Strategy to Optimize Resource Management of Storm Water (STORMS)

Identify Opportunities for Source Control and Pollution Prevention

Discussion and Recommendations

To Address Zinc in Urban Receiving Waters

June 18, 2019

DIVISION OF WATER QUALITY

STATE WATER RESOURCES CONTROL

Contents

Attachments

I. Executive Summary

Storm water runoff from municipalities, industrial facilities, and construction sites is a source of pollutants and contributes to water quality impairments in developed areas of California. Population growth and effects associated with climate change (e.g., drought, forest fires, and flooding) exacerbate such impairments and increase pressure on the state to take immediate action to more effectively address impacts to its water resources.

Zinc is a metal emitted to the environment from a variety of natural and anthropogenic sources. In urban runoff, zinc levels are commonly elevated resulting in zinc impairments in California water bodies. While zinc concentrations in urban runoff do not generally pose a threat to human health, concentrations above established water quality objectives can be toxic to aquatic organisms.

The California Stormwater Quality Association (CASQA), which represents the municipal storm water management community, developed a report in 2015 titled "Zinc Sources in California Urban Runoff" (CASQA Report),[1] motivated at least in part by the difficulty municipalities face in complying with two total maximum daily loads (TMDLs) for zinc. CASQA used existing scientific literature to examine likely sources of zinc in California's urban runoff and group them into major and minor sources for the purpose of developing cost-effective control measures. Zinc-containing paint, galvanized materials, and vehicle tires (including tire-derived fuels, tire shred and crumb products, and tread wear) are identified as potential major sources of zinc. The CASQA Report concludes that "treating urban runoff to achieve compliance, while theoretically feasible, could cost billions of dollars statewide" and instead promotes source control alternatives.

CASQA reached out to the State Water Resources Control Board (State Water Board) to consider a statewide source control approach to address zinc contributions from tires. As a result, State Water Board staff included *Evaluation of Zinc Sources in Urban Runoff* as a potential pilot project involving working with the Department of Toxic Substance Control (DTSC) to evaluate zinc in tires under its Safer Consumer Products Regulations as part of the State Water Board's Strategy to Optimize Resources Management of Storm Water (Storm Water Strategy or STORMS).[2] The Storm Water Strategy identifies goals, objectives, and actions for the State Water Board and nine Regional Water Boards (the Water Boards) to better regulate, manage, and utilize California's storm water resources. The pilot project was merged with Project 6b: *Identify Opportunities for Source Control and Pollution Prevention* as it supports the

[1] Attachment B of this report.

[2] https://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/docs/storms_strategy.pdf.

Storm Water Strategy's Goal 4: Collaborate in Order to Solve Water Quality and Pollutant Problems with an Array of Regulatory and Non-Regulatory Approaches.

Storm Water Strategy

Goal 1: Change the Perspective that Stormwater is a Waste or Hazard, and Treat it as a Valuable Water Resource.
Goal 2: Manage Stormwater to Preserve Watershed Processes and Achieve Desired Water Quality and Environmental Outcomes.
Goal 3: Implement Efficient and Effective Regulatory Programs.
Goal 4: Collaborate in order to Solve Water Quality and Pollutant Problems with an Array of Regulatory and Non-Regulatory Approaches.

This report is the result of stakeholder interest, in addition to CASQA, in the STORMS project to identify potential solutions the Water Boards may implement to address zinc exceedances in urban receiving waters. STORMS Unit staff convened a Work Group consisting of representatives from CASQA, the International Zinc Association (IZA), and the United States Tire Manufacturers Association (USTMA)[3] to discuss the data and information used to identify zinc sources in urban runoff and make a recommendation to the State Water Board. The Work Group met several times in 2017 to identify potential approaches to address zinc exceedances.[4] The Work Group identified three approaches (summarized below): Approach 1 is a source control strategy while Approaches 2 and 3 are compliance-based. These approaches are not mutually exclusive and pursuing multiple approaches may present the best solution to effectively address zinc exceedances and directly address the difficulty some municipalities are having complying with zinc TMDLs.

Source Control Strategy:

Approach 1: Track and support the DTSC's Safer Consumer Products program review of CASQA's petition, aimed at initiating a process to evaluate zinc in tires and options to minimize or eliminate zinc in tires.

Compliance-Based Strategies:

Approach 2: Develop a bioavailability-based (e.g., Biotic Ligand Model) water quality objective for zinc to apply in Water Boards actions.

Approach 3: Establish regulatory approaches that would create flexibility for NPDES permittees to meet their obligations:

a. Perform a use attainability analyses to revise or remove beneficial uses;

[3] Formerly Rubber Manufacturers Association (RMA).

[4] Attachment A contains a record of materials shared between members of the Work Group.

b. Develop site-specific criteria through use of a water-effect ratio;
c. Adopt a water quality standard variance for MS4 dischargers (potentially applicable only to MS4 dischargers subject to TMDL-assigned waste load allocations); or
d. Revise two TMDL implementation Schedules (applicable only to MS4 dischargers subject to TMDL-assigned waste load allocations).

Ultimately, the Work Group and STORMS Unit staff came to different conclusions on the appropriate recommended next steps. The Work Group recommends that the Water Boards implement Approach 2 (development of a bioavailability-based (e.g., Biotic Ligand Model, referred to as the BLM) water quality objective for zinc to apply in Water Boards actions). Because the time required for the Water Boards to implement Approach 2 is beyond the near-term TMDL compliance dates for the two TMDLs of concern, the Work Group additionally recommended that the Water Boards first implement Approach 3.c (development of a statewide water quality standard variance for MS4 dischargers).

Based on the resources necessary to implement the preferred Work Group recommendation, an ongoing effort by the United States Environmental Protection Agency (USEPA) to develop a bioavailability-based water quality objective for zinc and existing tools available to the Water Boards to address TMDL specific-concerns, staff instead recommends the Water Boards 1) track and support efforts initiated recently with DTSC to address zinc in tires; and 2) support the Regional Water Boards when and if they consider one of the compliance-based strategies discussed in Section III of this report (Approaches 2 and 3a-d).

II. Background

A primary responsibility of the Water Boards is to identify impaired water bodies that do not meet applicable water quality standards.[5] These impaired waters are listed on the California Integrated Report. There are 39 Integrated Report[6] listings in six regions for zinc. Each listing requires a TMDL or TMDL-equivalent plan to restore the impaired water body. Statewide to date, 15 TMDLs have been adopted for zinc in three regions (Table 1).

Table 1. Statewide Zinc TMDLs

Los Angeles Regional Water Board
Ballona Creek Metals
Ballona Creek Estuary Toxics

[5] Clean Water Act 303(d)

[6] 2014 and 2016 California Integrated Report

Colorado Lagoon OC Pesticides, PCBs, Sediment Toxicity, PAHs, and Metals
Los Angeles and Long Beach Harbor Waters Toxic Pollutants – Dominguez Channel & Torrance Lateral Channel
Los Angeles and Long Beach Harbor Waters Toxic Pollutants – Dominguez Channel Estuary
Los Angeles and Long Beach Harbor Waters Toxic Pollutants – Greater Los Angeles / Long Beach Harbor Waters
Los Angeles and Long Beach Harbor Waters Toxic Pollutants – Consolidated Slip
Los Angeles and Long Beach Harbor Waters Toxic Pollutants – Fish Harbor
Los Angeles River and Tributaries Metals
*Los Cerritos Channel Metals
Marina del Rey Harbor Toxics
San Gabriel River Metals & Selenium (Coyote Cr.)
Santa Ana Regional Water Board
San Diego Creek and Newport Bay Toxics – San Diego Creek (freshwater)
San Diego Creek and Newport Bay Toxics – Upper Newport Bay (saltwater)
San Diego Creek and Newport Bay Toxics – Rhine Channel area of Lower Newport Bay (saltwater)
San Diego Regional Water Board
*Chollas Creek Metals
*** TMDLs of CASQA focus**

Municipal compliance with two TMDLs for zinc adopted by the Los Angeles and San Diego Regional Water Boards – the Los Cerritos Channel Metals TMDL and the Chollas Creek Metals TMDL, respectively – has been challenging due to the high cost of treating urban storm water runoff for zinc. A list of applicable TMDLs and associated milestones is included in Table 2. This compliance challenge is what motivated CASQA to approach the State Water Board to develop a new approach or alter existing approaches to address zinc.

Table 2. CASQA Zinc TMDLs of Concern and Associated Milestones

Zinc TMDL	Regional Water Board	Milestones
Los Cerritos Channel Metals TMDL (2010) R4-2012-0175 -Amended by R4-2013-004	Los Angeles (Region 4)	Compliance measured by % of drainage area served by the storm drain system is effectively meeting the wet-weather Wasteload Allocations:[7] 9/30/2017 – 10% 9/30/2020 – 35% 9/30/2023 – 65 % 9/30/2026 – 100%

[7] https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R13-004_RB_BPA.pdf

Chollas Creek Metals TMDL (2008) R9-2007-0043 -Amended by R9-2015-0001 -Amended by R9-2017-0015*	San Diego (Region 9)	Compliance measures as the Allowable exceedance of the wasteload allocations:[8] 20% (above WLA) at 10 years 0% (above WLA) at 20 years

*For State Water Board consideration in 2019.

The traditional approach to address zinc in urban receiving waters is treatment. Storm water capture and treatment is used throughout the state to address both water quality and water supply. The potential combinations of capture and treatment, end-of-pipe treatment, and pretreatment of storm water may be necessary to reduce zinc to compliant concentrations. However, these options may be costly to install, manage, and maintain. In addition to cost, space limitations exist where zinc concentrations in runoff are anticipated to be the highest combined with the large footprint necessary for treatment makes treatment difficult. Another costly option is to divert storm water runoff to wastewater treatment plants. This would require additional infrastructure to move and store storm water where additional flows mays exceed a plant's existing capacity. In addition, plant upgrades may be necessary along with increases to operational costs.

CASQA developed a report summarizing the various sources of zinc in urban receiving waters (Section II.1 below) which initiated a coordinated STORMS project to target zinc contributions from tires. The report resulted in various responses from IZA and USTMA summarized in Sections II.2-3 below.

1. California Stormwater Quality Association Report

The CASQA Report used existing scientific literature to examine sources of zinc in California urban runoff, identify major source contributors and promising source control strategies for the major sources, and recommend steps toward implementing zinc source control strategies. Likely sources of zinc were identified and grouped into major and minor sources. Major sources identified include zinc-containing paints, galvanized materials, and tires. The State Water Board staff and CASQA met in February 2016 to discuss Recommendation 5 of the CASQA Report: "Examine the possibility of petitioning the California Department of Toxic Substance Control to require evaluation of zinc in tires under its Safer Consumer Products Regulations." The State Water Board agreed to provide staff resources to work with CASQA on development of a petition and, if appropriate, to submit the petition to DTSC; ultimately, however, CASQA submitted the petition on its own (the status of the petition is discussed below).

[8] https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/chollascreekmetals/update011509/R9-2007-0043_Signed.pdf

CASQA Report Recommendations

1. To identify major zinc sources in specific urban watersheds, develop a watershed-specific zinc inventory based on local watershed information.
2. Integrate source control into zinc load reduction programs.
3. Employ source control to reduce zinc in runoff from industrial facilities.
4. Develop a menu of zinc source control strategies for municipalities.
5. Examine the possibility of petitioning the California Department of Toxic Substance Control to require evaluation of zinc in tires under its Safer Consumer Products Regulations.
6. Seek integration of water quality considerations into California Department of Resources Recycling and Recovery's (CalRecycle's) water tire market development programs.
7. Seek integration of water quality considerations into U.S. EPA's review of zinc biocides.

2. International Zinc Association Review of CASQA's Report

In July 2016, IZA performed a technical review of the CASQA Report. In its report, *Critical Technical Review of Zinc Sources in California Urban Runoff* (IZA Report),[9] IZA supported several of CASQA's recommendations but felt that the report did not provide a novel synthesis of existing scientific knowledge.

IZA Review Comments

1. Urban runoff as a contaminant delivery mechanism does not provide a definitive linkage to sources or causality for impairment.
2. Source reduction strategies for zinc will not facilitate controlled emissions unless a comprehensive characterization of source apportionment is performed at the watershed scale.
3. No study has attempted to characterize or quantify the fate and transport of tire particles or, more importantly, liberated/leached zinc.
4. Local studies are necessary to confirm methods and calculations taken from the literature.
5. Evidence linking environmental zinc concentrations to tire wear debris is circumstantial.

The IZA Report challenged CASQA's literature analysis and emphasized the need to reevaluate water quality conditions using state-of-the-science methodologies (I.e., bioavailability-based water quality objective, Approach 2). The IZA Report identified

[9] Attached to this report as Attachment C.

uncertainty in the CASQA Report due to what it characterized as the use of circumstantial evidence to link tire wear debris to environmental zinc concentrations. Specifically, the IZA Report disagreed that edge of pavement zinc concentrations along with zinc-impaired urban waters in the California Integrated Report provide a definitive linkage to tires or necessitates a statewide solution. The IZA Report also critiqued the CASQA Report for not presenting zinc loads in context to all sources, including industrial and municipal wastewater treatment plant discharges as well as non-urban zinc sources.

IZA does support Recommendation 1 in the CASQA Report to "Identify major zinc sources in specific urban watersheds and develop a watershed-specific zinc source inventory based on local watershed information." IZA further added that only after a comprehensive characterization of zinc sources and apportionment at a watershed scale could comprehensive source reduction strategies for municipalities be developed.

The IZA Report added that the federal Clean Water Act section 303(d) listings driving the existing zinc TMDLs should be reassessed with a state-of-the-science analysis. IZA recommends developing revised water quality objective using the Biotic Ligand Model, described in greater detail below, to reassess all zinc-impaired water listings. IZA met with Water Boards staff to present information on the BLM on at least two occasions. In April 2017, IZA provided a memo informing the Water Boards of two ongoing projects related to a zinc BLM[10]

3. United States Tire Manufacturers Association Report

In November 2016, USTMA released a report titled *State of Knowledge Report – Contribution of Zinc to Watersheds from Building Materials, Consumer Products, Tires and Other Sources* (USTMA Report).[11] The USTMA Report generally found that zinc from tires is unlikely to be the source of impairments. The USTMA provided a summary of existing information regarding sources of zinc and tire wear rates and concluded that the vast majority of zinc is used in galvanization (85%) and metal alloys (12%) while very little (3%) is used for non-metallic purposes. The USTMA Report highlighted other zinc sources for which quantitative estimates of their zinc contributions in an urban watershed is missing, such as littered batteries and municipal and industrial waste discharges. USTMA additionally claimed that CASQA's use of studies from cities outside the United States is inappropriate and that a comprehensive zinc emission or mass balance for United States cities is necessary to support CASQA's conclusions.

[10] This memo is included in Attachment A of this report and summarized under Approach 2.

[11] Attached to this report as Attachment D.

USTMA Report Summary

1. Given the diversity of sources, different release mechanisms, and local, regional, and country controls, it is not possible to generalize studies to determine specific source contributions in U.S. locations.
2. Location-specific inventories are necessary to understand the significance of individual sources on a watershed or region.
3. Unlikely that zinc associated with tire wear would show a contribution to surface water exceeding 5 or 10% of all sources in an inventory assessment.
4. Quantitative estimates have not been provided for other potentially significant sources, such as littered batteries and discharge from treated municipal and industrial waste.
5. No watershed plans have suggested – or are able to suggest – that complete removal of zinc from tires would noticeably improve water quality.
6. To date, no published studies have been identified to indicate the possibility or commercialization of zinc-free vulcanization systems.

The USTMA Report provides an industry perspective on potential alternatives to zinc oxide for the vulcanization of rubber, concluding that there are currently no known viable alternatives. Additionally, USTMA challenged the CASQA Report's suggestion that tire manufacturers use a range of zinc concentrations in their existing vulcanization approaches and that reductions may be possible if manufacturers examine the necessity of current levels of zinc in tire tread. USTMA surveyed its members and found relative uniformity in concentrations of zinc used in the vulcanization of tire tread.

Additionally, USTMA surveyed its members and obtained revised tire tread wear rate estimates. The results were significantly less than was presented in the CASQA Report. To support the estimates, USTMA offered to perform a tire tread wear rate study. If USTMA's tire tread wear rate estimates are conclusive, the magnitude of contribution of zinc from tire tread may be properly classified as a minor source under the CASQA Report's classification approach, thereby supporting USTMA's assertion that a source control approach to address tire tread wear contributions is not a viable strategy to achieve municipal permit compliance.

4. CASQA, IZA, and USTMA Coordination

CASQA developed responses to the IZA and USTMA Reports in March 2017.[12] CASQA responded to the IZA Report comment by comment with broad agreement on recommendations, including the recommendation to work with IZA to support

[12] Attached to this report in Attachments E and F, respectively.

State Water Board establishing revised zinc water quality objective, using the BLM, to develop a bioavailability-based water quality objective (Approach 2). Since the USTMA Report was a summary of existing studies, CASQA contextualized the studies to determine relevance and ultimately disagreed with USTMA's finding that tires are not the cause of zinc impairments.

CASQA defended its use of California Department of Transportation (Caltrans) data as evidence that tires are a significant contribution to zinc impairments by saying, "The highway edge-of-pavement data by Caltrans is useful because it does not include galvanized building surfaces as a source." CASQA took the opportunity in its responses to IZA and USTMA to provide additional information to support the CASQA Report's recommendations and CASQA's decision to pursue a multifaceted approach to reduce zinc. In both response documents, CASQA agreed that potential contributions from minor zinc sources identified in the CASQA Report warrant additional investigation but do not alleviate the need to address known sources. Due to near-term compliance dates, CASQA determined that there is enough information to act on known sources of zinc while investigating additional opportunities to achieve relevant permit requirements.

On March 30 and June 5 of 2017, representatives from CASQA, IZA, and USTMA met with State Water Board staff and State Water Board Member Tam Doduc to share additional information about zinc in the urban environment and to discuss development of a draft petition for submittal to DTSC's Safer Consumer Products program. After hearing their concerns, Board member Doduc asked that CASQA, IZA, and USTMA work together to identify and present joint recommendations to address zinc in receiving waters.

III. Approaches Identified by CASQA, IZA, and USTMA

The Work Group identified various approaches to address zinc in receiving waters. The approaches discussed in this section are those that would involve some form of action by the Water Boards.

1. Track and Support CASQA's Petition to the Department of Toxic Substances Control's Safer Consumer Products Program

The Safer Consumer Products regulations[13] establish the legal authority for potential regulatory response by DTSC. The Safer Consumer Products program's process (illustrated in Figure 1) identifies candidate chemicals and proposes products with the candidate chemical to be evaluated. DTSC, following public input and a

[13] Health & Saf. Code, § 2521 et seq; Cal. Code of Regs., tit. 22, § 69501 et seq.

rulemaking, issues a final priority products list. Responsible entities (those that produce priority products) must perform an alternatives analysis to seek safer alternatives to the identified harmful chemicals. Depending on the results of the alternatives analysis, DTSC may implement a regulatory response.

The Safer Consumer Products program accepts petitions to add chemicals to the Candidate Chemicals list, add or remove the entirety of an existing chemicals list, or add a product-chemical combination to the Priority Products list. Petitions must include evidence: (1) that shows the potential Candidate Chemicals "exhibit one or more hazard traits and/or environmental or toxicological endpoints by considering" the chemicals' adverse impacts, potential exposures, and the extent and quality of available information substantiating the existence or absence of the potential adverse impacts and exposures, and/or (2) that, where the petition proposes adding a product-chemical combination to the Priority Products list, shows there is "potential public and/or aquatic, avian, or terrestrial animal or plant organism exposure to the Candidate Chemical(s) in the product" and "potential for one or more exposures to contribute to or cause significant or widespread adverse impacts."[14]

[14] Cal. Code of Regs., tit. 22, §§ 69502.2(b) [for revisions to the Candidate Chemicals list], 69503.2(a) [for the criteria needed to add a product-chemical combination to the Priority Products list], and 69504-69504.1 [for the petition process for identification and prioritization of chemicals and products].

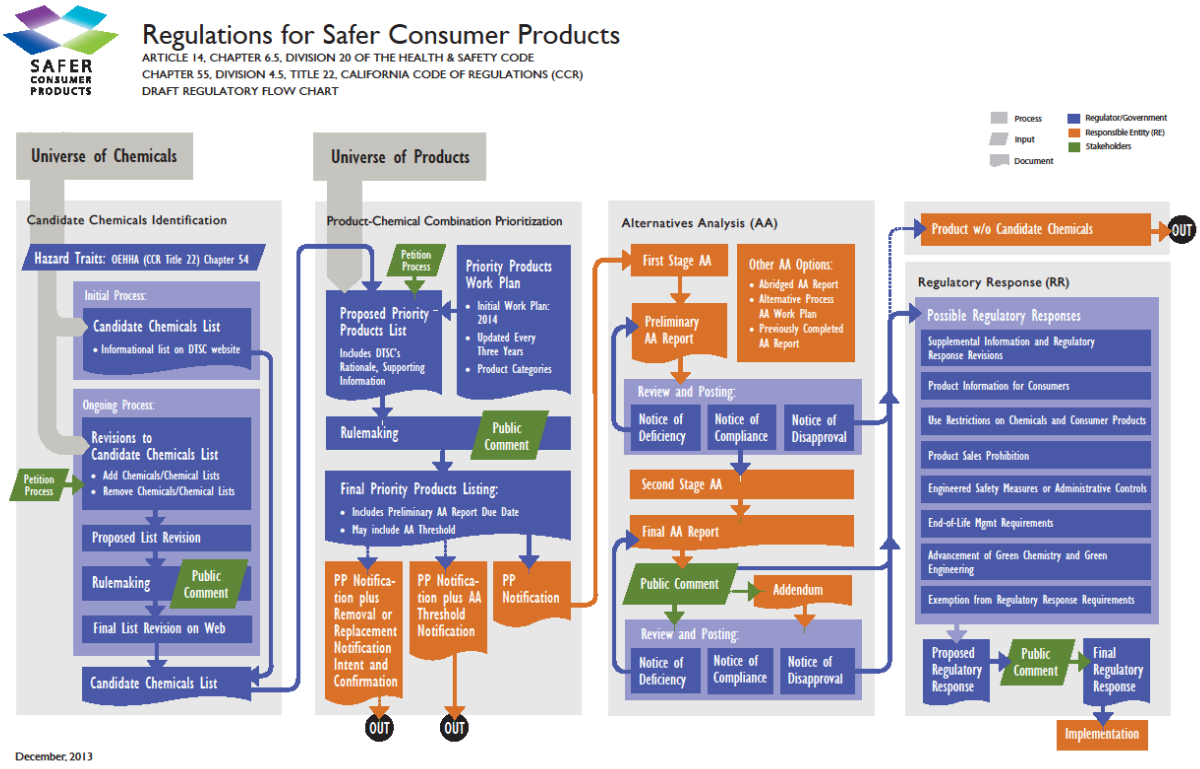

Figure 1 – Safer Consumer Products Regulatory Flow Chart

CASQA drafted the components of a petition to add the product-chemical combination of zinc in tires to the Priority Products list and initially proposed jointly submitting the petition with the Water Boards. The regulations give "high priority" to reviewing petitions filed by federal and California State agencies; CASQA, however, determined that, based on DTSC's current petition workload and the time required for the Water Boards to review, approve, and submit the petition jointly with CASQA, CASQA elected to independently submit the petition to DTSC on May 31, 2018.

Potential DTSC Regulatory Responses

1. Supplemental Alternatives Analysis Report Information and Regulatory Response Revisions;
2. Product Information for Consumers;
3. Use Restrictions;
4. Product Sales Prohibition;
5. Engineering or Administrative Controls;
6. End-of-Life Product Management Program;
7. Advancement of Green Chemistry and Green Engineering; or
8. No Regulatory Response.

It is not clear what regulatory response DTSC may make, if any, and to what extent any action would contribute to municipal TMDL compliance. If zinc in tires becomes a priority product, the alternatives analysis process will investigate the concentration of zinc in tires, wear rate (including from end-of-life uses), and mobility in urban runoff as well as potential alternatives to its use. Should DTSC make a regulatory response that reduces or replaces zinc used in the vulcanization of tire rubber (tread, entire tire, or a combination), implementation of that response may be beyond the near-term compliance dates established by the two TMDLs of concern.

2. Establish a Bioavailability-base Water Quality Objective for Zinc

In 1987, USEPA first published hardness-based ambient water quality criteria for zinc. The criteria recommendation was updated in 1995 and applied to California in 2000 when USEPA promulgated numeric water quality criteria in the California Toxics Rule (CTR) based on the determination that the numeric criteria are necessary in California to protect human health and the environment. The CTR fills a gap in California's water quality standards that was created in 1994 when a state court overturned the state's water quality control plans containing water quality objectives for priority toxic pollutants.

Since USEPA's publication of the hardness-based ambient water quality criteria, metal bioavailability models have matured and can provide more refined measurement of metal available to living organisms. In addition to hardness, bioavailability models consider other effects of water chemistry on metal bioavailability and may require 11 additional parameters of the water body of focus; however, simplified bioavailability models may be developed with as few as three additional parameters. Establishing a bioavailability-based water quality objective could provide a new, streamlined tool for developing site-specific objectives. IZA developed and published a peer-reviewed bioavailability-based water quality criterion using the BLM in 2012.[15]

The first of the Work Group's compliance-based strategies would have the State Water Board use a zinc BLM to establish a new water quality objective. The new water quality objective would require reevaluation of listed zinc impairments which could in turn require zinc TMDLs to be reopened and permit requirements to be adjusted. This approach would help address the zinc TMDL compliance issues some municipalities are experiencing but would not on its own impact the actual level of zinc discharged into receiving waters.

[15] Eric J. van Genderen, Application of U.S. EPA guidelines in a bioavailability-based assessment of ambient water quality criteria for zinc in freshwater, *Environmental Toxicology and Chemistry,* 31, 6, (1264-1272), (2012).

BLMs consider the environmental fate, bioavailability, mode of action, and effects of pollutants. BLMs have been developed for various metals and are used internationally by Australia, Canada, the European Union, and the United Kingdom as well as the Organization for Economic Co-operation and Development. In 2007, USEPA published recommendations for use of a BLM as the basis for freshwater copper water quality criterion and in 2016, Oregon became the first state to adopt a water quality standard using the USEPA-recommended copper BLM criterion. To date, USEPA has not revised its zinc water quality criterion using a BLM.

In 2006, IZA proposed a bioavailability-based ambient water quality criterion for zinc for USEPA's consideration, but USEPA took no action. IZA used the data to develop a scientific paper for peer review in 2012. In January 2018, USEPA entered a Cooperative Research and Development Agreement[16] with IZA and seven other metal associations to develop a common modeling approach to predict the bioavailability of metals. With a uniform, peer-reviewed model, USEPA plans to develop models to predict the bioavailability and toxicity of specific metals and update ambient water quality criteria for those metals. Once updated, USEPA would need to promulgate the new criterion for zinc into the CTR.

As states may adopt standards which are equally or more protective as those developed by USEPA, the State Water Board could develop a bioavailability-based water quality objective for zinc and incorporate it into its Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. This action would require USEPA to approve the State Water Board's bioavailability-based objective and de-promulgate the existing CTR zinc water quality objective.

3. Establish regulatory approaches that would create flexibility for NPDES permittees to meet their obligations

Flexibility mechanisms are tools to accommodate specific water quality-related circumstances while meeting the requirements of the Clean Water Act.[17] These tools may be used to revise existing water quality standards and would not constitute a source control action. However, they could help to alleviate or remove the storm water permit and TMDL compliance concerns of municipal dischargers. A revision of an existing beneficial use (which requires a use attainability analysis), or the development of site-specific criteria or a water quality standards variance, would change the applicable water quality standard dischargers must ultimately meet. Amending TMDL implementation schedules would not alter the underlying water

[16] https://www.epa.gov/wqc/cooperative-research-and-development-agreement-aquatic-life-bioavailability-modeling-metals.

[17] USEPA provides information on flexibility mechanisms on its website, at <https://www.epa.gov/wqs-tech/key-concepts-module-5-flexibilities> [as of Nov. 15, 2018].

quality standard on which permit obligations are based on but could provide more time to dischargers to meet the standard.

a. Use Attainability Analysis to remove or revise a beneficial use.

Stakeholders have suggested that one flexibility tool could be the removal of existing beneficial uses which the zinc water quality objectives support through use attainability analyses. A use attainability analysis is a structured scientific assessment of the factors[18] affecting the attainment of Clean Water Act section 101(a)(2) beneficial uses of waters that must be completed before a Water Boards may remove a designated use.[19] However, removal of existing beneficial uses to which the zinc water quality objectives support, removal of beneficial uses is limited to *potential* uses; *existing* beneficial uses may never be removed.[20] As a result, while this tool may have appeal, as a practical matter, it would not be available to address the concerns of this project, which primarily implicated zinc objectives established for existing beneficial uses.

b. Site-specific water quality objectives

The CTR gives the Water Boards discretion to adjust the aquatic life criteria for metals to reflect site-specific conditions using a water-effect ratio (WER)[21] in a water body with conditions that differ from those used to establish the national criteria. WERs are developed when laboratory-derived water quality objectives do not accurately reflect site-specific bioavailability. If appropriate, site-specific objectives may be established by the Water Boards through a water quality control plan (Basin Plan) amendment. In order to establish objectives less stringent than the CTR, the Water Boards would need to grant categorical or case-by-case exceptions to the CTR in compliance with the 2005 Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Case-by-case exceptions in individual water bodies or watersheds may be granted through a CEQA-compliant process, subsequent to a public hearing, and with the concurrence of US EPA. The exceptions may not compromise protection of enclosed bay, estuarine, and inland surface waters for beneficial uses and must serve the public interest.

Development of site-specific objectives would require permittees to develop a Regional Water Board-approved workplan, collect physical and/or chemical

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[18] Demonstration that attaining a use is not feasible must be based on one of six factors found in 40 C.F.R. § 131.10, subd. (g) (2015).

[19] 40 C.F.R. § 131.3, subd. (g) (2015).

[20] 40 C.F.R. § 131.10, subd. (h) (2015).

[21] https://www3.epa.gov/npdes/pubs/owm624.pdf

characteristic data to account for biological availability, and request that the Regional Water Board use site-specific criteria to develop the water quality standard. In the Chollas Creek watershed, a site-specific objective for zinc has been approved by the Regional Water Board with BLM used as a second line of evidence. This site-specific objective is anticipated to be considered by the State Water Board in 2019.

c. Water Quality Standard Variance

A water quality standard variance is a time-limited water quality standard that reflects the "highest attainable condition during the term of the . . . variance."[22] Variances are generally used when a State determines that a water quality standard is currently unattainable and finds that it is appropriate to temporarily replace the water quality standard. A variance may be adopted for one or more NPDES dischargers or for one or more waterbody segments. A variance must identify each NPDES discharger and waterbody segment to which it applies.

USEPA's water quality standards regulations establish a framework the Water Boards may use to adopt a variance.[23] A variance is subject to procedural requirements applicable to a water quality standards action, including a hearing and public participation process, as well as USEPA review and approval.

To adopt a variance, the Water Boards must demonstrate that attaining the targeted standard is not feasible due to one of the Code of Federal Regulations, title 40, section 131.10(g) factors discussed above with regard to use attainability analyses (Approach 3.a) or because the implementation of "[a]ctions necessary to facilitate lake, wetland, or stream restoration through dam removal or other significant reconfiguration activities preclude attainment of the" targeted standard.[24]

Whether the federal variance rule is applicable to MS4 dischargers is not clear. The federal regulations specify that a variance shall be the standard applicable to a permittee for "the purposes of developing NPDES permits limits and requirements under [Clean Water Act section] 301(b)(1)(C)," which requires effluent limits to be assigned to certain NPDES permittees to meet water quality standards.[25] Pursuant to Clean Water Act section 402(p)(3)(B), MS4s are not

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[22] 40 C.F.R. § 131.3, subd. (o) (2015).

[23] 40 C.F.R. § 131.14 (2015).

[24] 40 C.F.R. § 131.14, subd. (b)(2)(A)(1)-(2) (2015).

[25] 40 C.F.R. § 131.14, subd. (b)(3) (2015).

assigned effluent limitations under section 301(b)(1)(C) and are instead subject to the "maximum extent practicable" standard. As a result, the federal rule does not appear to be expressly applicable to MS4 permittees. For the same reason that MS4s do not have the same Clean Water Act mandate to comply with section 301(b)(1)(C) as do other permittees,[26] establishing a variance consistent with the federal regulation may also be unnecessary. A variance may be an option for MS4 NPDES permittees assigned numeric water quality-based effluent limitations based on USEPA-approved TMDL waste load allocations. However, USEPA staff has informally represented to State Water Board staff that the federal variance rule could and should be available to MS4 dischargers.

d. TMDL Implementation Schedules

Clean Water Act section 303(d) requires states to identify waterbodies that are not attaining water quality standards and develop TMDLs. A TMDL is a plan to restore impaired waters by determining the maximum amount of a pollutant a specific body of water can receive while maintaining water quality standards. TMDLs include a characterization of the watershed, source assessment, and allocation. Approved TMDLs must be incorporated into Basin Plans. In California, state law requires Regional Water Boards to develop programs of implementation, including implementation schedules that describe how and when water quality standards will be attained, when TMDLs are incorporated into Basin Plans.

TMDLs are not self-executing and are implemented through permit requirements "consistent with the requirements and assumptions" of TMDL wasteload allocations.[27] For this approach, a permittee would need to request that the appropriate Regional Water Board, through a Basin Plan amendment, adopt a new TMDL implementation schedule or extend an existing TMDL implementation schedule. This updated schedule would then need to be incorporated into the appropriate permits. To date, no MS4 permittee has submitted such a request for additional time to a Regional Water Board.

As an alternative to seeking a Basin Plan amendment, dischargers that believe additional time to comply with final TMDL wasteload allocations is necessary may request a time schedule order pursuant to California Water Code section 13300 for the appropriate Regional Water Board's consideration.

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[26] *See Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159 (discussed in State Water Board Order WQ 2001-15.

[27] 40 C.F.R. § 122.44(d)(1)(vii)(B) (2015).

IV. CASQA, IZA & USTMA Approach Recommendation

The Work Group recommends that the Water Boards first develop a statewide water quality standard variance available to MS4 dischargers statewide. With near-term TMDL compliance dates addressed, the Work Group recommends that the Water Boards then develop and adopt a zinc bioavailability-based water quality objective (Approach 2). The Work Group anticipates this approach would show that zinc concentrations are in fact below existing water quality objectives in many cases when bioavailability is considered and would lead to the removal of listed zinc impairments. Additionally, adoption of a bioavailability-based water quality objective could lead to a new, streamlined tool for developing site-specific objectives (Approach 3.b).

State Water Board staff response. Implementation of the CASQA, IZA, and USTMA recommendations will require staff resources from the State Water Board to develop and adopt a statewide variance (presuming USEPA would approve a variance established for an MS4 discharger) and to pursue a bioavailability-based water quality objective.

Currently, zinc TMDLs have been established by three Regional Water Boards in California. If the current Cooperative Research and Development Agreement with IZA is completed and a bioavailability-based water quality criterion for zinc is established and promulgated by USEPA, the Water Boards could choose to reopen and revise the pertinent zinc TMDLs to ultimately incorporate the new standard in permits and other Water Boards actions. If the Water Boards adopt a bioavailability-based water quality objective, USEPA would need to approve it and de-promulgate the existing zinc water quality objective from the CTR. Upon approval, the new standard would trigger all Water Boards actions that applied the hardness-based water quality objective to be reopened and assessed using the new bioavailability-based water quality objective.

V. Water Boards Staff Recommendation

Based on the significant resources necessary to implement the preferred Work Group recommendation for statewide applicability where the need has been identified in two TMDL areas, Water Boards staff recommends:

1) Approach 1 - Tracking DTSC's Safer Consumer Products program's review of CASQA's petition and providing technical assistance to DTSC staff as necessary. DTSC has conducted its completeness review of the CASQA petition and advanced to the merits review. At the request of DTSC, Water Boards staff will provide technical support to DTSC's merits review.
2) Supporting the Regional Water Boards should they consider any of the Flexibility Mechanisms discussed in this report (Approaches 3 a-d).

VI. Conclusion

Bringing a Work Group together with broad representation and differing perspectives was informative in identifying various options to address MS4 zinc TMDL compliance and ways to further our understanding of zinc impairment in receiving waters. Although the Work Group recommendation is legally and conceptually possible, implementation would require significant additional staff resources and policy direction from the Water Boards. The Storm Water Strategy acknowledges that storm water pollutants can be addressed through a combination of treatment and source control efforts. This parallels the Water Boards staff recommendation to track DTSC's Safer Consumer Products program review of the CASQA petition and to support the Regional Water Boards should they work with permittees on any flexibility mechanisms.