D R A F T
Peer Review Questions
for the
San Joaquin River Deep Water Ship Channel
Dissolved Oxygen TMDL

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The overall goal of this peer review is to help the Steering Committee/stakeholders and CALFED evaluate the adequacy of the technical information base upon which the TMDL analysis and stakeholder allocations of loads/responsibilities will be developed.

In addressing these questions it is important to consider the framework in which the peer review, these studies, the past studies and the TMDL implementation will take place. As discussed herein, the Central Valley Regional Water Quality Control Board must, in June 2003, develop the first phase of a TMDL designed to control the DO depletion in the Deep Water Ship Channel. While the first question, devoted to "Overall Understanding," asks whether there is adequate information to proceed with this effort, it is important to understand that there are information gaps in a number of areas, which are discussed in the synthesis report. However, sufficient information has been gained during the three years of studies to identify the primary approaches that can be used to solve the low-DO problem.

1. Overall Understanding

Is there adequate understanding of responsible constituents and conditions that lead to violations of DO water quality objectives in the San Joaquin River (SJR) Deep Water Ship Channel (DWSC) to develop the initial phase of a technically valid, cost-effective management plan for eliminating the DO water quality objective violations that occur in the DWSC each summer/fall?

If not, what are the major information gaps that need to be filled before it will be possible to formulate an appropriate management plan for controlling the low-DO conditions in the DWSC?

With respect to the second question (devoted to "Modeling"), part "a," at this time there is a fair understanding of the relationships between carbonaceous and nitrogenous BOD as a cause of DO depletion. We do not have a good handle on the organic nitrogen component of BOD at this point, although, with additional review of the existing data, we will likely be able to provide that information. With respect to "b," we are not in a position to forecast the implications of different management options. At this point, the existing, as well as the proposed, modeling effort will not provide the information needed to make for reliable forecasts. There will be need to follow an adaptive management approach. With respect to "c," the issue is not the modeling, but

the database from which the models are to be developed. With respect to "d," we are not able to differentiate the roles of flow, tidal exchange, basin morphometry and organic matter input adequately at this time. Modeling will not solve this problem. While five years of detailed studies might provide additional insight into these issues, it will be more cost-effective to start the implementation process, where we are specifically focusing on developing information for implementing each of the proposed approaches for managing the DO problem.

2. Modeling

a) Has the dynamic and mass balance box modeling of the oxygen demand load-DO depletion in the DWSC adequately defined the impact of the loads of oxygen demand constituents (carbonaceous BOD and nitrogenous BOD including algae, ammonia and organic N) derived from upstream of the DWSC and within the DWSC on DO depletion in the DWSC?

b) Will the existing models allow reliable forecasts of the implications of different management actions? Do the models help us understand the causes of the low DO?

c) If not, how should the modeling be expanded/changed to address areas of inadequate modeling capability?

d) Do the present studies differentiate the roles of flow, tidal exchange, basin morphometry and organic matter input (or its precursors) adequately? What additional studies are necessary to allow such differentiation?

With respect to the third question, "Allocation of Oxygen Demand Load," at this point the allocation of the oxygen demand load will be to the Mud Slough, Salt Slough and SJR upstream of Lander Avenue watersheds, as well as to the city of Stockton. With respect to parts "b" and "c," we are not in the position yet to predict how altering oxygen demand loads in any of these watersheds will affect the DWSC.

3. Allocation of Oxygen Demand Load

a) What SJR subwatersheds should be studied and what should be measured? Do we have enough information to determine where (what sub-watersheds) load reduction feasibility studies should be conducted?

b) Is there sufficient data and analysis to determine whether load reduction upstream could benefit, though possibly not solve on its own, the low DO problem in the DWSC? How much reduction in what substance would reduce the load entering the SJR from that watershed and how much would that reduction result in improved DO conditions in the DWSC?

c) Is there sufficient data and analysis to determine how much upstream load reduction would result in what level of DO improvement under different flow conditions?

With respect to the fourth question ("DO Concentration Goal"), since this is essentially the same as the US EPA's recommended "Gold Book" DO goal, it is appropriate as a Phase I

target. During this phase there will be need to determine what should be the appropriate DO concentration goal/water quality objective for the final phase of the TMDL.

4. DO Concentration Goal

Is the interim TMDL Phase I minimum DO concentration goal proposed by the CVRWQCB staff appropriate? If not, what should the Phase I minimum DO concentration goal be?

With respect to the fifth question on "Flow," there is insufficient information at this time to predict how changing the flow in the range from about 500 to 1,500 cfs will impact DO. Further data review of the existing database may help in this area.

5. Flow

Is there sufficient data and analysis to determine how increases or decreases in flows from different sources affect DO conditions? If not, what studies and monitoring should be undertaken?

With respect to the sixth question on "Aeration," the estimated oxygen deficits are dependent on a number of factors which range from a few thousand pounds of oxygen needed per day to several tens of thousands of pounds of oxygen needed. There is need to start comprehensive field studies which can be used to examine how effective aeration, practiced to various degrees at various locations, is in controlling the DO problem. With respect to "b," there is sufficient information available to develop the first phase of a monitoring program to investigate aeration. This monitoring program would be an adaptive management program which should be adjusted during the course of these studies. Item "c" relates flow to aeration. At this point there is insufficient understanding of the two to be able to directly couple flow to aeration, although estimates can be made which can then be evaluated in the pilot studies.

6. Aeration Questions

a) Are estimates correct for the amount of aeration that would be needed in the DWSC under different flows? How broad should the range of estimates be to ensure that if aeration occurred within those parameters, the performance goal milestones would be met?

b) Is there sufficient data and analysis to be able to develop a DWSC monitoring program during pilot aeration?

c) Is there sufficient data and analysis to be able to predict how much aeration will be needed under different flow conditions? Is this important to know before beginning pilot aeration and monitoring studies?

With respect to the seventh question ("DWSC Geometry"), there is no issue about whether the DO problem would be there if there were no DWSC. With respect to "b," we are not in a position to reliably predict how additional Channel deepening will affect DO conditions. We know it will be in the wrong direction. However, the magnitude of impact is not known.

7. DWSC Geometry Questions

a) Would there be a significant DO problem if the DWSC wasn't there and the river remained at its historic depth through this reach?

b) Do we know enough to fairly predict how additional channel deepening will affect DO conditions in the DWSC?