Association of
Metropolitan
Sewerage Agencies

August 9, 2004

Water Quality Standards for Coastal and Great Lakes Recreation Waters
Docket ID OW-2004-0010
U.S. Environmental Protection Agency, Mailcode: 4305T
1200 Pennsylvania Ave., NW
Washington, DC 20460
Email: wilcut.lars@epa.gov

VIA ELECTRONIC MAIL

Dear Sir or Madam:

The Association of Metropolitan Sewerage Agencies (AMSA) is pleased to offer the following comments on the U.S. Environmental Protection Agency's (EPA or Agency) proposed rule, *Water Quality Standards for Coastal and Great Lakes Recreation Waters* (July 9, 2004; 69 *Fed. Reg*. 41720). AMSA commends EPA for taking action to comply with the mandates under the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, and for the Agency's continuing commitment to improving the quality of our nation's beaches.

Over the past three years, AMSA has commented on several related EPA actions. These include EPA's May 2002 draft implementation guidance[1] for the 1986 bacteria criteria, which still is not final. AMSA's comments on those Agency efforts remain valid today, especially as they regard the 1986 criteria values themselves and our concerns with the lack of EPA-approved test methods for *E. coli* and enterococci. In addition to the implications of changing the indicator organisms for measuring bacteria levels, EPA's July 9 proposed rule is of particular interest to AMSA's members because it interprets the term "single sample maximum" and clarifies how it is intended to be used under the 1986 bacteria criteria.

[1] *Implementation Guidance for Ambient Water Quality Criteria for Bacteria*, May 2002 Draft, EPA-823-B-02-003

AMSA's comments on the proposed rule follow for your consideration.

I. Continuing Concerns with the 1986 Criteria

AMSA continues to question the scientific validity of the 1986 *Ambient Water Quality Criteria for Bacteria*.[2] On a number of occasions, AMSA has commented on the flaws in the original studies underlying the criteria and the fact that no studies to confirm the criteria have been conducted since they were first established.

A. Underlying Studies and Data Have Not Been Validated

The 1986 enterococci criterion, for example, was developed based on very limited and known to be highly polluted U.S. coastal marine environments. The sampling only looked at New York City, NY; Lake Ponchartrain, LA; and Boston Harbor, MA beaches. These data were further limited to narrow testing periods: 1973 to 1975 for New York City; 1977 and 1978 for Lake Ponchartrain; and 1978 for Boston Harbor. We are not aware of any recent examination of beaches noted for uncontaminated, pristine swimming conditions, nor of published literature post-1980 that verifies the 1986 criteria values.

B. Study Results Inconclusive and Potentially Biased

A closer look at the studies used to support the 1986 criteria reveals additional problems. Nine testing periods were used for data collection and statistical comparison of the results at New York City beaches, but only two (22%) of the nine tests found a statistically significant difference in the illness symptoms between swimmers and non-swimmers. In addition, the determination of illness in all the studies came from highly-subjective – and often erroneous – self-diagnosis of interviewed persons. These persons often were members of the same family unit, creating additional potential bias in the reported illnesses.

C. Criteria Fail to Consider Non-Human Sources of Contamination

The 1986 criteria also look only at human bacterial contributions. However, it is now possible to routinely and economically determine the source of fecal indicator organisms, whether stemming from humans, birds, pets, livestock, or wildlife. Recent studies in Virginia, for example, in areas with elevated enterococci levels have shown that natural sources of bacteria, such as geese, seagulls and wildlife, can significantly impact bacterial counts. EPA has not provided guidance on how to account for the impact of these sources on bacterial counts when implementing the 1986 criteria.

D. Additional Research Is Needed Before Criteria Are Implemented

Our knowledge of bacterial sources and contamination has advanced significantly since the data underlying the criteria were collected in the 1970's and the criteria were published in 1986. The methods of enumeration have also improved to eliminate old problems that had unknown effects on

[2] *Ambient Water Quality Criteria for Bacteria*, January 1986, EPA 440/5-84-002

the analysis results. Ultimately, the only way to respond to these serious concerns regarding the 1986 criteria is for EPA to conduct additional research using up-to-date methods and experience on the suitability of *E. coli* and enterococci as indicator organisms. Given that the statutory deadlines in the BEACH Act will not allow EPA to take additional research and epidemiological studies into consideration before states are required to make wholesale changes to their water quality standards and discharge permits, AMSA urges EPA to work with the states and permittees to implement the new standards in as careful and responsible a manner as is possible.

II. Lack of Guidance and EPA-Approved Test Methods Hamper Implementation

The lack of implementation guidance for the 1986 criteria and EPA-approved test methods for enumerating *E. coli* and enterococci are two reasons why many states have yet to adopt the 1986 criteria. Until these issues are fully resolved, they will continue to affect implementation of the proposed criteria.

A. Implementation Guidance

Drafts of the implementation guidance were released in May of 2002 and November 2003. EPA indicated that the guidance might be finalized in Spring 2004. EPA, however, has now informed stakeholders that the guidance may never be finalized. Even more troubling is the fact that key components of the guidance have been rolled into the proposed rule, which will likely only result in providing less flexibility to states in how they implement the standards.

B. Test Methods

Currently there are no EPA-approved test methods for enumerating *E. coli* or enterococci in wastewater effluent. EPA has over the past few years validated and approved test methods for enumerating these indicators in ambient water, but those approvals exclude effluent as an approved sample matrix. This is a serious concern that will undermine widespread implementation of the 1986 bacteria criteria. AMSA understands that EPA is validating the approved ambient water test methods for use on effluent, but that there have been problems with false negatives during the validation efforts and that additional study may delay proposal of the methods until late 2004, with final, approved methods not available until sometime in 2005.

While many wastewater treatment agencies have begun to evaluate their effluents for the new indicators using various test methods to get out ahead of the regulations, knowledge regarding the effectiveness of current disinfection practices on enterococci and *E. coli* remains limited at best.

In preliminary studies, one AMSA member has identified differences between *enterococcus* methods when analyzing wastewater samples – one method (EPA Method 1600) shows consistently lower counts than the other (SM 9230C) in treated wastewater, and suggests that Method 1600 (the subject of EPA's ongoing validation efforts) is inappropriate for wastewater analysis. The marked difference between the two methods is particularly worrisome if EPA or states use enterococcus results analyzed with Method 1600 to determine achievable limits in treated wastewater. Enterococcus concentrations in chlorinated wastewater analyzed with Method 1600

may be artificially low, and these artificially low results may lead to the false conclusion that meeting proposed EPA limits is achievable in chlorinated wastewater when in fact it is not.

III. Interpretation of "Single Sample Maximum"

In the July 9 proposal's preamble, EPA seeks comment on interpretations of the term "single sample maximum (SSM)" because the 1986 criteria document does not interpret the meaning of the term. EPA posits that one possible interpretation is that the SSM is a single value never to be exceeded. AMSA strongly disagrees with this interpretation, as it is inconsistent with other EPA guidance and not reflective of the level of protection the 1986 criteria are intended to provide.

A. Concerns Regarding the SSM

Single sample maximum (SSM) is a seriously flawed concept for bacteria, because of the nature of bacterial sampling, detection and enumeration. Differences in single sample measurements are often meaningless. Analytical results are actually estimates of true concentrations based on a series of assumptions. This is a major reason for the established, and EPA recommended practice, of using geometric means to characterize bacterial conditions. As an example, the Most Probable Number (MPN) fecal determination is considered one of the most precise of all the bacterial density determinations. According to Standard Methods (1992), when use of the MPN technique results in a detected concentration of 110 MPN/100 ml, a 95% confidence can be used that the real number is between 40 and 300. Single sample differences between numbers like 104 (as proposed), 105 and even 150 are meaningless.

SSM is also flawed in this specific case because of the particular statistical approach used in the initial 1986 criteria. While AMSA would argue that the data were flawed, the geometric mean standards for the 1986 criteria were at least developed from actual data. The proposed SSM values were based only on statistical assumptions of log probability distribution and an arbitrarily selected "confidence limit". As stated in the original 1986 criteria relative to this confidence interval, "[t]o set the single sample maximum, it is necessary to specify the desired chance that the beach will be left open when the protection is adequate. This chance, or confidence level, was based on Agency judgment" (January 1986; page 9). Using a control chart analogy and the actual log standard deviations from the 1970 studies, SSM for various confidence levels were calculated. The result was to select the 75% confidence interval around a geometric mean. The statistical analysis was based on the assumption that this data set had a log normal distribution. Following the selection of this confidence level, EPA again cautioned that the development and listing of the SSMs for this specific data set "*should be recalculated for individual areas if significant differences in log standard deviations occur.*"

B. AMSA's Recommended Approach

The BEACH Act requires EPA to promulgate criteria that are "as protective of human health as" the 1986 criteria. The interpretation of the SSM is critical to demonstrating whether the criteria are in fact "as protective." As stated above, the 1986 criteria document does not interpret the term "single sample maximum," discusses SSMs solely in the context of beach closures, and states that "in deciding whether a beach should be left open, *it is the long term geometric mean bacterial*

density that is of interest. Because of day-to-day fluctuations around this mean, a decision based on a single sample (or even several samples) may be erroneous, i.e., the [single] sample may exceed the recommended mean criteria even though the long-term geometric mean is protective, or may fall below the maximum even if this mean is in the nonprotective range" (January 1986; page 9).

The May 2002 draft bacteria implementation guidance (page 5) further indicates that "[i]n terms of criteria setting, the targeted level of protection is the illness rate, *and the most direct relationship between measurements of bacterial levels and illness rate is the geometric mean of measurements taken over the course of a recreation season.*" This is consistent with the proposal's preamble statement at 41725 that "the geometric mean has the most direct relationship to the illness rate." Therefore, as EPA goes on to say in the preamble, "EPA could interpret the phrase 'as protective of health as' the 1986 bacteria criteria document *to apply only to the geometric mean."* AMSA believes this is the most reasonable interpretation and recommends that EPA only promulgate the geometric mean in the final rule, leaving the SSM available for use as an implementation tool for making beach opening and closure decisions only.

C. Alternative Limited Application Approaches

EPA's May 2002 draft bacteria implementation guidance (page 46) recommends that states use only the geometric mean component for National Pollutant Discharge Elimination System (NPDES) water quality-based effluent limits. AMSA strongly recommends that the regulatory text, if EPA insists that it include the SSM in the criteria, be modified to plainly state that the SSM is to be used only for making beach closure and opening decisions as originally intended in the 1986 criteria document, and not for assessing attainment of standards, developing total maximum daily loads (TMDL)s or developing NPDES permit limits.

Alternatively, if EPA will not clearly limit use of the SSM to beach opening/closing decisions, AMSA recommends that EPA modify the proposed regulatory text to state that the SSM shall not be exceeded only when there is insufficient data to determine that the geometric mean criterion is being met. A sufficient number of samples for comparison with the geometric mean criterion provide an indication of swimming-associated health risks superior to reliance on single values from single samples. Where a statistically sufficient number of samples is available (at least five tests evenly spaced over thirty days, according to EPA), application of the geometric mean criterion is as protective as application of a SSM criterion set equal to a confidence limit where such a data set does not exist. The SSM is a surrogate for the geometric mean in the absence of a suitably large data set to protect against the risk of exceeding the geometric mean. Therefore, in the presence of a suitably large data set, reliance upon the geometric mean criteria from the 1986 bacteria criteria document completely satisfies the "as protective as" test.

IV. Application in CSO-Receiving Waters

AMSA also recommends that EPA clarify the applicability of the final rule in combined sewer overflow (CSO) impacted waters. Implementation of water quality standards for CSO-impacted waters is covered by the Wet Weather Water Quality Act of 2000 (CWA Section 402(q) and the

1994 CSO Policy). Based on the provisions of that law we recommend the following language be included in the rule:

> "For CSO impacted waters, compliance with these water quality standards shall be assessed following implementation of an approved long term control plan in accordance with the *CSO Control Policy"*.

V. New Discharges

EPA's proposal limits the use of compliance schedules to "existing pathogen dischargers." Given that EPA often encourages CSO communities to relocate CSO outfalls in the context of long-term control plan (LTCP) implementation, AMSA requests that EPA clarify in the final rule that the definition of "new pathogen discharger" does not apply to relocated CSO outfalls.

VI. EPA's Economic Analysis Fails to Assess Key Cost Considerations

EPA's economic analysis for the proposed rule assumes EPA will promulgate the geometric mean. However, the real cost associated with this rulemaking will be affected by the final interpretation of the term "single sample maximum." If EPA applies the SSM as a never to exceed value, virtually any waterbody with a measurable amount of urban runoff, not to mention a CSO-impacted waterbody, will not be able to fully attain the criteria. AMSA believes that if EPA applies the SSM as a never to exceed value, the Agency must redo its economic analysis accordingly and re-propose the criteria.

EPA's existing economic analysis is problematic because it does not directly estimate the costs associated with the control of municipal separate storm sewer systems (MS4), CSOs, and sanitary sewer overflows (SSOs). EPA indicates that "these sources are difficult to model and evaluate with respect to potential costs impacts." EPA does, however, address these discharges in "existing and anticipated regulations and policies, and has tallied potential control costs as a part of analyses for these actions" in the proposed rule.

EPA's economic analysis primarily evaluated the ability of wastewater treatment plant effluent to comply with the new standards, specifically the geometric mean. EPA indicates that chlorination processes can be upgraded or adjusted to produce the levels of bacteria necessary for compliance with the proposed rule. AMSA's members have indicated, for the most part, that for a full secondary treatment plant, EPA's characterization, that disinfection process optimization should be sufficient, is accurate. However, plants that are not at full secondary, for example wet weather treatment facilities at CSO outfalls, may have more difficulty meeting the new standards. The costs associated with bringing these facilities into compliance with EPA's final standards should be considered.

A. Implications for CSO Communities

A closer examination of the supporting document, *Economic Analysis for Proposed Water Quality Standards for Coastal Waters* (June 2004), reveals that, with respect to CSOs, EPA has "accounted for the potential costs of these controls in its report to Congress" on CSOs in 2001. The stated

national CSO needs figure of $44.7 billion was based on the 1996 Clean Watersheds Needs Survey Report to Congress – *Assessment of Needs for Publicly Owned Wastewater Treatment Facilities, Correction of Combined Sewer Overflows, and Management of Storm Water and Nonpoint Source Pollution in the United States*. The Report to Congress and the underlying needs survey, however, did not take into consideration EPA's proposed narrow interpretation of the SSM. There is no evidence that the standard to which CSOs were held in these needs estimates (the equivalent of primary clarification and disinfection) would ensure compliance with a SSM for bacteria.

In fact, preliminary estimates by one AMSA member in the Great Lakes region indicate that CSO construction to support the SSM criteria will increase costs by approximately 60%, or nearly a billion dollars, without considering O&M costs. Thus, this regulation would result in an annual capital expenditure by just *one* Great Lakes discharger of more than the proposal's $7,000,000 estimate for *all* Great Lakes dischargers.

Should EPA adopt the SSM as a never to be exceeded water quality standard, CSO communities would have no choice but to eliminate all overflows to meet the standard. During the CSO LTCP development process, most wastewater treatment agencies evaluate the costs associated with achieving zero overflows (i.e., sewer separation) as compared to the cost of achieving 4-6 overflows per year. AMSA informally polled its CSO members to assist in preparing these comments, and found that the costs to achieve zero overflows for many communities were staggering when compared to their existing plans geared to some remaining overflows:

- Midwest – A large discharger (greater than 100 MGD) estimates its costs would climb from $3.8 billion to $20 billion if forced to achieve full separation.

- Northeast –
  - A large discharger (greater than 100 MGD) estimates its current cost estimate would increase by $3 to $5 billion, if complete elimination of overflows was required.

  - A medium-sized discharger (less than 20 MGD) estimated a nearly six-fold increase in cost from $42.5 million to $250 million to achieve full separation.

We do not believe that EPA would intend to impose such dramatic costs on public agencies, and are confident that this result is inconsistent with Congress' intent in endorsing the process for CSO communities outlined in the *CSO Policy*. Achieving zero overflows through sewer separation will only ensure that CSOs are no longer contributing to the problem. In the end, the waterbody will still not be able to meet the "never to exceed SSM" standard due to stormwater impacts, which will be exacerbated by sewer separation.

B. Additional Cost Considerations

- The model used to develop the SSO needs is based on reducing wet weather overflows within a collection system to one every five years, but again, the SSM criteria has not been considered.

- The proposed regulation makes no provision for suspending the SSM requirement for extreme climatic events. Therefore, the model used by EPA to develop costs virtually guarantees that there will be violations.

- In a large collection system, five year return storms will not occur across the entire system *at the same time*, or even in the same year. Therefore, the events presupposed in the model will actually result in multiple occurrences in one watershed.

- In reference to total maximum daily loads (TMDLs), and state impaired water listings, the Economic Analysis document states:

  > There is no data to indicate that changing the bacterial indicator for coastal recreation waters from fecal coliform to *E. coli* and enterococci would result in any additional waters listed as impaired by pathogens, or in additional controls on sources to coastal recreation waters already listed as impaired by pathogens.

  While this statement may be true, the document presents no evidence that the converse is not equally true.

- Based on several years of voluntary enterococcus monitoring at one AMSA member facility (approximate average daily flow of 400 million gallons per day), sodium hypochlorite dosage would need to increase by approximately 15% in order to meet the geometric mean enterococcus limit of 35 col/100 mL. This increase in total chlorine residual concentration after disinfection, even with subsequent dechlorination, may result in increased toxicity to marine organisms, difficulties in meeting existing toxicity limits, and increases disinfection/dechlorination operating costs over $200,000 per year.

- In Appendix D of EPA's Economic Analysis the following statement appears regarding energy use:

  > *Increasing chemical (chlorine) dose:* Involves allowing more chemical to flow through the pipes from pressurized vessels, or by gravity for liquid chlorine applications. EPA estimates that there is no incremental increase in energy use associated with this activity.

  The procedures described here are not used because they are impractical, imprecise, and dangerous. In fact, liquid chlorine (which we presume to mean sodium hypochlorite) is fed using metering pumps so that disinfection can be matched to the conditions, particularly flow, present at the time. In order to avoid the fatalities that could result from trying to directly diffuse gaseous chlorine into the effluent stream, a solution of water and chlorine is first prepared under controlled conditions. This solution is then mixed with the effluent. In either case, an increase in applied dose *will* result in increased pumping and therefore increased energy costs.

Thank you for considering our comments on this matter. If you should have any questions, please do not hesitate to contact Chris Hornback, AMSA's Director of Regulatory Affairs, at 202/833-9106.

Sincerely,

Ken Kirk
Executive Director