

CV-SALTS Technical Committee Agenda Item # 2
Site-Specific Salinity Study Workplan and Time Schedule
City of Live Oak: Order No. R5-2011-0034

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 is requesting 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 requirements 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 staff 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) for comparison. If the effluent was evenly distributed over the 900-acres for 6-months, it would provide approximately 10-inches.

Staff comment: The Vicinity Basis selection appears to provide an adequate "worst-case" area for reviewing potential effluent impact and concurs with the process of comparing the cropping pattern with the broader based Local 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 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.

Staff 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 area is primarily orchard or whether it currently rotates cropping patterns.

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.

Staff 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.

Staff comment/recommendation: 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 report should identify typical irrigation methods in the Vicinity area and determine 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.

Staff Comment/Recommendation: The annual average focus likely is an artifact of the wording of the overall effluent limitation as an annual average. Protection of the AGR use is typically determined on a monthly or a 30-day rolling average concentration (e.g. Vernalis objective in the Lower San Joaquin River). The permit itself contains the following wording:

- a. Salinity/EC Site-Specific Study.** If, after one year following construction of the tertiary Facility, the effluent EC level is greater than 700 $\mu\text{mhos/cm}$ 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:
- i. 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.
 - ii. The sodium adsorption ratio of soils in the affected area.
 - iii. The alkalinity of soils to whether site specific conditions would reduce fluoride impacts.
 - iv. The effects of rainfall and flood-induced leaching; and
 - v. 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.

To protect AGR, the report should recognize that the proposed objective would need to be met on either a monthly or 30-day rolling average.