



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

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San Francisco, CA 94105-3901

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Thomas Howard  
Acting Executive Director  
State Water Resources Control Board  
P.O. Box 100  
Sacramento, CA 95812-0100

Dear Mr. Howard:

Thank you for submitting the total maximum daily load (TMDL) to address dissolved oxygen in the Stockton Deep Water Ship Channel. The submission was dated November 28, 2006 and supplemental information was received on February 7, 2007. The State of California adopted the TMDL to address dissolved oxygen in the Stockton Deep Water Ship Channel as identified on the State's 2002 Clean Water Act Section 303(d) list.

Based on EPA's review, I have concluded the TMDL adequately addresses the pollutant of concern, and will, upon implementation, result in attainment of applicable water quality standards. The TMDL include allocations as needed, take into consideration seasonal variations and critical conditions, and provides an adequate margin of safety. The State provided adequate opportunities for the public to review and comment on the TMDL. All required elements are adequately addressed; therefore, the TMDL is hereby approved pursuant to Clean Water Act Section 303(d)(2).

The State's submittal also contains a detailed plan for implementing the TMDL. Current federal regulations do not define TMDLs as containing implementation plans; therefore, EPA is not taking action on the implementation plan provided with the TMDL. However, EPA generally concurs with the State's proposed implementation approaches.

The enclosed review discusses the basis for this approval decision in greater detail. We appreciate the State and Regional Boards' work to complete and adopt the TMDL and look forward to our continuing partnership in TMDL development and implementation. If you have questions concerning this approval, please call me at (415) 972-3572 or Debra Denton at (916) 341-5520.

Sincerely yours,

Alexis Strauss, Director  
Water Division

Enclosure

cc: Pamela Creedon, Central Valley RWQCB

## TMDL Review Checklist

**State:** California

**Waterbodies:** Stockton Deep Water Ship Channel

**Pollutant(s):** Dissolved Oxygen

**Date of Initial Submission:** November 28, 2006

**Date Received By EPA:** December 6, 2006

**Dates of Supplemental Submission(s) and Receipt by EPA:** February 7, 2007

**EPA Reviewer:** Debra Denton

### **1. Submittal Letter:**

*State submittal letter indicates final TMDL(s) for specific water(s)/pollutant(s) were adopted by state and submitted to EPA for approval under 303(d). Acknowledge if any supplemental material was provided and receipt date.*

Submittal letter dated November 28, 2006.

The Central Valley RWQCB adopted the dissolved oxygen TMDL for Stockton Deep Water Ship Channel on January 27, 2005 (RWQCB Resolution # R5-2005-0005). The California State Board (SWRCB) approved the dissolved oxygen TMDL on November 16, 2005 (SWRCB Resolution # 2005-0086). The State Office of Administrative Law approved the TMDL on August 4, 2006 (OAL file # 06-0705-01 S). The submittal addresses one segment of Stockton Deep Water Ship Channel as identified on the State's 2002 CWA Section 303(d) list for dissolved oxygen.

The submittal contained the TMDL staff report and the Basin Plan amendment both dated February 28, 2005. This February 28, 2005 final report incorporates late revisions and miscellaneous editorial changes into the December 13, 2004 report, adopted at the January 27, 2005 Central Valley RWQCB hearing. EPA received additional information regarding the existing NPDES permits within the Stockton Ship Channel on February 7, 2007.

### **2. TMDLs Included:**

*The submittal clearly identifies the water segments and pollutants or stressors for which TMDLs were developed. The submittal should include the water segment identifier (e.g., NHD code) for each segment addressed. The submittal should clearly identify the TMDLs adopted for currently 303(d) listed waterbody-pollutant combinations. It should also clarify if TMDLs were adopted for new impairment findings (by waterbody-pollutant combinations) that do not exist on the current 303(d) list. If appropriate, the submittal should describe any assessment decisions that may have resulted in non-impairment status for water/pollutant combinations that exist on State's most current 303(d) list.*

The submittal addresses one segment of Stockton Deep Water Ship Channel that was identified on the State's 2002 CWA Section 303(d) list. This segment was identified on the State's 2006 CWA Section 303(d) list for dissolved oxygen.

**3. Water Quality Standards Attainment:** *TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.*

(TMDL report, page 26)

The numeric targets are the Central Valley RWQCB Basin Plan's existing water quality objectives for dissolved oxygen for Stockton Deep Water Ship Channel. The dissolved oxygen water quality objective for the impaired portion of the San Joaquin River is 6.0 mg/L between September 1 to November 30 and 5.0 mg/L all other months of the year.

The State reasonably concluded that attainment of the numeric targets and associated TMDLs, waste load allocations, and load allocations will result in attainment of the applicable numeric water-quality objective.

**4. Numeric Target(s):** *Submission describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. Numeric water quality target(s) for TMDL identified, and adequate basis for target(s) as interpretation of water quality standards is provided.*

(TMDL report, page 26)

The numeric targets are the Central Valley RWQCB Basin Plan's existing water quality objectives for dissolved oxygen for Stockton Deep Water Ship Channel. The dissolved oxygen water quality objective for the impaired portion of the San Joaquin River is 6.0 mg/L between September 1 to November 30 and 5.0 mg/L all other months of the year. The CWA 303(d) listing for low dissolved oxygen in the Deep Water Ship Channel is based on impairment to the following fisheries-related beneficial uses identified in the Basin Plan, 1) warm freshwater species (striped bass, and sturgeon and shad) migration and spawning (WARM MIGR and WARM SPWN), 2) cold freshwater species (salmon and steelhead) migration (COLD MIGR), and 3) warm and cold freshwater species habitat (not including anadromous species) (WARM and COLD).

This TMDL clearly defines the beneficial uses and the numeric water quality objectives to be achieved.

**5. Source Analysis:** *Point, non-point, and background sources of pollutants of concern are described, including the magnitude and location of sources. Submittal demonstrates all significant sources have been considered. Point, nonpoint, and background sources of pollutants of concern are described, including the magnitude and location of sources. The submittal demonstrates all significant sources have been considered.*

(TMDL report, page 26-35)

The Central Valley RWQCB report concludes that three main contributing factors to the dissolved oxygen impairment are as follows:

- 1) Loads of oxygen demanding substances from upstream sources react by numerous chemical, biological and physical mechanisms to remove dissolved oxygen from the water column in the Deep Water Ship Channel.
- 2) The Deep Water Ship Channel geometry impacts various mechanisms that add or remove dissolved oxygen from the water column, such that net oxygen demand exerted in the Deep Water Ship Channel is increased.
- 3) Reduced flow through the Deep Water Ship Channel impacts various mechanisms that add or remove dissolved oxygen from the water column, such that net oxygen demand exerted in the Deep Water Ship Channel is increased.

This TMDL and associated control program allocates responsibility for reduction of excess net oxygen

demand such that the basin plan, dissolved oxygen objectives are attained in the Deep Water Ship Channel. This TMDL assigns 100% of the responsibility for reducing the excess net oxygen demand to those parties collectively responsible for each of the three contributing factors identified above.

**6. Loading Capacity Linkage Analysis:** *Submittal describes relationship between numeric target(s) and identified pollutant sources. Submittal clearly identifies loading capacity. For each pollutant, describes analytical basis for conclusion that sum of allocations and margin of safety does not exceed the loading capacity of the receiving water(s).*

(TMDL report, pages 36-37)

For this TMDL the existing water quality objective for dissolved oxygen is used as numeric targets, therefore an analytical link between the numeric targets and protection of designated beneficial uses of the lower San Joaquin River has already been established. The analysis demonstrates the load reduction scenarios reflected in the final TMDL and allocations will be sufficient to meet water quality objectives for dissolved oxygen.

The linkage analysis for this TMDL is intended to demonstrate the waste load allocations and load allocations will result in attainment of the water quality objectives. The submittal adequately describes the relationship between the numeric targets, pollutant sources and the total assimilative capacity (loading capacity) of the waterbody.

### **7. TMDL and Allocations:**

*TMDL—Submittal identifies the total allowable load, which is set equal to or less than the loading capacity. TMDL is expressed in terms of mass-based, concentration-based or other equivalent approaches that are consistent with federal requirements. If TMDL has seasonal features then please describe. TMDLs and allocations should be expressed in terms of daily time steps. If the TMDL and/or allocations are also expressed in terms other than mass loads per day, the submittal explains why it is reasonable and appropriate to express the TMDL in those terms.*

*Allocations—Submittal identifies appropriate waste load allocations for all point sources and load allocations for all non-point sources. Allocations are expressed in terms of mass-based, concentration-based or other equivalent approaches, the submittal explains why it is reasonable and appropriate to express in those terms. If point sources are present, submittal identifies existing NPDES permits by name and number. More discussion of point sources in watershed. If no point sources are present, waste load allocations are zero. More discussion of non-point sources. If no non-point sources are present, then load allocations are zero.*

The loading capacity (LC) of the Deep Water Ship Channel is the amount of net oxygen demand that can be present at any point in the Deep Water Ship Channel such that dissolved oxygen objectives are not violated. In equation form the loading capacity is expressed as:  $LC = [DO_{sat} - DO_{obj}] * (Q_{DWSC} + 40 \text{ cfs}) * 5.4$ , where  $DO_{sat}$  is a saturation dissolved oxygen concentration, which is itself a function of water temperature, in milligrams per liter;  $DO_{obj}$  is the applicable basin plan dissolved oxygen objective in milligrams per liter;  $Q_{DWSC}$  is the net daily flow rate through the Deep Water Ship Channel in cubic feet per second, plus an additional 40 cfs is added to account for the uncertainty in the measurement of flow; and 5.4 is a unit conversion factor that provides the loading capacity, in terms of pounds per oxygen per day. As expressed in the LC equation is a function of flow through the Deep Water Ship Channel and temperature (to the extent that temperature affects  $DO_{sat}$ ). Although temperature is a factor that determines LC, it will not be a factor that is allocated responsibility for the dissolved oxygen impairment.

(TMDL report pages 39-43)

#### **Waste load Allocations for Point sources**

Waste load allocations are established for the point sources. The dischargers currently subject to this allocation were clarified in an email dated February 7, 2007 and include:

The City of Stockton Regional Wastewater Control Facility (NPDES No. CA0079183, WDR Order No. R5-2002-083).

#### **Load Allocations for Nonpoint sources**

The Central Valley RWQCB report concludes that three main contributing factors to the dissolved oxygen impairment are as follows:

- 1) The Deep Water Ship Channel geometry impacts various mechanisms that add or remove dissolved oxygen from the water column, such that net oxygen demand exerted in the Deep Water Ship Channel is increased.
- 2) Reduced flow through the Deep Water Ship Channel impacts various mechanisms that add or remove dissolved oxygen from the water column, such that net oxygen demand exerted in the Deep Water Ship Channel is increased.
- 3) Oxygen demanding substances (WLA + LA).

This TMDL and associated control program allocates responsibility for reduction of excess net oxygen

demand such that the basin plan, dissolved oxygen objectives are attained in the Deep Water Ship Channel. This TMDL assigns 100% of the responsibility for reducing the excess net oxygen demand to those parties collectively responsible for each of the three contributing factors identified below. The three responsible parties include 1) DWSC geometry, 2) reduced DWSC flow and 3) oxygen demanding substances (which includes both point, and nonpoint sources).

TMDL = ENOD = WLA + LA + BL + MOS, where the TMDL is the sum of all wasteload allocations for point sources, plus the sum of all, load allocations for nonpoint sources, plus background loads (BL), and the margin of safety (MOS). The net oxygen demand over and above assimilative capacity is the excess net oxygen demand (ENOD).

**Figure 4-5 (pg. 43 of TMDL report) Summary of Apportioning and Allocations**

Responsibility for Excess Net Oxygen Demand	100% ENOD + 20% MOS	DWSC Geometry ( $R_{DWSC}$ ) (to account for ship channel geometry)
		Reduced DWSC Flow ( $R_{Flow}$ ) (to account for factors that reduce flow)
		Oxygen Demanding Substances [ $\Sigma WLA + \Sigma LA$ ] <ul style="list-style-type: none"> <li>• 30 % Waste Load Allocation - Stockton RWCF (<math>WLA_{RWCF}</math>)</li> <li>• 60 % Load Allocation - non-point sources (<math>LA_{NPS}</math>)</li> <li>• 10% Reserve for unknown sources and impacts, and known or new sources that have no reasonable potential to impact (<math>LA_{RES}</math>)</li> </ul>

EPA concludes the State's approach of addressing the TMDL and allocations on pounds of oxygen per day basis and is appropriate for the pollutant of concern and consistent with the provisions of CWA and federal regulations. See 40 CFR 130.2(j)

**8. Margin of Safety:** *Submission describes explicit and/or implicit margin of safety for each pollutant.*

(TMDL report, page 39)

The TMDL incorporates an explicit margin of safety as 1) an adjustment to the flow term in the equation for excess net oxygen demand to account for flow measurement error and 2) percentage of the excess net oxygen demand to account for technical uncertainty in allocation of loads at 20%. Margin of safety is calculated as follows:  $MOS = -0.2 \times ENOD$  (excess net oxygen demand). This margin of safety is applied in the determination of the TMDL as an additional amount of excess net oxygen demand that must be removed by those responsible for the various contributing factor, as such the margin of safety must have a negative sign.

EPA considers this an appropriate approach for dealing with uncertainty concerning the relationship between TMDL, wasteload allocations, load allocations, and water quality conditions.

**9. Seasonal Variations and Critical Conditions:** *Submission describes method for accounting for seasonal variations and critical conditions in the TMDL(s).*

The submittal relies on water quality objectives which are identified in the Basin Plan and applicable for specific seasons of the year.

This TMDL takes into account seasonal variations in critical conditions by basing the allocations as the equations directly incorporate the dissolved oxygen at saturation which reflects temperature. In addition, the flow is measured concurrently with the dissolved oxygen measurement. The flow and temperature are factors which influence the mechanisms on dissolved oxygen concentration.

**10. Public Participation:** *Submission documents provision of public notice and public comment opportunity; and explains how public comments were considered in the final TMDL(s).*

The Central Valley RWQCB adequately held public meetings and responded to written and oral comments from the public. The Central Valley RWQCB public hearings were held on July 8 and 9, 2004, and January 27, 2005 for the purpose of receiving testimony on the proposed basin plan amendment. California SWRCB also held a public hearing November 16, 2005 for approval of this TMDL. Stakeholder comments were addressed in these workshops and hearings.

The State demonstrated how it provided sufficient opportunities for public comment.

**11. Technical Analysis:** *Submission provides appropriate level of technical analysis supporting TMDL elements.*

The TMDL analysis provides an acceptable review and summary of available information about dissolved oxygen in the watershed, and a sufficiently clear discussion of analytical methods used to calculate this TMDL.

EPA concludes the State was reasonably diligent in its technical analysis of the oxygen demanding substances or their precursors with the potential to impact the dissolved oxygen impairment.

**12. Reasonable Assurances:** *If waste load allocations are made less stringent based on inclusion of load allocations that reflect nonpoint source reductions, submission describes how there are reasonable assurances necessary nonpoint source reductions will occur.*

not applicable

**13. Other:** *table for clarifying submittal for TMDL waterbody-combinations for corresponding 303(d) listing, new impairment findings or non-impairment findings.*

not applicable