
Santa Ana Regional Water Quality Control Board

TO: Dr. Patricia Holden
Professor, Bren School
University of California, Santa Ana Barbara

FROM: Joanne E. Schneider
Environmental Program Manager

DATE: March 12, 2012

SUBJECT: PEER REVIEW OF PROPOSED BASIN PLAN AMENDMENTS MODIFYING
RECREATIONAL WATER QUALITY STANDARDS FOR FRESHWATERS IN
THE SANTA ANA REGION

This is to acknowledge receipt of the comments you provided on February 29, 2012 regarding the proposed recreational standards amendments.

With respect to the scientific basis of both of the issues raised in our peer review request documentation (the replacement of established fecal coliform water quality objectives with *E. coli* objectives and targets, and specifying and implementing single sample maximum *E. coli* values for REC1-designated waters), you state that "The report [January 12, 2012 staff report concerning the proposed amendments] uses U.S. EPA sources as the basis. This appears appropriate in light of the objectives."

With respect to the "Big Picture", other scientific issues not addressed/considered, you provided the following comments.

The first pertains to the proposed definition of "use tiers" and the application of the appropriate statistical confidence factors that are used in the calculation of single sample maximum values. You suggest that in identifying use types, erring on the side of conservatism (i.e., expecting that use types could change from a lower tier to a higher tier) would be more protective of public health, unless changes in use tier are unlikely. You also comment that it is not apparent that there has been consideration of hydrologic connections and the possibility of reduced protection if upstream to downstream influences are not considered.

Our response to these comments is as follows. First, the proposed REC1 use tier assignments begin by being very conservative. The Santa Ana River, Reach 3 is used as the baseline REC1 use condition for the assignment of other freshwater streams to the use tiers. This reach of the River is known to receive high intensity use by the public for recreational activities, *relative to the other fresh waterbodies in the Region*. However, it could be argued easily that a more suitable baseline would have been the ocean beaches, which receive several orders of magnitude greater REC1 use than the River (or any other freshwater stream or lake in the Region). The staff report and proposed amendments take care to recognize that the tier assignments are based on the best available information and are subject to review and change over time. Second, the Stormwater Quality Standards Task Force effort that resulted in the

proposed amendments began with a careful and thorough review of all pertinent law and regulation regarding recreational standards and changes to those standards. From the outset, it has been clearly recognized, though perhaps not sufficiently described in the January 12, 2012 staff report *per se*, that any standards action must assure the protection of downstream beneficial uses, including recreational uses. This requirement is explicitly stated in a set of regulatory axioms that is documented in the administrative record for this matter. In short, the obligation to protect downstream water quality and beneficial uses is clearly understood and, irrespective of use tiers, would drive actions to implement water quality standards.

The second main “Big Picture” issue you identified concerns the specificity of indicator bacteria for the purposes of indicating human health risks. You indicate that there are broad and longstanding questions regarding how protective of human health indicator-based objectives really are. You indicated that “the state of the art in microbial source tracking includes discovering, particularly where indicator bacterial concentrations would suggest public health risk, what fecal sources (as these are likely pathogen carriers) are present. Discoveries as such are then used to prioritize management or remediation investment.”

We recognize and agree that there is a high degree of uncertainty about the utility of indicator bacteria for human health risk assessment. Pursuant to our legal obligations, the proposed amendments implement U.S. EPA criteria guidance regarding the objectives that should be employed to protect public health and recreational use of surface waters. It is beyond the scope of the amendments, and our expertise, to recommend alternative objectives based on direct measurement of pathogens, or some other alternative indicators.

While it is not evident from the documentation provided to you, we have been engaged in microbial source tracking investigations in certain areas of the Santa Ana Region (e.g., the Middle Santa Ana River watershed). These investigations are designed to provide source information such that appropriate control actions can be determined and implemented in a prioritized manner. For example, to support implementation of the Middle Santa Ana River Bacteria TMDL, MS4 permittees are using microbial source tracking techniques to identify locations where bacteria from human sources may be present. That information coupled with bacterial indicator data is being used to prioritize subwatersheds for additional bacteria source evaluation analyses and identification of BMPs to reduce bacterial indicators in urban runoff.

Finally, you state that the scientific basis upon which the amendment documentation is based stems from U.S. EPA documentation, and that its soundness thus rests on the scientific basis of the source documents and the applicability of the EPA study results to other settings. You also point out that the relationship between public health risk and indicator organisms depends on the origin of the contamination, which is not addressed in the proposed amendments.

Once again, the proposed amendments are intended to fulfill our obligation to implement U.S. EPA bacteria criteria recommendations. We recognize that implementation of the proposed amendments will require further investigation of the sources of contamination so that appropriate corrective actions can be taken.

Thank you once again for your time and effort in providing peer review of the proposed amendments.

cc: Gerald Bowes - SWRCB

Santa Ana Regional Water Quality Control Board

TO: Dr. Kristina D. Mena
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School of Public Health
The University of Texas Health Science Center at Houston

FROM: Joanne E. Schneider
Environmental Program Manager

DATE: March 12, 2012

SUBJECT: PEER REVIEW COMMENT : BASIN PLAN AMENDMENT – REVISIONS TO
RECREATIONAL STANDARDS FOR INLAND FRESH SURFACE WATERS IN
THE SANTA ANA REGION

This is to acknowledge receipt of the comments you provided on March 4, 2012 regarding the proposed recreational standards amendments.

You have framed your review of the amendment-related documentation as follows. “This review was approached as a response to the two issues listed below, yet carefully considered each of the specific amendments described in section 5.0 of the document [January 12, 2012 staff report, with attachments]. This review takes a precautionary approach, and addresses each proposed amendment from a public health perspective that offers the maximum protection to all populations who may be exposed.”

You have also noted the inconsistency of studies regarding the usefulness of coliform bacteria as indicators of human health and state that “There is no correlation between the occurrence or absence of pathogens – such as protozoa and enteric viruses – and these indicator bacteria.” Further, you state that “Because of the limitations associated with coliform bacteria as indicators of public health, it is important when utilizing coliforms as indicators to counter their shortfalls with conservative assumptions regarding exposures in order to be protective of all (potentially) affected populations.”

We take note of these statements and acknowledge that there is a high degree of uncertainty about the utility of indicator bacteria for human health risk assessment. Pursuant to our legal obligations, the proposed amendments implement U.S. EPA criteria guidance regarding the objectives that should be employed to protect public health and recreational use of surface waters. It is beyond the scope of these amendments, and our expertise, to recommend alternative objectives based on direct measurement of pathogens or some other alternative indicators. We appreciate your recognition that it is not practical or economical to monitor all possible pathogens. Further, we appreciate that your review conceded that, “for practical purposes, coliform bacteria – specifically *E. coli* - is currently the available indicator for

recreational water standards.” As science progresses and better indicators of public health risk are identified, we anticipate that revised guidance will be provided that we can use as the basis for future improvements to Basin Plan standards.

Issue 1. Replacement of established fecal coliform water quality objectives with *E. coli* objectives/targets.

- You state that risk managers should recognize the limitations of *E. coli* as a water quality indicator when developing policy and in interpreting water monitoring data. You state that when considering water quality and public health, it is necessary to consider sensitive subpopulations, such as the elderly and children, and you indicate that policy-making should have a conservative approach, erring on the side of caution to be protective of all populations.

As indicated above, the proposed amendments implement U.S. EPA criteria recommendations, which were based on U.S. EPA’s assessment of the bacteria indicator concentrations necessary to protect the health of those members of the population engaged in primary contact recreation, including children. (We are not aware of any specific reference in the U.S. EPA documentation concerning their recommended criteria that speaks to the elderly.)

- You also state that while it is important to clarify definitions, it is not appropriate to sacrifice safety for the sake of clarity. You assert that the proposed amendment regarding the REC1 Beneficial Use Name and Definition inherently creates a less stringent approach to human health protection. You critique the rationale for the proposed change in the REC1 name and definition that is stated in the January 12, 2012 staff report by pointing to the age (more than 25 years) of the studies upon which the established Basin Plan bacteria objectives (and the recommended U.S. EPA national bacteria quality criteria) are based, and identify limitations of those studies, including their limitation to dry weather conditions and the exposure classifications employed.

While we understand that there are differences in scientific opinion about the strengths and weaknesses of the epidemiological studies that underlie the U.S. EPA bacteria criteria recommendations, those differences have no immediate bearing on our obligation to implement the U.S. EPA recommendations. We believe that the proposed amendments do so faithfully and, further, that if approved they will provide a higher degree of public health and beneficial use protection than is afforded by the recreational standards now established in the Basin Plan. As stated in the January 12, 2012 staff report, and as we are sure you are aware, U.S. EPA has been engaged in additional epidemiological studies and has recently distributed draft 2011 national bacteria criteria recommendations. When and if such recommendations become final, we will be obligated to consider their implementation in further amendments to the Basin Plan. Once again, it is beyond the scope of the proposed amendments to critique the studies underlying the U.S. EPA criteria.

As discussed further below, the proposed clarifications of the REC1 definition are intended to assure that the long-understood meaning of the definition is clearly stated to avoid misinterpretation and inconsistent interpretations and to mirror the primary contact definition that is employed by USEPA and other states. We believe that your comments confirm the necessity of these modifications. Further, changes to the name and definition have no direct regulatory effect, since all waters are presumed REC1 unless and until a Use Attainability Analysis is

conducted to demonstrate that the use is not “existing” (as defined in federal regulations) and that it cannot be attained because of one or more factors specified in federal regulations.

- You identify several other issues with respect to the proposed changes to the name and definition of REC1:
 - “The definition that “primary contact” means “ingestion” – what about the health effects associated with skin, eye or ear contact?”
 - “Changing the terminology from “reasonably possible” to “likely to occur” creates a more stringent definition for REC1 water exposure that could lead to less protection policy.”
 - “Is it better to differentiate “forms of wading” or rather take a conservative approach and simply keep “wading” as part of REC1?”

As you know, in its bacteria criteria documents, the preamble to the BEACH Act Rule (2004) and other guidance, U.S. EPA provides extensive discussion of the types of illness addressed by its recommended criteria. The January 12, 2012 staff report summarizes those discussions in a review of the scientific basis of the criteria recommendations. In part, U.S. EPA reported that of the illnesses that may be contracted during recreational activities in water, gastrointestinal illnesses were the most frequent. U. S. EPA acknowledges that while other illnesses can be contracted from recreational activities, they are not specifically addressed by EPA’s criteria. There is, at present, no scientific basis upon which to base such criteria. The proposed amendments implement criteria that are based on the best available science. The proposed changes in the REC1 name and definition would have no effect with respect to the protection of the public from possible skin, eye, or ear illnesses, since the objectives implemented to protect the use are based on gastrointestinal illnesses only. Once again, as science advances to provide appropriate criteria recommendations to address other types of illnesses, then the Basin Plan standards will need to be revisited.

Our understanding of the scientific basis of the criteria led us to consider whether other amendments might be appropriate, including the proposed revisions to the REC1 name and definition. Specifically, as U.S. EPA makes clear, the criteria are intended to protect full body, primary contact recreation. The name “primary contact recreation” is employed by many states and U.S. EPA to describe full body contact recreational uses such as swimming. While the definitions of this beneficial use differ slightly from state-to-state, the common denominator is that the ingestion of water is likely. The proposed revisions of the REC1 use name and definition are intended to clarify the current definition to mirror the widely accepted definition of the use intended to be addressed by the REC1 criteria. Further, the term “reasonably possible” has a wide range of interpretations, while the term “likely” is more precise and therefore less subject to different interpretation. Finally, it is essential to recognize that the proposed clarifications would have no direct regulatory effect. As discussed in the January 12, 2012 staff report and above, under the Clean Water Act and its implementing regulations, all surface waters are presumed to be REC1 unless rebutted by a Use Attainability Analysis.

Please note that the current REC1 definition identifies activities, such as wading, that **may be** included in REC1. The proposed changes reflect that some forms of wading, such as by children, have the likelihood of ingestion, given the typical nature of water play by children and their propensity for hand-to-mouth contact. On the other hand, wading by adults may have no such likelihood; the extensive photographic evidence compiled as part of the investigations leading to the proposed amendments confirm that such contact is highly unlikely. The proposed change to “some forms of wading” is intended to reflect these realities. Any consideration of designating a REC1 use for a specific waterbody would need to be accompanied by careful

consideration of evidence concerning the nature of recreational use in that waterbody, including wading.

- You state that “considering only *E. coli* and gastroenteritis as the targets for creating recreational water standards isn’t adequate”, as you have described in your preceding comments. You also state that “However, the challenges associated with including pathogens and/or other health endpoints are recognized. For the sake of discussion, the application of a gastrointestinal illness risk level of 8/1000 is appropriate, given the acceptable risk range provided by the USEPA. The geometric mean density of 126 CFU/100mL for REC1- and REC1/REC2-designated areas is also appropriate, and should be based on monthly monitoring (minimum five samples per month.”

Once again, we acknowledge the limitations of the recommended *E. coli* criteria, as you have discussed. We appreciate your confirmation that the proposed application of the *E. coli* criteria is appropriate.

- You asked whether guidance will be provided for each waterbody as to specifically when and where samples should be taken, and whether the sampling locations will be representative of microbial water quality and recreational locations. You state that each waterbody under consideration should be evaluated to address these points related to sampling.

The proposed amendments include monitoring-related requirements, which, if approved, would be included in Chapter 5 – Implementation of the Basin Plan (“*Monitoring plan for pathogen indicator bacteria in freshwaters*”). Responsible parties would be required to submit a proposed comprehensive monitoring plan for approval by the Regional Board, and to implement that plan upon approval. The proposed Basin Plan amendment text includes specific items that must be addressed, at a minimum, in the proposed plan. These include justification for site selection to assure that representative sites are selected, monitoring frequency, etc. Our experience indicates that this approach, requiring the submittal of a proposed plan for consideration as opposed to specifying monitoring specifics in the Basin Plan itself, is far superior in that it preserves flexibility to make appropriate changes efficiently, without the need for a time-consuming Basin Plan amendment process.

- You ask whether REC-2 designated waters are truly less susceptible to children interaction and/or body contact, and whether it is appropriate to assume that recreation water associated with boating, camping and sunbathing would not be used for other purposes involving body contact. You point out that the design of Use Attainability Analyses is critical in accurately categorizing waterbodies as REC1 or REC2. You recommend that these waterbodies be further evaluated individually to assess all possible ways of human exposure and re-categorized if necessary to offer maximum human health protection.

The Use Attainability Analyses conducted to support the recommended REC2-only waters carefully considered a suite of factors that might affect the use of those waters for recreation, including by children. Based on that evidence, supported by extensive photographic surveys, we found that REC1 type activities had not been and were not likely to occur in these waters and thus recommend de-designation of the REC1 use. Where there was evidence that these waters offered some opportunity for aesthetic enjoyment, wildlife observation and the like, where ingestion of water is unlikely (per the REC2 definition, for which no change is proposed), we recommend the REC2 only designation. We agree that these waterbodies will need to be re-

evaluated over time; in fact, we have a legal obligation to do so, per requirements for triennial review of water quality standards. As discussed in the staff report, where a REC1 designation is not applied to a surface water body, that waterbody must be re-evaluated at least once every three years to determine whether conditions have changed such that the REC1 designation has become appropriate. In that case, the Basin Plan would be amended accordingly.

Issue 2: Specifying and Implementing Single Sample Maximum *E. coli* Values for REC1-designated waters.

- You state that “The application of a single sample maximum is appropriate where data are lacking. However, consider whether it is necessary to further delineate REC1-designated waters into tiers based on usage frequency. When considering human health risks, it is the microbial quality of the water that drives illness estimates – not necessarily exposure frequency. Whether a contaminated waterbody is frequented by 10 people or 100 people, individual health risks still exist with any exposure. Risk managers should develop recreational water standards based on microbial quality, and not based on the numbers of people projected to be exposed. A more protective, conservative approach is to address REC1 waterbodies as one group. Further, in considering the default values listed for each tier in Table 5-REC1-ssv, the values for each tier are essentially the same.”

The proposed amendments recommend implementation of single sample maximum values in accordance with U.S. EPA’s 1986 national bacteria quality criteria and consistent with implementation of those criteria in the BEACH Act Rule, by which U.S. EPA promulgated the 1986 criteria for certain Great Lakes states and coastal recreation waters in other states. As described in that guidance and Rule, and in other guidance published by U.S. EPA on the application of single sample values, U.S. EPA developed the single sample maximum values as a tool for beach managers to determine, in a timely manner and based on limited data, whether or not beaches should be closed or posted. Irrespective of the tier and single sample maximum values assigned, each REC1 water would have the same geometric mean, which is the more reliable measure of risk to public health resulting from primary contact recreation.

As you aware, U.S. EPA published draft revised bacteria criteria guidance in late 2011 to solicit scientific views. In part, the draft revised criteria would eliminate the tiered approach because of inconsistency in and misinterpretation of the application of single sample values by the states. In our view, this would eliminate a pragmatic approach to regulating water quality and restricting recreational activity at primary contact recreation areas. The tiered approach enables regulators and beach managers to prioritize their actions to protect public health and the use of waters for primary contact recreation to assure that appropriate measures are implemented where people are most likely to be affected. As a practical matter, since resources are limited, such prioritization is necessary, as well as prudent. As indicated above, if and when the draft revised bacteria criteria become final, then it would be appropriate to review and consider revising recreational standards in the Basin Plan once again.

Other Issues

- Re High Flow Suspension of REC1 and REC2 Standards: You state that “REC1 and REC2 standards should not be stopped (even temporarily) during high flow conditions. Although

those waterbodies may not be used during those particular time periods due to safety, water quality monitoring should continue...It is critical to obtain data during high flow conditions when water quality is more likely to be compromised. This contributes to the interpretation of the remaining monitoring data, as well as provides "worst-case" scenario information that is important when developing policy."

The application of the high flow suspension does not necessarily preclude monitoring during rain events. However, it is necessary as a practical matter, given resource limitations, to assign higher priority to monitoring where and when recreational activity is taking place or is likely to take place. Where we have evidence of recreational use impairment as the result of bacteria indicator concentrations that exceed objectives in the Basin Plan, then source investigations are required to identify appropriate corrective action. The temporary suspension of recreation standards enables responsible parties to design and focus their corrective efforts where and when members of the public are most likely to be affected. Once again, this pragmatic approach is necessary and prudent given that resources are limited.

- Re Deleting the Total Coliform Objective for Surface Waters Designated MUN: You recommend against deleting this objective. You state that "Even minimal total coliform monitoring could trigger an action or alert to those individuals using the water. It is not appropriate to assume that the property owners know not to consume that water.

We know of no scientific or regulatory basis that supports the total coliform objective. Current regulations required the treatment of raw surface waters before consumption. Deleting the objective would have no effect on monitoring efforts that might trigger an action or alert. While we are concerned about the possible health effects of drinking untreated surface water, we do not have the ability to regulate the actions of all individuals who may elect to do so.

In summary....

- You point out that it is critical that science inform risk management decisions whenever possible, and that where data are lacking or the science has inherent limitations, it is all the more important for risk managers to take a cautious, conservative approach when developing standards. You point to some examples within the proposed Basin Plan amendments that call for subjectivity. Finally, you point to the need to protect the health of susceptible populations.

We agree that a conservative approach in protecting public health is appropriate. We believe that the proposed amendments employ this approach, consistent with bacteria criteria guidance and regulation by the U.S. EPA. We believe that the approval and implementation of the proposed amendments, including the designation of certain waters as REC2 only and the application of a high flow suspension, will provide greater public health protection than that afforded by the current Basin Plan standards. To a large degree, this is because the amendments would enable limited public resources to be focused first on areas where and when people and public health are most likely to be affected.

We sincerely appreciate your thoughtful review and comments.

cc: Gerald Bowes