City of SACRAMENTO
Department of Utilities

August 16, 2017

Letter 11

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State Water Resources Control Board
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Subject: Comment Letter – Bacteria Provisions

The City of Sacramento (City) appreciates this opportunity to provide comments on the proposed Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (ISWEBE)—Bacteria Provisions and a Water Quality Standards Variance Policy and the Proposed Amendment to the Water Quality Control Plan for Ocean Waters of California (Ocean Plan)—Bacteria Provisions and a Water Quality Standards Variance Policy (hereafter Bacteria Provisions). The City operates its Combined Sewer System (CSS) under the National Pollutant Discharge Elimination System (NPDES) permit (Order No. R5-2015-0045; NPDES No. CA0079111; Permit). The CSS conveys combined stormwater and wastewater to the Sacramento Regional Wastewater Treatment Plant year-round, and during high rainfall events, discharges primary-treated combined wastewater to the Sacramento River.

The City recognizes the tremendous effort by the State Water Resources Control Board (State Water Board) to develop the Bacteria Provisions. These documents will help to standardize the state approach and further protect California waters and human health. As stated in the Staff Report[1], the Bacteria Provisions seek to establish consistent statewide water quality objectives (WQOs) for California waters using the 2012 USEPA Recreational Water Quality Criteria (EPA 2012 Criteria)[2] as a framework. The Bacteria Provisions are also meant to provide the Regional Water Quality Control Boards (Regional Water Boards) "with tools and direction in addressing specific issues related to applying the Bacteria Objectives."

11.01

The City supports the State Water Board's efforts to update the state's bacteria objectives and the variance policy. However, the City would like to submit the following comments to support more effective implementation of actions by the regulated community to protect human health, and to strengthen the technical basis for the Bacteria Provisions.

COMMENT 1 – ALLOW SUSPENSIONS OF REC-1 USES WITHOUT A UAA; ALLOW REFERENCE SYSTEM/ANTIDEGRADATION APPROACH AND NATURAL SOURCE EXCLUSION APPROACH TO BE APPLIED TO ALL WATERBODIES; AND PROVIDE IMPLEMENTATION GUIDANCE TO DISCHARGERS AND REGIONAL WATER BOARDS.

The City fully supports the State Water Board's inclusion of implementation provisions that account for natural sources of bacteria and allow high flow suspension and seasonal suspension of the REC-1

[1] Draft Staff Report, including the Draft Substitute Environmental Documentation, for the Bacteria Provisions. June 30, 2017.
[2] US EPA. 2012. Recreational Water Quality Criteria. Office of Water 820-F-12-058.

beneficial use. However, the City has three specific requests to improve the implementation of these provisions:

- Allow the reference system/antidegradation and natural source exclusion approaches to be applied to all waterbodies;
- Allow suspension of REC-1 uses without a UAA; and
- Provide implementation guidance to Regional Water Boards and dischargers.

11.02

The City supports the use of the reference system/antidegradation approach and natural sources exclusion approach, which will provide Regional Water Boards with flexibility to adapt the water quality objectives (WQOs) to their specific regions. It is important that stormwater agencies focus bacteria reduction efforts on anthropogenic sources. However, the City requests that these implementation tools not be limited to waterbodies that have an existing Total Maximum Daily Load (TMDL) or TMDL in development. The General MS4 Permit specifies a Pollutant Prioritization approach for permittees to implement stormwater management programs focused on their prioritized water quality constituents, to address priority water quality issues and preclude the need for TMDLs to be developed. It would be appropriate for dischargers to have the same tools available as they actively work to address bacteria as a water quality issue so as to preclude the need for TMDL development.

11.03

The City requests that the State Water Board allow the high flow and seasonal suspension of the REC-1 beneficial use implementation provisions to be completed without a UAA. The requirement to complete a UAA requires review by USEPA, and places an unnecessary burden upon the dischargers and Regional Water Boards, which will likely impede these options from being implemented.

The proposed Bacteria Provisions do not provide an adequate process or toolset to avoid costly and potentially unnecessary TMDL development and control programs. There is precedent within Regional Water Board Basin Plans for a temporary suspension of objectives, without a UAA. The Santa Ana Regional Water Board includes criteria within the Basin Plan for temporary suspension of recreational use designations and objectives, which can be implemented without a UAA. As part of the work that led to the adoption of the 2012 amendments to the Santa Ana Basin Plan recreation standards, the Stormwater Quality Standards Task Force considered the merits of and various alternatives for modifying the REC-1 definition to improve clarity and precision, based on careful consideration of the scientific basis of the 1986 USEPA Recreational Criteria and earlier criteria guidance. The Santa Ana Basin Plan provides definitions for site-specific flow triggers, eligibility for temporary suspensions, engineered or highly modified channels, and for the termination of the temporary suspension. The City suggests that the State Water Board either provide similar guidance, or allow Regional Water Boards to develop regional guidance for temporary suspensions without development of a UAA.

11.04

Thirdly, the City appreciates the inclusion of these implementation options in the Bacteria Provisions, and requests that the State Water Board provide implementation guidance to the Regional Water Boards and dischargers. The implementation options within the Bacteria Provisions provide a useful

toolkit, but place a significant technical burden on the Regional Water Boards and dischargers – which will result in statewide inconsistencies. Guidance developed by the State Water Board would support statewide consistency for regulatory programs and technical evaluations.

COMMENT 2 – SPECIFY HOW SITE-SPECIFIC EVALUATIONS COULD BE FACILITATED THROUGH THE BACTERIA PROVISIONS

11.05

The proposed bacteria provisions include a consideration for Water Quality Standards Variances, which may be a mechanism for site specific evaluations for mixing zones, fate and transport, duration of impacts, among other factors, but the Bacteria Provisions do not specifically include those considerations. The City requests that the State Water Board staff provide language within the Bacteria Provisions that acknowledge that these are factors which may be considered with a Water Quality Standards Variance. As discussed in Comment 1, this is an additional area where guidance from the State Water Board would be useful in promoting consistency among Regional Water Boards in implementing the Bacteria Provisions.

COMMENT 3 – ALLOW A SITE-SPECIFIC CONVERSION FACTOR TO BE USED TO CONVERT FECAL COLIFORM TO *E. COLI* WHEN APPROPRIATE

11.06

Appendix C of the Staff Report uses a conversion factor to convert fecal coliform objectives used in Regions 1, 5 and 6 to *E. coli* objectives, and to back calculate the associated risk levels. The conversion factor used is "*E. coli* is ~ 90% of Fecal Coliform (based on number used by Ocean Plan staff – M. Gjerde)." This conversion factor does not include a citation to scientific literature. At the Stakeholder Meeting on July 10, 2017, State Water Board staff suggested that the conversion factor came from a study conducted by the Southern California Coastal Water Research Program (SCCWRP), but staff did not remember specifics of the study.

Communication with SCCWRP indicated that the Southern California Bight 1998 Regional Monitoring report[3] was the source of the 0.9 ratio. This study included an interlaboratory comparison of indicator bacteria results among multiple laboratories that used samples spiked with wastewater influent. However, the study neither includes nor makes a recommendation for a conversion factor from *E. coli* to fecal coliform.

In a later SCWRRP 2007 study of natural open-space sites spread across southern California's coastal watersheds, the researchers stated an assumption that "*E. coli* levels typically equal 80% of fecal coliforms;"[4] however, no basis was provided in the study report to support that assumption.

It is inappropriate to assume that a southern California-specific relationship would be applicable statewide. Fecal coliform bacteria are a large group of bacteria, including those that originate in feces (e.g. *E. coli*) as well as genera that are not of fecal origin (e.g., *Enterobacter, Klebsiella, Citrobacter*). The EPA's 2012 Criteria noted

[3] Noble, R., J. Dorsey,. M. Leecaster, M. Mazur, C. McGee, D. Moore, B. Orozco-Borbón, D. Reid, K, Schiff, P. Vainik, and S. Weisberg. 1999. Southern California Bight 1998 Regional Monitoring Program: I. Summer Shoreline Microbiology.
[4] Stein, E. and V. Yoon. 2007. Assessment of Water Quality Concentrations and Loads from Natural Landscapes. Southern California Coastal Water Research Project Technical Report 500. February.

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that "Scientific advancements in microbiological, statistical, and epidemiological methods have demonstrated that culturable enterococci and *E. coli* are better indicators of fecal contamination than the previously used general indicators, total coliforms and fecal coliforms." Fecal coliform can be naturally present in the environment due to re-growth and wildlife, in addition to human sources. The composition of fecal coliform bacteria present can vary due to the sources of bacteria. Any conversion factors used to estimate *E. coli* from fecal coliform would be site specific. It is inappropriate to apply one conversion factor statewide.
In other locations in the United States, state environmental agencies have developed region-specific ratios to convert fecal coliform data to *E. coli* to align with the EPA-recommended criteria. A summary of a few conversion factors are shown in **Table 1**. A report by the United States Geological Survey (USGS) noted that "[*E. coli* to fecal coliform] ratios and regression models are site specific and make it possible to convert historic fecal coliform bacteria data to estimated E. coli densities for the selected sites," and also noted that variation between locations is probably due to site-specific factors such as sources of bacteria and water-quality conditions.[5]

Furthermore, an examination of Sacramento Stormwater Quality Partnership data over the last ten years at three sites: Sacramento River at Freeport (30 samples), Strong Ranch Slough (18 samples), and the Natomas detention basin (31 samples), showed average ratios of *E. coli* to fecal coliform of 0.74, 0.73, and 0.78, respectively.

Table 1. Conversions used to estimate *E. coli* based on Fecal Coliform

Location	***E. coli* to fecal coliform conversion**	**Reference**
Kansas	*E. coli* = 0.77 x fecal coliform	Rasmussen, P. and A. Ziegler. Comparison and Continuous Estimates of Fecal Coliform and *Escherichia Coli* Bacteria in Selected Kansas Streams, May 1999 Through April 2002. U.S. Geological Survey. Water-Resources Investigations Report 03-4056.
Oregon	*E. coli* = 0.531 x fecal coliform$^{1.06}$	Cude, Curtis G. 2005. Accommodating Change of Bacterial Indicators in Long Term Water Quality Datasets. Journal of the American Water Resources Association, Paper No. 02144, February.
Virginia	*E. coli* = 0.998 x fecal coliform$^{0.919}$	Commonwealth of Virginia, Department of Environmental Quality. 2003. HSPF Model Calibration and Verification for Bacteria TMDLs, Guidance Memo No. 03-2012. Water Division, September.
Ohio (Northeast District)	*E. coli* = 0.667 x fecal coliform$^{1.034}$	Ohio Environmental Protection Agency. 2006. Ohio EPA Bacterial TMDL Correlation Equations for Converting Between Fecal Coliform and *E. Coli*. December.
Ohio (rest of the state)	*E. coli* = 0.403 x fecal coliform$^{1.028}$	

[5] Rasmussen, P. and A. Ziegler. Comparison and Continuous Estimates of Fecal Coliform and *Escherichia Coli* Bacteria in Selected Kansas Streams, May 1999 Through April 2002. U.S. Geological Survey. Water-Resources Investigations Report 03-4056.

In summary, the City requests that the State Water Board not include a single statewide conversion factor to estimate *E. coli* levels based on fecal coliform data, or, should qualify the use of this value with a statement that locally derived values are preferred. In addition, the Staff Report should provide a citation for any conversion factor that is used, along with an explanation of the conditions under which it was developed, and justification of why it is appropriate.

COMMENT 4 – ACKNOWLEDGE THE RISK BASIS FOR THE BACTERIA PROVISIONS.

11.07

The City requests that the State Water Board include a more detailed description of the risk level that is the basis for the Bacteria Provisions. The only mention of risk level in the Bacteria Provisions occurs in the header of the table presenting the WQOs. The proposed objectives do not acknowledge that the USEPA 2012 Criteria are standards based on an allowable risk level, derived from epidemiological studies. This risk level is the basis for the objective, and the *E. coli* objectives are the tool to implement the risk-based objective. Since the risk level is the driving mechanism to protect human health, it should be clearly described in both the Bacteria Provisions and Staff Report.

The USEPA has a long record of establishing recreational criteria based on risk levels. The USEPA published recommended recreational water quality criteria in 1986 that establish the ambient condition of a recreational waterbody necessary to protect the designated use of primary contact recreation[6]. Criteria values were selected for *E. coli* and enterococci in order to carry forward the same level of public health protection that were believed to be associated with the USEPA's previous criteria recommendations[7] based on fecal coliform. The USEPA carried forward this risk-based approach in its 2012 Criteria development. Elevated levels of indicator bacteria were linked to increased risk of gastrointestinal illness through epidemiological studies conducted by USEPA during the National Epidemiological and Environmental Assessment of Recreational Water (NEEAR)[8] and the 2012 Criteria were established to carry forward the risk-based approach to setting recreational criteria based on indicator bacteria levels.

The ultimate goal of recreational water quality improvement programs is to reduce risk of illness to recreators, as opposed to being solely focused on reducing densities of fecal indicator bacteria. As such, incorporating a discussion of the risk-basis for the Bacteria Provisions will allow them to be

[6] USEPA. 1986. EPA's Ambient Water Quality Criteria for Bacteria – 1986. U.S. Environmental Protection Agency: Washington, DC. EPA440/5-84-002.

[7] USEPA. 1976. Quality Criteria for Water. U.S. Environmental Protection Agency: Washington, DC.

[8] USEPA, 2010a. Report on 2009 National Epidemiologic and Environmental Assessment of Recreational Water Epidemiology Studies. United States Environmental Protection Agency, Office of Research and Development. (EPA Report Number EPA-600-R-10-168, 2009).

USEPA, 2010b. Quantitative Microbial Risk Assessment to Estimate Illness in Fresh water Impacted by Agricultural Animal Sources of Fecal Contamination. United States Environmental Protection Agency. EPA 822-R-10-005.

adaptable to the evolving science in the event that a better indicator becomes available and ensure a clear understanding that the risk-level established in the provisions is protective of human health.

COMMENT 5 – ALLOW INDICATORS IN ADDITION TO *E. COLI* AND ENTEROCOCCI THAT MAY BETTER CHARACTERIZE RISK.

11.08

The focus on numeric objectives for culturable *E. coli* and enterococci, rather than on the appropriate risk level, does not allow for other pathogen indicators or analytical methods that may better characterize risk. The Bacteria Provisions recommend USEPA Methods 1603 and 1600 or other equivalent method to measure culturable *E. coli* and enterococci, respectively. This language may be interpreted as precluding the use of new methods to measure *E. coli* and enterococci that are not culture based, or if newly developed rapid indicators could be used. Rapid indicators to measure the presence of pathogens outside of a lab culture continue to be an active area of research.

In addition, if an alternative indicator (e.g., coliphage) is developed and approved, the current Bacteria Provisions language could be problematic, assuming that the use of those methods is interpreted as a requirement. The City recommends that the text in the Bacteria Provisions specifying preferred methods be rewritten to be adaptable to future scientific developments such as improved measurements of *E. coli* and enterococci, as well as alternative indicators that better characterize human health risk.

In closing, the City appreciates the opportunity to comment on the Bacteria Provisions, and we hope that our comments will assist you in development of the statewide bacteria objectives and implementation provisions.

If you have any questions or would like to discuss any of comments further, please contact me at 916-808-1455 or Kyle Ericson at 916-808-5390.

Sincerely,

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