram per liter (mg/L) increase in boron, suggesting an arbitrary 95 percent yield level could be established by adding 1 mg/L to the threshold. The only documented exceptions are snap beans and cowpeas, which exhibited a 12 percent yield reduction per mg/L increase in boron; therefore, for legumes the arbitrary 95 percent yield level could be established by adding 0.4 mg/L to the threshold.

Another potential method would be to determine if the limiting crop(s) is successfully grown in areas where boron concentrations are elevated and identifying boron concentration of the source water. This second method relies on the general tendency of the western flanks of the central valley and coast range valleys to have naturally elevated boron concentrations in groundwater and surface water. In particular, areas near Capay Valley, Winters, Woodland, and Patterson generally have elevated boron concentrations in their surface and/or groundwater resources, and agriculture production does not appear to be limited. Therefore, the water quality of these sources may provide a basis for demonstrating protection of the agricultural use for similar crops and soils.

Once an acceptable crop productivity based boron concentration is established, it will need to be adjusted based on site specific conditions, including climate and soils. This is generally a qualitative assessment due to complex relationships between environmental factors and crop responses to individual ions. To some extent, simple models can be used to estimate boron adsorption in soils, resulting soil solution boron, and the amount of boron needed to be applied
to achieve those levels. These models can be used to assess time frames required to achieve levels above the accepted threshold, typically in the 5 to 60 year time frame depending on initial water quality and soil types. Simple equilibrium salt build up models can be applied to boron, but they do not account for the stronger adsorption of some of the boron pool, which reduces the available and exchangeable boron in the soil. However, for this study simple models will be used to assess soil solution boron concentrations to establish the boron objective that is appropriate for long term protection of the use.

The contribution of precipitation to irrigation demand and leaching fractions will be addressed using average year precipitation. Therefore, the boron objective will be based on total water applied. As with most soil salinity concerns, the time frames needed to cause deleterious effects are generally long (e.g. measured in years or decades); therefore, the boron objective will be presented as an annual average. A potential effluent limit will be derived from the water quality objective adjusted for precipitation and through consideration of the attenuation of effluent effects on the resource due to general mixing with the aquifer and other recharge sources.

6.0 TIME SCHEDULE

This study is necessary to support findings in the Waste Discharge Requirement (WDR) that will regulate the new WWTF that is being proposed to comply with a 2008 Cease and Desist Order (CDO). Under terms of the CDO the Report of Waste Discharge must be submitted to the Regional Board staff by November 30, 2013, with a Board hearing to likely to occur in April/May 2014.

In addition, as stated in a letter from the Executive Officer, the results of this proposed study must be reviewed by CV_SALTS committees who are asked to provide recommendations to Board staff on site specific objectives to support WDR findings.

Therefore, the study will be implemented concurrently with submittal of this workplan for Regional Board staff and CV_SALTS review. The study will proceed following the general framework presented in this workplan unless the City receives alternative direction from Board staff and/or CV_SALTS. A Preliminary Draft Study based on readily available information will be submitted along with the RWD to Board Staff and CV_SALTS by November 30, 2013.

It is expected additional information, if found to be necessary by Board staff, could be incorporated into the RWD Technical Support Documentation as late as March 2014 without impacting the schedule of Board consideration of the WDR.
7.0 REFERENCES


SSALTS Objectives

– Identify a range of viable alternatives for salt disposal for consideration during development of the Salt and Nutrient Management Plan (SNMP).

– Provide information to help guide discussions regarding:
  • The establishment of regional salt management policies.
  • The need for changes to the existing Basin Plan to facilitate salt disposal in a manner that is most beneficial to the Central Valley.
SSALTS Objectives

– Phase 1, Characterize Existing Salt Accumulation Study Areas
  • Identify Representative Study Areas
  • **Characterize study areas to establish baseline information**
– Phase 2, Develop Potential Long-term Salt Management Strategies
  • In-Valley alternatives
  • Out-of-Valley alternatives, and
  • Hybrid alternatives
– Phase 3, Evaluate Potential Salt Disposal Implementation Alternatives
  • Develop and apply feasibility criteria (e.g., regulatory, institutional, economic, technological, etc.).
  • Identify and prioritize acceptable salt disposal alternatives for potential incorporation into the Central Valley SNMP.
# SSALTS Study Areas

<table>
<thead>
<tr>
<th>Section Number</th>
<th>Study Area</th>
<th>Central Valley Basin Planning Area</th>
<th>Representative Sector/Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Red Rock Ranch</td>
<td>Tulare Lake Basin</td>
<td>Agriculture</td>
</tr>
<tr>
<td>3</td>
<td>City of Dixon</td>
<td>Sacramento River Basin</td>
<td>Municipal</td>
</tr>
<tr>
<td>4</td>
<td>Westside Regional Drainage Plan</td>
<td>San Joaquin River Basin</td>
<td>Agriculture</td>
</tr>
<tr>
<td>5</td>
<td>San Luis Unit Ocean Disposal</td>
<td>San Joaquin River Basin</td>
<td>Agriculture</td>
</tr>
<tr>
<td>6</td>
<td>Hilmar Cheese</td>
<td>San Joaquin River Basin</td>
<td>Industrial</td>
</tr>
<tr>
<td>7</td>
<td>Grasslands Water District</td>
<td>San Joaquin River Basin</td>
<td>Agriculture</td>
</tr>
<tr>
<td>8</td>
<td>City of Tracy</td>
<td>San Joaquin River Basin</td>
<td>Municipal</td>
</tr>
<tr>
<td>9</td>
<td>Stevinson Water District</td>
<td>San Joaquin River Basin</td>
<td>Agriculture</td>
</tr>
<tr>
<td>10</td>
<td>Tulare Lake Bed</td>
<td>Tulare Lake Basin</td>
<td>Agriculture</td>
</tr>
<tr>
<td>11</td>
<td>Industrial Food Processing</td>
<td>Central Valley</td>
<td>Industrial</td>
</tr>
</tbody>
</table>
Study Area Characterization (Task 1.3)

- Objective is to “characterize the Study Areas based on available data/reports, discussions with affected stakeholders & reasonable extrapolations.”
  - Attributes
    - Physical,
    - Land cover,
    - Institutional, economic or regulatory obstacles
  - Sources of Salt
  - Salt Accumulation Capacity
    - Existing approaches for evaluating capacity
    - Additional opportunities to evaluate capacity
  - Cost/Benefits
  - Institutional/Regulatory Barriers
People/Agencies that Provided Comments

- Jeanne Chilcott & Rudy Schnagl (Central Valley RWQCB)
- Burt Fleischer (Hilmar Cheese Company)
- Jose Faria (DWR)
- Joe DiGiorgio (Stantec for City of Dixon)
- Rob Neenan (California League of Food Processors)
Summary of Comments Received –
General Comments

- Study Area descriptions need to include the current status.
- The changing regulatory climate may mean that existing projects may not comply with new regulations. The report should include discussion of the current and future “regulatory climate.”
- Impacts to groundwater quality need to be included for each of the Study Areas.
- Short-term and long-term impacts of each Study Area should be discussed.
Summary of Comments Received – General Comments

• The Study Areas should address:
  – Whether or not they comply with current Basin Plan requirements and regulations and whether or not they will do so in the long-term (~200 years).
  – If the management of salt provides a complete solution and what steps will eventually need to be taken.
  – Where the salt ultimately ends up.
Summary of Comments Received – Red Rock Ranch

- Address why the IFDM concept has not taken off.
- Include potential IFDM WDR requirements for selenium.
- IFDM is more applicable for implementation on a regional basis.
- Water supply availability may cause a shift to permanent crops.
- There are some studies on the reuse of salt accumulated on the salt evaporator.
Summary of Comments Received – City of Dixon

• The section should include a discussion of all options analyzed by the City.
• The City will construct an activated sludge process to reduce salinity concentrations by 50% by preventing evaporation losses.
• The ban on water softeners yielded ~15% reduction in chloride.
Summary of Comments Received – Westside Regional Drainage Plan

- The Plan has not been reviewed or adopted by the RWQCB.
- A discussion on the 1996 Basin Plan amendment needs to be added.
- The Westlands Drainage District is operating as a closed basin. Currently, the salt is accumulating in the groundwater.
- Break discussion of the Study Area into a “closed system” and an “open system”
Summary of Comments Received – Hilmar Cheese Company

- The characterization should focus on current operations and not past regulatory/enforcement issues.
- Problems with compatibility of the injected concentrate and the deep aquifer. Precipitate is clogging the injection system.
- Aquifer has a higher salinity than the injected concentrate.
- The treatment system requires 24/hr monitoring. HCC has concern with the long-term sustainability of this.
Summary of Comments Received – Grasslands Real Time Water Quality Management

- This project is more of a concept than a current project.
- Address the RWQCB requirements to review and approve the project prior to implementation.
Summary of Comments Received – Tulare Lake Bed

- Use of evaporation basins has declined over past several years.
- Increasing the volume of evaporation basins has been difficult.
- Address regulations to prevent the degradation of shallow groundwater.
Summary of Comments Received – Industrial Food Processing

- The discussion of the Study Area does not put food processing discharges into context.
- Food processors only account for small percentages of salt discharges in the Central Valley (between ~2% - 4%)
Screening-Level Analysis of Long-Term Sustainability (Task 1.4)

- Objective is to analyze each Study Area “to assess their longevity & sustainability.”
  - Assessment considers 50-year increments, up to a total of 200 years.
  - Apply screening-level forecasts of known trends relative to historical, current, and future conditions at each Study Area.
  - Utilize information developed under the ICM study.
SSALTS Study Areas relative to ICM Initial Analysis Zones

- SSALTS Study Areas are distributed across the central valley
- Study Area scale ranges from very small (individual farm) to large (San Luis Unit)
- IAZ scale is not conducive to SSALTS analysis except: Westside/San Luis Unit and Tulare Lake Bed.
Screening-Level Analysis of Long-Term Sustainability (Task 1.4) continued

• Each Study Area provides potential example strategies for management of salt accumulation.

• Three broad categories:
  – Source controls or salinity management practices
  – Treatment to concentrate salt
  – Ultimate salt disposal (in-valley/out-of-valley)

• Not every study area addresses all three categories.

• Sustainability assessment requires judgment to consider likely outcomes.
Screening-Level Analysis of Long-Term Sustainability (Task 1.4) continued

• Factors considered under the sustainability assessment of each Study Area are:
  – Longevity of the project (e.g., service life)
  – Salt capacity of the disposal method
  – Regulatory requirements (e.g., permitting)
  – Capital and annual O&M costs
  – Impacts to beneficial uses
  – Potential environmental impacts (e.g., selenium impacts to birds at RRR, etc.)
  – Other considerations (population growth, cropping practices, land cover changes, water demands, public acceptance)
Screening-Level Analysis of Long-Term Sustainability (Task 1.4) continued

• Long-term Sustainability assessment
  – Salt management costs ($/ton/year)
  – Salt capacity (onsite vs. offsite, in-valley vs. out-of-valley)
  – Regulatory barriers (WDRs, existing/future Water Quality Objectives per Basin Plan)
  – Environmental concerns (selenium impacts on wildlife)
  – Project longevity (capital improvement project planning period)

• Quantitative/Qualitative Assessment (Low, Medium, or High)
Screening-Level Analysis of Long-Term Sustainability (Task 1.4) continued

• San Luis Drain Ocean Disposal Study Area (draft costs)
  – Net reduction of 500,000 tons of salt annually (Reclamation, 2006)
  – Equivalent annual costs
    • Conveyance system - $17.4M
    • Land retirement – $0.6M
    • Drainage collection system - $11.1M
    • Regional reuse facilities – $4.6M
    • Total - $33.7M
  – Annual cost for ton of salt disposal - $67/ton
Screening-Level Analysis of Long-Term Sustainability (Task 1.4) continued

• Hilmar Cheese Study Area (draft costs)
  – Trucked to EBMUD
    • Gallons trucked to EBMUD in 2012 – 37M gallons
    • EBMUD charges at $0.115/gal - $4.3M
    • Trucking costs - $2.7M
    • Annual disposal costs - $7M
  – Deep Well Injection
    • Capital costs – $2.5M
    • Annual O&M costs - $250K
    • Equivalent annual cost - $427K
Screening-Level Analysis of Long-Term Sustainability (Task 1.4) continued

• Red Rock Ranch
  – Salt accumulation area is 10,000 square feet
  – Density of coarse salt is 1.08 tons/cubic yard
  – After one year, the salt pile would be 0.2 feet high
  – After 50 years, the salt pile would be 10 feet high
Refer to Long-Term Sustainability Table (separate handout)
SSALTS Schedule Proposed Revisions

• Phase I on-hold mid-April to July 2013
• Currently completing Phase I
  – Draft Phase I Report 10/04/13
  – Final Phase I Report 10/29/13
• Phase II
  – Draft Report 12/20/13
  – Final Report 1/17/14
• Phase III – to be coordinated with Phase II Conceptual Model work plan
  – Final Report 5/2/14
<table>
<thead>
<tr>
<th>Study Area</th>
<th>Source Control</th>
<th>Treatment</th>
<th>Salt Disposal Method</th>
<th>Salt Disposal Sustainability</th>
<th>Relative Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Rock Ranch</td>
<td>• IFDM –Sequential Crop Production Areas &lt;br&gt;• Efficient Irrigation Methods</td>
<td>• Salt Tolerant Crop Uptake &lt;br&gt;• Solar Evaporator &lt;br&gt; N/A</td>
<td>N/A</td>
<td>Salt Accumulation at the Site</td>
<td>$</td>
</tr>
<tr>
<td>City of Dixon</td>
<td>• Public Outreach &lt;br&gt;• Water Softener Ban/Incentive Program &lt;br&gt;• Reduction of Inflow/Infiltration to Sewers &lt;br&gt;• Higher Quality Source Waters</td>
<td>High Rate treatment to minimize evaporation losses at WWTF &lt;br&gt; Wastewater Treatment Facility: Activated Sludge¹</td>
<td>Wastewater Treatment Facility Percolation Ponds</td>
<td>M</td>
<td>H $</td>
</tr>
<tr>
<td>Westside Drainage Plan</td>
<td>• Grasslands By-Pass Project² &lt;br&gt;• Land Retirement &lt;br&gt;• Regional Reuse Facilities¹</td>
<td>• Drainage Water Treatment &lt;br&gt;• N/A</td>
<td>• Grassland’s Open System Discharges to the SJR &lt;br&gt;• Westland’s Closed System Discharges to the Shallow Groundwater</td>
<td>M</td>
<td>M $</td>
</tr>
<tr>
<td>San Luis Unit Ocean Disposal</td>
<td>• Land Retirement and re-allocated irrigation water³ &lt;br&gt;• On-Farm Drainage Reduction including: drainage reuse, irrigation practice improvements⁴</td>
<td>N/A</td>
<td>Selenium Bio-treatment &lt;br&gt; Regional drainage collection system brine line to ocean outfall at Point Estero⁵</td>
<td>L</td>
<td>L $</td>
</tr>
<tr>
<td>Hilmar Cheese</td>
<td>N/A</td>
<td>UF/RO/Evaporator</td>
<td>N/A</td>
<td>Deep Well Injection</td>
<td>M $</td>
</tr>
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<td>Grasslands Water District</td>
<td>Real-time water quality monitoring network</td>
<td>N/A</td>
<td>N/A</td>
<td>Real Time Management Program¹</td>
<td>M $</td>
</tr>
<tr>
<td>City of Tracy</td>
<td>• Source Water of Higher Quality &lt;br&gt;• Industrial Source Controls¹</td>
<td>Desalinization Plant¹</td>
<td>Tracy Wastewater Treatment Plant - Discharge to Old River</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Stevinson Water District</td>
<td>• Lateral Canal Pipelining Project &lt;br&gt;• Agricultural Drainage Control Project</td>
<td>N/A</td>
<td>N/A</td>
<td>Constructed Wetlands</td>
<td>M</td>
</tr>
<tr>
<td>Tulare Lake Bed</td>
<td>N/A</td>
<td>Evaporation Ponds</td>
<td>Evaporation Ponds/ Sequestered On-Site¹</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Industrial Food Processing</td>
<td>• Water Treatment of Source Supply &lt;br&gt;• Boiler Feed Water Treatment &lt;br&gt;• Product Loss Reduction &lt;br&gt;• Cleaning and Process Chemical Treatment &amp; Reduction</td>
<td>Evaporation Ponds &lt;br&gt; Effluent Treatment</td>
<td>Evaporation Ponds/Sequestered On-Site &lt;br&gt; Disposal to local POTWs &lt;br&gt; Land Application</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

¹ Potential future projects.  
² Project began in 1996 permitted through 2019.  
³ RO demonstration project operated between 2003 and 2006.  
⁴ The determination of the sustainability of a particular salt disposal method considers factors such as the longevity (service life) of the project, the salt capacity of the disposal method, regulatory requirements, costs, potential impacts to the environment, and other considerations (e.g., population growth, cropping practices, and water demands).
## STRAWMAN Summary of the Salt Removal Strategies in Each of the Representative Study Areas and the Long-Term Sustainability of the Salt Disposal Method

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Source Control</th>
<th>Treatment</th>
<th>For Other Constituents</th>
<th>Salt Disposal Method</th>
<th>Salt Disposal Sustainability(^1)</th>
<th>Relative Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Rock Ranch</td>
<td>IFDM –Sequential Crop Production Areas, Efficient Irrigation Methods</td>
<td>For Salt Concentration or Removal: Salt Tolerant Crop Uptake, Solar Evaporator</td>
<td>N/A</td>
<td>Salt Accumulation at the Site</td>
<td>L L L L</td>
<td>$</td>
</tr>
<tr>
<td>City of Dixon</td>
<td>Public Outreach, Water Softener Ban/Incentive Program, Reduction of Inflow/Infiltration to Sewers, Higher Quality Source Waters</td>
<td>High Rate treatment to minimize evaporation losses at WWTF</td>
<td>Wastewater Treatment Facility: Activated Sludge(^1)</td>
<td>Wastewater Treatment Facility Percolation Ponds</td>
<td>H M M M</td>
<td>$$$</td>
</tr>
<tr>
<td>Westside Drainage Plan</td>
<td>Grasslands By-Pass Project(^2), Land Retirement, Regional Reuse Facilities(^1)</td>
<td>Drainage Water Treatment, RO Demonstration Project(^3)</td>
<td>N/A</td>
<td>Grassland’s Open System Discharges to the SJR</td>
<td>$$$</td>
<td></td>
</tr>
<tr>
<td>San Luis Unit Ocean Disposal</td>
<td>Land Retirement and re-allocated irrigation water(^2), On-Farm Drainage Reduction including: drainage re-use, irrigation practice improvements(^2)</td>
<td>Selenium Bio-treatment</td>
<td>Regional drainage collection system brine line to ocean outfall at Point Estero(^3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hilmar Cheese</td>
<td>N/A</td>
<td>UF/RO/Evaporator</td>
<td>Onsite Wastewater Treatment Facility (DAF/Aerobic Digester/Sequencing Batch Reactors)</td>
<td>Deep Well Injection</td>
<td>M L L L</td>
<td>$$$</td>
</tr>
</tbody>
</table>

\(^1\) Costs are provided for reference and are not definitive. Costs are subject to change based on local regulations and market conditions.

\(^2\) Projects specific to the region may vary.

\(^3\) Longer term sustainability may require additional planning and investment.
<table>
<thead>
<tr>
<th>Study Area</th>
<th>Source Control</th>
<th>Treatment</th>
<th>Salt Disposal Method</th>
<th>Salt Disposal Sustainability</th>
<th>Relative Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasslands Water District</td>
<td>Real-time water quality monitoring network</td>
<td>N/A</td>
<td>Real Time Management Program&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| City of Tracy               | • Source Water of Higher Quality  
|                            | • Industrial Source Controls<sup>1</sup>                                         | Desalinization Plant<sup>1</sup>                                          | Tracy Wastewater Treatment Plant                                                    | Tracy Wastewater Treatment Plant - Discharge to Old River |               |
| Stevinson Water District    | • Lateral Canal Pipelining Project  
|                            | • Agricultural Drainage Control Project                                         | N/A                                                                       | Constructed Wetlands                                                             | N/A                          |               |
| Tulare Lake Bed             | N/A                                                                              | Evaporation Ponds                                                        | Evaporation Ponds/Sequestered On-Site<sup>1</sup>                                   |                              |               |
| Industrial Food Processing  | • Water Treatment of Source Supply  
|                            | • Boiler Feed Water Treatment  
|                            | • Product Loss Reduction  
|                            | • Cleaning and Process Chemical Treatment & Reduction                           | Evaporation Ponds                                   | Evaporation Ponds/Sequestered On-Site                                             | Disposal to local POTWs      |               |
|                             |                                                                                  | Effluent Treatment                                                      | Land Application                                                                     |                              |               |

<sup>1</sup> Potential future projects.  
<sup>2</sup> Project began in 1996 permitted through 2019.  
<sup>3</sup> RO demonstration project operated between 2003 and 2006.  
<sup>4</sup> The determination of the sustainability of a particular salt disposal method considers factors such as the longevity (service life) of the project, the salt capacity of the disposal method, regulatory requirements, costs, potential impacts to the environment, and other considerations (e.g., population growth, cropping practices, and water demands).
Technical Project Status Updates – as of September 11, 2013

- **ICM Study**
  - LWA team has been working on addressing the 200+ comments on the draft report, including working directly with commenters where necessary.
  - Final report expected for submittal to Project Committee by end of this week – focus will be on verifying that the many comments were adequately addressed.

- **Phase II Conceptual Model**
  - Comments addressed post August TAC meeting
  - LWA and EKI teams both indicated interest in bidding on Phase II project; RFP will be released very soon.

- **GIS Services**
  - Final report and Comment/Response (C/R) summary sent to Project Committee for final review in late August to verify comments on draft report addressed.
  - Currently appears that there will be no comments; once confirmed, final report will be submitted for acceptance and posted to website.

- **Agricultural Zone Mapping**
  - Draft Task 5.1/5.2 report sent to Project Committee in late August for review; comments received to date being collated.
  - At a minimum will be scheduling a Project Committee meeting to discuss comments with project team; expect to also seek input from agricultural interests on draft report approach to establishing Crop Sensitive Zones.

- **Aquatic Life Study**
  - Draft Final Report received along with C/R summary; significant number of comments from Dennis Westcot received in mid-August delayed preparation of final report.
  - Scheduling a meeting with Dr. Buchwalter next week to review how comments were addressed.
  - Planning to have Final Report along with C/R on October TAC agenda for final presentation.

- **Tulare Lake Bed Archetype**
  - Tulare Lake Drainage District and its technical team continuing to work on a revised draft technical report that addresses comment received on the draft technical report.
Agenda Item #7. Selection of Contractor to Conduct Environmental and Economic Review for MUN Evaluation in Ag Dominated Water Bodies Project

Action Item: A recommendation from the TAC on contractor selection

Background

A Request for Proposal (RFP) to provide CEQA and Economic Analysis support for the project to evaluate the Municipal and Domestic Supply (MUN) Beneficial Use in Agriculturally (Ag) Dominated Surface Water Bodies was sent to potential CV-SALTS salinity services vendors (EKI, LWA and CDM-Smith) on July 23, 2013. Proposals were due by August 16, 2013.

The following two consulting firms responded to the RFP:

- Larry Walker Associates, Inc. (LWA)
- CDM Smith

Proposals were reviewed by the following:

- Roger Reynolds – Summers Engineering, Co-Chair CV-SALTS TAC
- Nigel Quinn – Bureau of Reclamation, Co-Chair CV-SALTS TAC
- Jeanne Chilcott – Central Valley Water Board
- Anne Littlejohn - Central Valley Water Board

A standardized scoring sheet was used to review both proposals and the areas of evaluation included:

- Technical Qualifications
  - Responsiveness to RFP, organization and clarity
  - Experience and qualification in project-related areas
  - Project approach and understanding
  - Project Management qualifications

- Cost
  - Clarity and completeness
  - Appropriateness of proposed cost structure and anticipated value and quality of services received
  - Total cost compared to the value of projects and services

Score Summary:

CDM-Smith’s proposal received a higher total score from all four reviewers. Email discussions indicated preference to award the contract to CDM-Smith based on experience and approach.

Recommendation to TAC:

Based on overall results and comments from reviewers, recommend that contract to conduct economic and environmental review for the MUN evaluation in ag dominated water bodies be awarded to CDM-Smith and that staff initiate development of final scope of work and subcontract.
CV-SALTS Meeting Calendar

2013

January

February

March

April

May

June

July

August

September

October

November

December

Notes

2nd or 3rd Thursdays
Dark Green Exec Comm Policy
RWQCB Update Bold Underline
2nd or 3rd Tuesdays
Lt. Green Hatch Exec Comm Admin
First Monday except conflicts
Yellow Salty 5
Lower San Jaquin River Committee
Light Red conflicts
TAC Meeting
Third Thursday Exceptions
January 7, 2014 State Board Presentation
Dark in July & December for Policy
Nov 14 vs 21 due to Thanksgiving