

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2015-0008

CONTROL PROGRAM FOR THE DISSOLVED OXYGEN IMPAIRMENT IN THE
STOCKTON DEEP WATER SHIP CHANNEL

WHEREAS, the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) finds that:

1. From 1913 to 1933, the San Joaquin River downstream of Stockton was dredged forming the Stockton Deep Water Ship Channel. This deep water channel serves as a shipping corridor for ocean-going cargo ships, and as a migration corridor for anadromous fish such as Chinook salmon and steelhead.
2. Since the mid-1930s, the San Joaquin River near Stockton has experienced regular periods of low dissolved oxygen. These conditions occurred year-round, and resulted in fish kills and the delay of the fall upstream migration of Chinook salmon.
3. In 1983, a continuous water quality monitoring station was installed by the Department of Water Resources in the San Joaquin River near Stockton on Rough and Ready Island. This monitoring station collects continuous dissolved oxygen data. Since data collection began, the annual excursion rate (dissolved oxygen levels measured below (i.e., not meeting) water quality objectives) has been as high as 48 percent in 1992 and as high as 46 percent as recently as 2002.
4. In 1994, fourteen miles of the Stockton Deep Water Ship Channel between Disappointment Slough and Stockton were listed on the Clean Water Act Section 303(d) list as impaired for low dissolved oxygen. In 1998, this listing was identified as a high priority.
5. In 2005, the Central Valley Water Board adopted Resolution No. R5-2005-0005, amending the Basin Plan with a Control Program for Factors Contributing to the Dissolved Oxygen Impairment in the Stockton Deep Water Ship Channel. The Basin Plan amendment and Control Program were approved by the State Water Resources Control Board and Office of Administrative Law in 2006 and by USEPA in 2007.
6. The Control Program identified three main contributing factors to the dissolved oxygen impairment – loads of oxygen demanding substances from upstream point and non-point sources, the geometry of the Stockton Deep Water Ship Channel, and reduced flow through the Stockton Deep Water Ship Channel. The

Control Program did not specify the relative responsibility among the three contributing factors. Instead, it considered each of the three contributing factors to be 100% responsible for addressing the excess net oxygen demand and margin of safety.

7. For the parties responsible for contributing oxygen demanding substances, allocations for oxygen demand above the assimilative capacity (excess net oxygen demand) were identified as follows:
 - 30% waste load allocation for the City of Stockton's Regional Wastewater Control Facility
 - 60% load allocation to non-point sources of algae and/or precursors (i.e., nutrients) in the watershed
 - 10% reserve for unknown sources and impacts, and known or new sources that have no reasonable potential to impact

8. The Control Program directed the Central Valley Water Board to use its authority under California Water Code §13267, or alternatively by Waste Discharge Requirements and National Pollution Discharge Elimination System (NPDES) permits, to require entities for sources of oxygen demanding substances and their precursors within the TMDL source area to conduct additional watershed studies in order to reevaluate the assigned allocations. These studies were required to identify and quantify the following:
 - sources of oxygen demanding substances and their precursors in the TMDL source area
 - growth or degradation mechanisms of these substances as they are transported through the source area downstream to the Stockton Deep Water Ship Channel
 - the impact of these substances on dissolved oxygen concentrations in the Stockton Deep Water Ship Channel under a range of environmental conditions and considering the effects of chemical, biological, and physical mechanisms that add or remove dissolved oxygen from the water column

9. The Control Program studies were completed in two phases because of the large size of the San Joaquin River watershed. In 2005, the first set of studies was conducted in the upstream, riverine reach of the San Joaquin River from Mossdale to the confluence with Bear Creek at Lander Avenue. These studies were completed in 2008 and focused on identifying sources and growth or degradation mechanisms. In 2011, the final set of studies was conducted in the downstream, tidally-influenced reach of the San Joaquin River from Mossdale to Disappointment Slough. These studies were completed in 2014 and were focused on identifying and quantifying the impact of oxygen demanding substances and their precursors (i.e., nutrients) on dissolved oxygen conditions

in the Stockton Deep Water Ship Channel under a range of environmental conditions.

10. In 2014, an independent scientific peer review of the studies was conducted. The peer review panel expressed concerns with the models used and recommended they not be relied upon, at this time, for revising load and waste load allocations. The Panel suggested the model used in the upstream riverine reach could be used if improvements were made but felt that the model used in the downstream, tidally-influenced estuary was inappropriate altogether. However, the Panel did conclude the models could be used as screening tools to improve our understanding of the San Joaquin River system. In order to revise the allocations, additional work on the models would be required.
11. To address the waste load allocation for the City of Stockton's Regional Wastewater Control Facility, the City upgraded the Facility to comply with its 2008 NPDES permit which required ammonia reductions. In 2014, the City was issued a new permit that required further ammonia reductions and the addition of denitrification to the treatment train. This will further reduce the nitrogen loading into the San Joaquin River once the treatment facility is upgraded.
12. In 2003, a peer review of dissolved oxygen studies suggested aeration as a means of increasing dissolved oxygen levels in the Stockton Deep Water Ship Channel. The San Joaquin River Steering Committee proposed aeration as a component of the Committee's 2003 Dissolved Oxygen TMDL Implementation Plan, and a letter of intent to fund an aeration device was submitted to the Central Valley Water Board by the Port of Stockton, the San Joaquin River Group Authority, the State Water Contractors, the San Luis & Delta-Mendota Water Authority and the San Joaquin Drainage Authority.
13. In 2006, the Department of Water Resources, using bond funds, constructed a full-scale aeration facility at the Port of Stockton on Rough and Ready Island.
14. The aeration facility was demonstrated from 2008 to 2010 to test the feasibility of the system to increase dissolved oxygen concentrations in the Stockton Deep Water Ship Channel. The demonstration of the facility showed that under positive flow conditions, the aerator was effective at increasing dissolved oxygen concentrations within the channel.
15. In May 2011, following completion of the demonstration project, Central Valley Water Board staff requested interested parties consider developing an aeration agreement to ensure continued operation of the aeration facility.
16. In March 2012, ownership of the aeration facility was transferred from the Department of Water Resources to the Port of Stockton. At the same time, a five-year voluntary aeration agreement between the Port of Stockton, the San

Joaquin River Group Authority, the State Water Contractors, the San Luis & Delta-Mendota Water Authority and the San Joaquin Drainage Authority was finalized. This agreement provided funding for the operation and maintenance of the aeration facility with possible extensions through May 2016.

17. The aerator has been operated for limited periods since the end of the demonstration period. In 2012, the aerator was operated for 42 days between June and October delivering approximately 193,000 pounds of oxygen to the channel. In 2013, the aerator was operated for 23 days in September delivering approximately 80,000 pounds of oxygen to the channel.
18. Between the adoption of the 2008 NPDES permit for the City of Stockton Regional Wastewater Control Facility and 2013, the average annual excursion rate was less than three percent.
19. Starting in September 2012, the aeration facility has been operated to minimize excursions below the dissolved oxygen water quality objective. Under this operating regiment, the rate of excursions below water quality objectives for 2013 has been less than one percent.

THEREFORE BE IT RESOLVED:

1. The Central Valley Water Board recognizes that dissolved oxygen levels in the Stockton Deep Water Ship Channel have improved significantly since 2008 due to implementation of the Control Program as well as other regulatory actions.
2. The Central Valley Water Board recognizes that a number of other actions have impacted water quality in the Stockton Deep Water Ship Channel. These actions include adoption or updates of the following permits or Waste Discharge Requirements: the NPDES Permit for the City of Stockton Regional Wastewater Control Facility, the Municipal Separate Storm Sewer System Permits for the City of Stockton, County of San Joaquin, and Port of Stockton, the NPDES Permit for Storm Water Discharges for small storm water systems in the San Joaquin River basin, Waste Discharge Requirements for irrigated agriculture in the San Joaquin River basin, and Waste Discharge Requirements for the Port of Stockton berth dredging. Each of these actions has improved dissolved oxygen conditions in the Stockton Deep Water Ship Channel by reducing the discharge of oxygen demanding substances or their precursors (i.e., nutrients) or by requiring aeration.
3. The Central Valley Water Board recognizes that studies undertaken as directed by the Control Program were completed in 2014. The Control Program studies included data collection, data evaluation, and modeling to characterize the lower San Joaquin River and the Stockton Deep Water Ship Channel.

4. The Central Valley Water Board recognizes that, based upon the information gathered during the Control Program studies, it is not feasible to revise the load allocations included in the Control Program. Additional information regarding the relationship between upstream loads of oxygen demanding substances and their precursors and their impacts on conditions in the Stockton Deep Water Ship Channel would be required to revise the load allocations included in the Control Program.
5. The Central Valley Water Board directs staff to continue to implement the Control Program.
6. The Central Valley Water Board supports the continued operation of the aeration facility located at the Port of Stockton on Rough and Ready Island to minimize excursions below the dissolved oxygen water quality objectives.
7. The Central Valley Water Board strongly supports a stakeholder agreement to ensure continued operation of the aeration facility located at the Port of Stockton on Rough and Ready Island.
8. The Central Valley Water Board directs staff to use authority granted under California Water Code Section §13267 to require additional studies to further characterize how the three main contributing factors identified in the Control Program affect dissolved oxygen levels in the Stockton Deep Water Ship Channel if operation of the aeration facility does not continue and excursions below the water quality objectives occur.
9. The Central Valley Water Board recommends that, if funding becomes available, additional continuous monitoring stations be installed upstream and downstream of the aeration facility to better characterize dissolved oxygen conditions in the Stockton Deep Water Ship Channel.
10. The Central Valley Water Board supports future efforts to improve water quality in the Stockton Deep Water Ship Channel.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 6 February 2015.

Original signed by

PAMELA C. CREEDON, Executive Officer