Revision of the Implementation Plan for Tillman, LA-Glendale, and Burbank POTWs in the Total Maximum Daily Load for Metals for the Los Angeles River and its Tributaries

Staff Report

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1. Introduction

This staff report discusses the scientific and regulatory basis for a proposed Basin Plan amendment to revise the implementation plan for the Los Angeles River and Tributaries Metals Total Maximum Daily Load (TMDL). The proposed revision extends the implementation schedule for the three largest publicly owned treatment works (POTWs) in the watershed and establishes interim copper waste load allocations (WLAs) for these POTWs.

1.1 History of the TMDL

The Los Angeles Regional Board adopted the Los Angeles River and Tributaries Metals TMDL on June 2, 2005 under Resolution No. R05-006. The TMDL was subsequently approved by the State Water Resources Control Board (State Board), the Office of Administrative Law (OAL), and U.S. EPA. The effective date of the TMDL was January 11, 2006, when the Certificate of Fee Exemption was filed with the California Department of Fish and Game.

The Regional Board re-adopted the TMDL on September 6, 2007 by Resolution No. R07-014 in compliance with a writ of mandate issued by the Los Angeles County Superior Court in the matter of *Cities of Bellflower et al. v. State Water Resources Control Board et al.* (Los Angeles Superior Court # BS101732). The writ directed the Regional Board to consider alternatives to the project before re-adopting the TMDL. The writ was limited to this issue, and the TMDL was affirmed in all other respects. The only manner in which the re-adopted TMDL differs from the previous TMDL is in the new alternatives analysis and the implementation deadlines, which are now identified with actual calendar dates instead of the number of months or years from the "effective date of the TMDL."

The re-adopted TMDL was subsequently approved by State Board, OAL, and U.S. EPA. The effective date of the re-adopted TMDL is October 29, 2008. On May 7, 2009, the Regional Board voided and set aside the TMDL adopted under Resolution No. R05-006.

1.2 TMDL Requirements

The technical basis for the TMDL adopted by Resolution No. R05-006 and re-adopted by Resolution No. R07-014 is contained in the June 2005 staff report entitled "Total Maximum Daily Loads for Metals – Los Angeles River and Tributaries."

1.2.1 TMDL Numeric Targets

The TMDL specifies numeric targets for cadmium, copper, lead, and zinc based on criteria in the California Toxics Rule (CTR). The CTR allows for the adjustment of certain metals criteria through the use of a water-effect ratio (WER) that accounts for site-specific chemical conditions. The chemical conditions of a waterbody, such as the amount of dissolved organic matter in the water, can affect the bioavailability of metals to aquatic life. Metals that are less bioavailable are less toxic. A WER thus represents the correlation between metals that are measured and metals that are biologically available and toxic to aquatic life.

A WER is a ratio calculated by dividing an appropriate measure of toxicity of a material, such as the EC50[1], in site water by the same measure of toxicity of the same material in laboratory dilution water. A WER greater than 1.0 means that the site water reduces the toxic effects of the pollutant being tested. A WER less than 1.0 means that the site water increases the toxic effects of the pollutant being tested. Most metals criteria contained in the CTR can be modified to reflect site-specific conditions by multiplying the CTR criteria by a site-specific WER.

No site-specific WERs had been developed for the Los Angeles River at the time the TMDL was adopted. Therefore, for those metals criteria containing a WER multiplier, a WER default value of 1.0 was assumed, as directed in the CTR, when setting the TMDL numeric targets and allocations.

The numeric targets were adjusted for site-specific hardness and converted from dissolved metals to total recoverable metals. Separate numeric targets for wet and dry weather were calculated. Dry-weather targets are based on chronic criteria or the criteria continuous concentration (CCC). Wet-weather targets are based on acute criteria or the criteria maximum concentration (CMC). Because the proposed TMDL revisions are related to the implementation plan for copper, only the copper numeric targets are discussed here. The dry-weather numeric targets for copper are presented in Table 1.

[1] EC50 is the 50% effect concentration, or the concentration of a pollutant that adversely affects 50% of the test species.

Table 1. Dry-weather numeric targets for copper (µg/l) as presented in Table 3-1 of the June 2005 staff report. Reach-specific targets are based on chronic criteria (CCC) and 50th percentile hardness values for each reach. Conversion of dissolved to total recoverable metals is based on default or site-specific conversion factors.

Los Angeles River	Dissolved copper	Hardness (mg/L as $CaCO_3$)	Conversion factor	Total recoverable copper
LA Reach 6	29	702*	0.96	30
LA Reach 5 above Tillman	29	702*	0.96	30
LA Reach 4 below Tillman	19	246	0.74	26
LA Reach 3 above LAG WRP	22	282	0.96	23
LA Reach 3 below LAG WRP	21	278	0.80	26
LA Reach 2	21	268	0.96	22
LA Reach 1	22	282	0.96	23
Tributaries	**Dissolved copper**	**Hardness (mg/L as $CaCO_3$)**	**Conversion factor**	**Total recoverable copper**
Bell	29	702*	0.96	30
Tujunga	19	246	0.96	20
Verdugo Wash	22	282	0.96	23
Burbank (above WRP)	25	326	0.96	26
Burbank (below WRP)	18	229	0.96	19
Arroyo Seco	21	268	0.96	22
Compton Creek	18	225	0.96	19
Rio Hondo Reach 1	12	141	0.96	13

*Maximum hardness value for criteria adjustment is 400 mg/L

The wet-weather numeric targets for copper are presented in Table 2.

Table 2. Wet-weather numeric targets for copper (µg/l) as presented in Table 3-4 of the June 2005 staff report. Targets are based on acute criteria (CMC) and 50th percentile hardness value at the Wardlow station in Reach 1 (80 mg/L as $CaCO_3$). Conversion of dissolved to total recoverable metals based on site-specific conversion factor.

Dissolved copper	Conversion factor	Total recoverable copper
11	0.65	17

1.2.2 TMDL Allocations

The TMDL assigns WLAs for point sources and load allocations (LAs) for nonpoint sources in the watershed. The WLAs and LAs are interdependent and are calculated according to the following equation:

TMDL = Σ (POTW WLAs) + Σ (Storm Water Sources WLAs) + Direct Air Deposition LA + Open Space LA **Equation 1**

The Donald C. Tillman (Tillman), Los Angeles-Glendale (LA-Glendale), and Burbank water reclamation plants are the three largest POTWs in the Los Angeles River watershed. The final copper WLAs for these POTWs are shown in Table 3.

Table 3. Copper waste load allocations for three POTWs (µg/l total recoverable metals)

Facility	Design Flow (cfs)	Type of WLA	Copper WLA
Tillman	124	Concentration-based	26 µg/L
		Mass-based	7.8 kg/day
Glendale	31	Concentration-based	26 µg/L
		Mass-based	2.0 kg/day
Burbank	14	Concentration-based	19 µg/L
		Mass-based	0.64 kg/day

The concentration-based and mass-based copper WLAs apply at all times in dry weather. The mass-based copper WLAs are based on the design flows of the POTWs at the time of TMDL development. In wet weather, the mass-based copper WLAs do not apply when influent flows exceed the current design capacity of the treatment plants.

1.2.3 TMDL Implementation

The POTW copper WLAs are implemented through National Pollution Discharge Elimination System (NPDES) permits. The TMDL specifies that compliance schedules may allow up to five years in NPDES permits to meet WLA-based permit requirements. The TMDL also specifies that POTWs requiring advanced treatment to meet WLAs may be allowed an extension up to January 11, 2016. POTWs requesting an extension must submit work plans for the installation of advanced treatment by January 11, 2010.

The TMDL allows for voluntary special studies, including WER studies, to evaluate the uncertainties and assumptions made during TMDL development. The results of these studies are due by January 11, 2010. The Regional Board intends to reconsider the TMDL by January 11, 2011 to re-evaluate the WLAs and the implementation schedule based on the results of these special studies.

2. Background on Copper WER Development

2.1 2008 Copper WER Study

On October 18, 2005, the City of Los Angeles Bureau of Sanitation and the City of Burbank submitted a work plan for a copper WER study in the Los Angeles River downstream of the Tillman, LA-Glendale and Burbank POTWs. The copper WER study

included a public participation plan. As part of the plan, a technical advisory committee (TAC) and a stakeholder committee (SC) reviewed the work plan, work progress, and the final study report. The TAC included experts not affiliated with the project and the SC included Regional Board staff, other state and federal agency staff and other interested parties. Public participation and comments were also solicited through public workshops.

The study collected data from August 2005 to April 2006. The study was conducted in accordance with U.S. EPA's 2001 *Streamlined Water-Effect Ratio Procedure for Discharges of Copper* (Streamlined Procedure). In addition to the requirements of the Streamlined Procedure, the study included additional (above the minimum requirements) sampling events during dry weather conditions (the critical condition) and added toxicity testing for both wet and dry weather conditions to confirm the assumption that dry weather conditions are the critical condition. Two additional sampling stations were also included in Reaches 1 and 2 of the river, downstream of the POTWs, to ensure that copper WERs developed for the upstream reaches where the POTWs discharge would result in attainment of downstream water quality standards.

According to the Streamlined Procedure, to calculate a WER, side-by-side, laboratory water and site water toxicity tests are run to obtain the EC50 of a test species. The result may be expressed as either dissolved or total recoverable copper. After adjusting for any hardness differences between laboratory water and site water, the WER for the sample (sWER) is the lesser of (a) the site-water EC50 divided by the laboratory-water EC50, or (b) the site-water EC50 divided by the documented Species Mean Acute Value (the mean EC50 from a large number of published toxicity tests with laboratory water). The geometric mean of the two (or more) sWERs is the final WER.

The Cities' WER study used copper toxicity tests with a single sensitive species (*Ceriodaphnia dubia*) to develop dissolved copper EC50 data for the calculation of sWERs for the reaches of the river below the three POTWs, as well as for Reaches 1 and 2. The sWERs were grouped to calculate the final WERs based on variability in sampling location, weather conditions, and seasons. Variability was evaluated based on the raw toxicity test response data, as well as the sWERs. The analysis showed that sWERs for dry weather conditions were statistically lower than sWERs for wet weather conditions, leading to a lower or more stringent objective, confirming that dry weather was the critical condition. The study then grouped the dry weather sWERs for sites with statistically similar sWERs to calculate the final WERs. The resulting final WERs are shown in Table 4.

Table 4. 2008 Copper WER Study Recommended Final WERs

Sampling Site	Final WERs (Geometric Mean of Dry Weather Statistically Similar sWERs)
Tillman (Reach 4)	5.871
Burbank (Burbank Western Channel)	
LA-Glendale (Reach 3)	3.958
Reach 2	
Reach 1	

On June 3, 2008, the City of Los Angeles Regulatory Affairs Division and the City of Burbank submitted the *Final Report for the Los Angeles River Copper WER Study*. The final report is included as Appendix A to this report.

The 2008 copper WERs were developed for specific reaches of the Los Angeles River with the intention that they could be used to support development of copper site-specific objectives or, in accordance with the "Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" (State Implementation Policy or SIP), directly incorporated into the NPDES permits for the three POTWs.

2.2 Watershed-Wide Copper WER Study

On May 20, 2009, the City of Los Angeles Bureau of Sanitation Watershed Protection Division submitted a separate draft work plan for a copper WER to support implementation of the Los Angeles River and Tributaries Metals TMDL. The intention of this study is to complement the previous 2008 study by developing copper WERs for the entire Los Angeles River and its tributaries in order to revise TMDL copper WLAs for all sources in the watershed. The proposed study is geared towards a watershed-wide application of any resulting WERs. Given the broad geographic scope of the resulting WERs and their potential application in multiple board actions, they have a greater potential to impact the affected water bodies; therefore, the new study will include a more extensive data set than was used in the 2008 study. The applicable EPA guidance for the proposed WER study is the *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals* (U.S. EPA, 1994). The Streamlined Procedure is recommended only for situations where copper concentrations are elevated primarily by continuous point source effluents. The tributaries under consideration in the proposed watershed-wide study do not have copper concentrations elevated primarily by continuous point source effluents.

The proposed study also will include a public participation plan with a TAC and SC. The cities revised the May 20, 2009 work plan based on stakeholder and TAC comments and submitted it to the Regional Board on November 2, 2009. According to the revised work plan, the watershed-wide copper WER study will not be completed before August 2011.

3. Rationale for Revisions to TMDL Implementation Plan

Given that there is a metals TMDL for the Los Angeles River in effect with WLAs established for the three POTWs, the POTW permit limitations must be based on the existing WLAs in the TMDL. This is because the existence of WLAs takes precedent over the WER provisions in the SIP. Both state and federal law require that NPDES permits are consistent with any available WLAs (40 CFR 122.42 ; Cal. Water Code §13263).

In order to apply the copper WERs developed by the 2008 study to the copper effluent limitations in the NPDES permits for the three POTWs, the TMDL must be revised to adjust the copper WLAs based on the WERs. However, because the WLAs for all point and nonpoint sources are interdependent, adjusting the final copper WLAs for the three major POTWs would necessitate adjusting the final copper WLAs for other sources in the watershed in order to achieve the TMDL (see equation 1). Furthermore, as previously mentioned, the Streamlined Procedure is only applicable in situations where copper concentrations are elevated primarily by continuous point source effluents. Therefore, the copper WERs developed in the 2008 study, which were calculated according to the Streamlined Procedure, should not be used to adjust the final copper WLAs for sources other than the POTWs. Additional time and data would be needed to revise the final copper WLAs for all sources in the watershed. Therefore, it is necessary to wait for the completion of the watershed-wide copper WER study, as well as any other special studies, before revising all of the final copper WLAs for all sources. This will ensure that any revised final copper WLAs are scientifically defensible and protective of beneficial uses and downstream standards.

In the meantime, the current TMDL implementation schedule and permit provisions for the three facilities require that the Tillman, LA-Glendale and Burbank POTWs must achieve compliance with NPDES permit limits for copper based on the existing final copper WLAs by January 11, 2011. The POTWs will not be able to meet the existing copper limits by January 11, 2011. However, neither will the POTWs submit a work plan for the installation of advanced treatment in order to receive an extended implementation schedule. This is because the 2008 WER study demonstrates that the POTWs can discharge copper at levels higher than the WLA-based permit limits and still fully protect beneficial uses. The study results indicate that, for copper, it may not be necessary to undertake capital improvement projects to attain the final WLAs, since WER-adjusted WLAs would be protective of beneficial uses. The Cities of Los Angeles and Burbank have requested that the Regional Board adjust the permit limits to reflect the 2008 WER study given these study findings. The only way to modify the POTWs' final permit limits to reflect the 2008 WER study is to modify the final copper WLAs for all sources, established in the TMDL, to reflect the 2008 WER study, which is not appropriate at this time for reasons previously discussed. Therefore, staff proposes an extension of the implementation schedule for the POTWs to allow them additional time to attain copper WLA-based permit limits with the clear expectation that the final copper WLAs may be revised in the future based on the 2008 WERs or subsequently developed watershed-wide WERs, and other data.

4. Proposed Changes

The proposed amendment revises the Los Angeles River Metals TMDL to extend the implementation schedule for the Tillman, LA-Glendale, and Burbank POTWs to achieve their final WLAs until three years after the effective date of this amendment. Additionally, the proposed amendment revises the TMDL to incorporate interim copper

WLAs for these POTWs, which shall apply in the meantime until compliance with the final copper WLAs is required. The extended implementation schedule will allow the POTWs additional time before the final copper WLAs apply and will allow for the completion of the watershed-wide WER study that may be used to adjust the final copper WLAs for all sources. The extended implementation schedule acknowledges the early and cooperative efforts of the Cities of Los Angeles and Burbank to develop a copper WER. The three year implementation schedule for the interim copper WLAs is consistent with the required review period for state revision of water quality standards and related implementation provisions (40 CFR 131.20). The interim copper WLAs are based on the 2008 WER study, which was developed under the guidance of the TAC and Regional Board staff, and will protect water quality and beneficial uses until the final copper WLAs apply.

4.1 Calculation of Interim Copper WLAs

The 2008 WER study final report proposed applying the final copper WER of 5.87 to the Tillman and Burbank POTWs and the final copper WER of 3.96 to the LA-Glendale POTW (Table 4). The report included an analysis of the protectiveness of WER-modified copper water quality objectives on downstream beneficial uses (Section 8 of the report). The analysis estimated the frequency that in-stream copper concentrations would exceed WER-modified water quality objectives for a given reach. However, staff does not believe that this analysis adequately demonstrates that upstream WER-modified objectives will attain downstream water quality standards. Therefore, staff proposes to apply the more protective downstream copper WER of 3.96 to all upstream reaches when calculating the interim copper WLAs.

The interim copper WLAs for the Tillman, Burbank, and LA-Glendale POTWs are based on the copper WER of 3.96 and the final concentration-based WLA for copper (Table 3) according to the following equation:

Interim Copper WLA = final Copper WLA x Copper WER **Equation 2**

The resulting interim WLAs for copper for the three POTWs are presented in Table 5. These apply at all times during dry and wet weather.

Table 5. Interim WLAs for Copper for Three POTWs

Discharger	POTW Interim Copper WLAs (total recoverable metals)
Tillman	26 x 3.96 = 103 µg /L
LA-Glendale	26 x 3.96 = 103 µg /L
Burbank	19 x 3.96 = 75 µg /L

Permit writers may translate the interim copper WLAs into interim daily maximum and interim monthly average copper effluent limitations for the POTWs by using the 2008 WER of 3.96 to adjust the CTR criteria, and applying the effluent limitation procedures in Section 1.4 of the SIP or other applicable engineering practices authorized under federal regulations.

4.2 Proposed Changes to Implementation Schedule and Monitoring

The proposed extension to the TMDL implementation schedule will allow for the interim copper WLAs for the Tillman, LA-Glendale, and Burbank POTWs to apply for up to three years following the effective date of this amendment. After that date, the final copper WLAs will apply.

The Tillman, LA-Glendale, and Burbank POTWs must conduct additional receiving water monitoring to verify that water quality conditions for the interim copper WLA implementation period are similar to those of the 2008 copper WER study period. Monitoring is also required to determine if the WER-based interim copper WLAs will achieve downstream water quality standards. This additional monitoring shall be required through the POTWs' NPDES permit monitoring and reporting programs or other Regional Board required monitoring programs. The Regional Board will evaluate the WER-based interim copper WLAs based on potential changes in the chemical characteristics of the water body that could impact the calculation or application of the WER and will revise the WERs and interim copper WLAs, if necessary, to ensure protection of beneficial uses.

Finally, in the event that a watershed-wide copper WER study is not completed, the Regional Board will consider the results of the 2008 copper WER study as well as data from the receiving water monitoring described above for the purposes of adjusting the final copper WLAs for the POTWs when the TMDL is reconsidered.

5. References

City of Los Angeles Regulatory Affairs Division and the City of Burbank. 2008. Final Report for the Los Angeles River Copper WER Study, June 3, 2008.

City of Los Angeles Bureau of Sanitation Watershed Protection Division. 2009. Draft Work Plan for a WER to Support Implementation of the Los Angeles River and Tributaries Metals TMDL, May 20, 2009.

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