



**California Regional Water Quality Control Board**  
**Lahontan Region**



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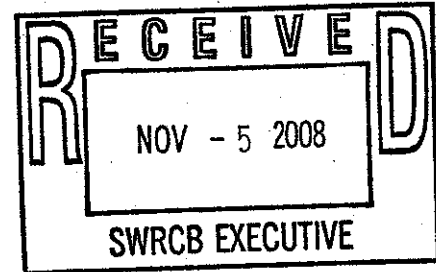
**MEMORANDUM**

**TO:** Jeanine Townsend, Clerk to the Board  
State Water Resources Control Board  
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**FROM:** Bruce T. Warden, Ph.D  
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**LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD**

**DATE:** November 4, 2008

**SUBJECT: COMMENTS ON PUBLIC SCOPING DOCUMENT FOR "PROPOSED REVISION TO THE BACTERIAL STANDARDS FOR WATER CONTACT RECREATION IN FRESH WATERS OF CALIFORNIA"**



**General Comments**

Lahontan Region staff is in the process of developing Regional criteria for *E. coli* (EC) to augment or supplant the current Fecal Coliform (FC) Water Quality Objective (WQO). FC and EC data are being collected to establish reference conditions and to develop FC versus EC correlations. The Lahontan fecal coliform objective (20 CFU/100 mL log mean) is modeled after the USEPA fecal coliform objective, though it is 10 times more restrictive than the Federal objective, based on the fact that Region 6 has many "pristine" waters and supports high recreational use.

Analysis of fecal coliform data over the last 15 years has shown the log-normalized metric to be a very reliable indicator of fecal coliform sources associated with identifiable land uses, within the confines of a well-designed monitoring plan. However, the not-to-exceed 10% (NTE10) of samples criteria value (40 CFU/100 mL) is unreliable for identification of fecal coliform sources—it is frequently subject to false positives. Consistent with the log-normal distribution of FC in the environment, occasional spikes in FC are expected, given the event nature of FC source loading. The Single Source Allowable (SSA) metric being proposed by the State Board may be an improvement over the NTE10 approach, though this will have to be confirmed by field observation and data analysis. The functional problem with the NTE10 metric is that the 11 or more samples is seldom collected in a 30 day period, which is the minimum sample size required to bring a single, possibly false positive exceedance below the 10% threshold.

**California Environmental Protection Agency**

The Lahontan Water Board adopted a more restrictive FC bacteria objective in the 1970s for the Lake Tahoe Basin recognizing the pristine water quality and the importance of water recreation. The Lahontan Water Board recognizing similar values in the rest of the Lahontan Region, extended the objective to the entire region in the 1995 Basin plan update. Adoption of the proposed E. coli objective would allow lowering of water quality in the Lahontan Region and be considered a significant environmental impact. An E. coli objective comparable to the current Lahontan fecal coliform standard would be 10 times less than that proposed—about 13 E. coli per 100 mL compared to the 126 E. coli per 100 mL proposed.

There are areas within the Lahontan region where site-specific objectives higher than the current fecal coliform standard might be appropriate. An example of this would be the Bridgeport Valley where a combination of historic grazing practices on private lands with limited public access doesn't fall into the category of pristine waters with high recreational use that the lower fecal coliform standard was intended to protect.

### **Specific Comments for Region 6 Bacteria Objectives:**

#### **Element 1: Bacterial Indicators**

E. coli is a superior test organism for bacteriological contamination for the following reasons: (1) USEPA data show E. coli gives the best correlation coefficient ( $r^2 = 0.80$ ) for swimming-related gastroenteritis rates in comparison with fecal coliform ( $r^2 = -0.08$ ) and enterococci ( $r^2 = 0.74$ ) indicator tests; (2) colonies from E. coli tests can be used directly for Bacterial Source Tracking (BST) Molecular (DNA fingerprinting) methods such as Ribotyping (RT), Polymerase chain reaction (PCR), and Pulsed-field gel electrophoresis (PFGE); and (3) the emergence of the enterhemorrhagic E. coli O157:H7 strain makes it a more direct indicator of a key public health concern. Therefore we support the recommendation to adopt a E. coli criteria and drop other bacteria criteria, excluding the Lahontan Region from the policy, or recognizing a Lahontan-specific criteria that is comparable to our existing criteria for the reasons given above and below.

#### **Element 2: Level of Protection for Water Contact Recreation**

We prefer a detailed analysis of item 4, "Adopt risk level more stringent than U.S. EPA recommendation" be performed in the environmental document. In keeping with the high recreational values associated with Sierra Nevada pristine waters the current Lahontan fecal coliform standard has a risk level of about one-in-a-million, compared to the proposed risk of eight-in-one thousand. It used to be that fecal coliform, E. coli, and enterococci tests were mere indicators of the potential for disease. Now E. coli is potentially a source of serious disease itself. E. coli O157:H7 is an enterhemorrhagic strain of the bacterium Escherichia coli and a cause of foodborne illness. Based on a 1999 estimate, there are 73,000 cases of infection and about 60 deaths caused by E. coli O157:H7 each year in the United States. Infection often leads to bloody diarrhea, and occasionally to kidney failure, especially in young children and elderly people. Most illness has been associated with eating undercooked, contaminated ground beef,

drinking unpasteurized milk, **swimming in or drinking contaminated water**, and eating contaminated vegetables. Therefore, the 22-year-old *Ambient Water Quality Criteria for Bacteria – 1986* document is out-of-date with respect to current risk factors, and should not be relied on solely. Recent outbreaks of *E. coli* O157:H7 infections suggest a more protective standard is required to protect public health. This is particularly more appropriate for high recreation, high water contact regions, such as those of the Lahontan Region. We suggest that lower risk levels be allowed for Lahontan, consistent with the current Lahontan fecal coliform bacteria objective.

#### Element 3: Calculation of Effluent Limits

No comment – Alternative 1 “no action” recommendation is an acceptable alternative for the policy.

#### Element 4: Mixing Zones

No comment – Alternative 2 “Allow mixing zones in a small area near an outfall” is an acceptable alternative for the policy.

#### Element 5: Averaging Periods

The recommended Alternative 2 “Specify the geometric mean as a rolling average” is similar to the Lahontan method for calculating fecal coliform, with two exceptions: (1) log-normalized data is calculated instead of the geometric mean, and (2) only the data within a 30-day period is used, regardless of the number of samples in that period. The proposed alternative has the advantage of a sample size of at least five, potentially improving the statistics for less than weekly sampling regimens. The disadvantages of the proposed alternative include the use of a geometric mean rather than a log-normalized mean, which may be inappropriate for log-normally distributed populations, such as bacteria in natural waters (this is covered in more detail later), and there is no requirement for a minimum sampling interval (such as weekly or monthly, etc.), which may mask important seasonal considerations such as the short high alpine meadow grazing season, if a longer sampling period is used. These advantages and disadvantages should be covered in the environmental document.

#### Element 6: Effluent Monitoring and Reporting

No comment – Alternative 1 “No action” recommendation is an acceptable alternative for the policy.

#### Element 7: Analytical Methods

We recommend that Alternative 2 “Specify analytical methods for receiving waters and effluents” be pursued. We agree that Membrane Filter (MF) methods are superior to other methods for the following reasons: the method results in discrete enumeration of bacteria in waters which is necessary for assessment of compliance with numerical water quality objectives. Most Probable Number (MPN) multiple tube methods often result in non-quantitative results such as “less than 20” or “greater than 2000,” which cannot be put in a spreadsheet for calculations without some dubious statistical assumptions. This makes data from MPN methods functionally unusable for compliance purposes. We recommend that the criteria for allowable test methods be

those listed as acceptable MF methods in the Code of Federal Regulations (CFR). For example, 40 CFR Parts 136 and 503, Vol. 72, No. 57 (March 26, 2007), Table 1H.—List of Approved Microbiological Methods for Ambient Water gives a list of EPA, Standard Methods (SM), and other approved analytical methods for bacteria. This list is periodically updated as improved methods are developed, so it would make sense to build in the policy the flexibility to automatically adopt the best methods available.

Element 8: Compliance Schedules and Interim Requirements

No comment – Alternative 1 “No action” recommendation is an acceptable alternative for the policy.

Element 9: Site-Specific Objectives

The scope of this element needs to be significantly expanded to include assessment of not just Single Sample Maximums (SSM) site-specific objectives, but also the “mean density” objective. Furthermore, the scope of “mean density” metrics allowable should be expanded to include log-normalized mean density metrics such as are used for the fecal coliform standard, in addition to geometric means. The in-house Lahontan lab has performed numerous monitoring studies on fecal coliform in natural waters over about the last 15 years involving hundreds of samples. These studies have usually confirmed the assumption of log-normal distribution characteristics for fecal coliform statistical populations inherent in the fecal coliform standard. There is no logical reason to assume that *E. coli* population distributions are any different than fecal coliform population distributions, particularly since *E. coli* is typically the predominant, if not the only constituent of fecal coliform in samples. The State Board should not impose a policy that relies on a normal statistical distribution if that population is log-normally distributed. If the data shows a log normal distribution, a log-normalized mean should be used. If the data shows a normal distribution, then a geometric mean should be used. Therefore, flexibility to allow a log-normal mean density metric should be assessed in the environmental document. Though we generally agree with the recommendation that Alternative 4 be adopted, we recommend that it be reworded to something like “Allow calculation of equal or more stringent site-specific mean density metrics, including log-normalized means and SSMs.” Rather than “Allow calculation of more stringent site-specific SSMs only.”

We appreciate the efforts of State Board staff to develop new bacteria objectives. We are willing to provide technical assistance and we urge you to explicitly recognize the uniqueness of the Lahontan Region’s pristine waters and the need to continue protection of our valuable water resources for recreation and other beneficial uses. Please contact us if you wish to discuss this matter further.

BTW/clhT: St Bd Bac-t Public Scoping Document, Comments, btw.doc  
[General: Bacteria Standards (new)]