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Joe Martens
Commissioner

March 25, 2011

SENT BY PDF AND REGULAR MAIL

Ms. Iris Goodman
Designated Federal Officer (DFO)
EPA Science Advisory Board (1400F)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW.
Washington, DC 20460

Re: Scientific Advisory Board Draft Report and SAB discussion during March 15 and March 17 teleconferences: New York's comments

Dear Ms. Goodman:

This letter provides New York State's additional written comments on the Scientific Advisory Board (SAB) Draft Report, and on the SAB's discussion of that report during its March 15 and March 17 teleconferences. The comments have been prepared primarily by Dr. Raymond Vaughan of the New York Attorney General's Office, and are submitted on behalf of New York's ballast water management team which is coordinated by our Department. We understand from your March 17, 2011 email that comments may still be submitted at this point in time.

1. During the March 15 teleconference, the SAB expressed a preference for using a 95% confidence level as a criterion for ballast water treatment system performance. While we agree that a relatively high confidence such as 95% is preferable, the SAB should be willing and able to compute the full range of confidence levels, including those lower than 95% that can be calculated from current and ongoing test data. In reviewing treatment-system performance, the SAB needs to be able to *express* and *assess* the progress being made toward a desired goal such as 95%. It should not deprive itself of this ability by converting numeric data into a less informative "pass/fail" format at a premature stage that hinders scientific inquiry.

2. As stated in comment 4 of our recent comments (submitted with our cover letter dated March 11, 2011), 30 milliliters is the minimum sample volume that needs to be collected in order to demonstrate compliance at 95% confidence with a 100x IMO standard for organisms in the 10-50 μm size class, assuming a Poisson distribution. Specifically, the standard is met at 95% confidence if the organism count shows zero living organisms within the collected sample volume of 30 ml. Compliance at 95% confidence can also be demonstrated when non-zero numbers of living organisms are counted within larger volumes of collected sample, but for a count of zero the necessary sample volume is 30 ml. Judging from the draft report and March 17 teleconference discussion, the SAB does not recognize this important statistical relationship.

This distinction must be so recognized.

3. As noted, the 30-ml minimum sample volume has not been acknowledged in the SAB's teleconference discussions or in its draft report and there appears to be no evidence that the correct relationship is being applied in the following important sections of the draft report:

> For the most stringent standards, 100x and 1000x more stringent than D-2/Phase 1, if any living organisms in any size class were found following treatment, the BWMS earned a 'D'. This score indicates that it is extremely unlikely (or perhaps impossible) the BWMS could meet a stricter standard, again because the detection limit of the test methods used provide resolution to D-2/Phase 1, at best. (SAB draft report dated March 3, 2011, page 40, lines 22-26.)

> Given the data available, it is highly unlikely that any of the systems listed in Table 4.1 could provide organism removal to the level of 100x or 1000x the standard because all systems showed at least one observation of a living organism within the sample volumes as specified in IMO D-2 guidelines, thus clearly exceeding these more stringent standards. No BWMS reported zero living organism in all samples analyzed following treatment. (SAB draft report dated March 3, 2011, page 45, lines 32-37.)

Our specific concern here involves organisms in the 10-50 μm size class. When using a living organism count of zero to demonstrate 100x IMO compliance at 95% confidence in this size class, the necessary sample volume is 30 ml, assuming a Poisson distribution. If using a *non-zero* living organism count for this purpose in this size class, the necessary sample volume and/or the confidence level would be different, in which case the SAB would need to provide a clear explanation. If the SAB is assuming a non-Poisson distribution, it needs to specify clearly which distribution is being used.

4. In assigning scores and otherwise assessing ballast water treatment systems, the SAB needs to deal separately and explicitly with the different organism size classes. For the 100x IMO standard, the five different organism classes include organisms >50 μm, organisms 10-50 μm, and three different microorganisms. All of these need to be assessed and reported separately because there are differences in how easily the standard is met for each class, and also differences in the existing and foreseeable technical options for meeting each standard. For example, the standard for organisms >50 μm is typically considered the most difficult to meet, yet the organisms in this size class can be largely eliminated by filtration. Even though a 50-μm filter cannot remove all organisms larger than this size, it remains generally true that a progressively smaller mesh size will catch or kill an increasingly large number of the organisms >50 micrometers, thus minimizing the number of organisms in this size class that pass through as living organisms. As another example, the so-called 100x IMO standards for the indicator microorganism classes are expected to be routinely achievable because they are already used as U.S. public health standards and are also substantially similar to the IMO standards for those classes. The *vibrio cholera* limit is the same as the IMO limit (<1 cfu per 100 ml in both cases); the *e. coli* limit differs from IMO by about a factor of 2 (<126 cfu as compared to <250 cfu per 100 ml); and the intestinal enterococci limit differs from IMO by about a factor of 3 (<33 cfu as compared to <100 cfu per 100 ml). See also page 3 of our comments dated January 25, 2011.

5. The SAB presents a poorly defined argument that "imperfect ships" are a substantial impediment to achieving standards more stringent than the IMO standard. While we recognize the nature of the concern, the SAB's portrayal of the problem is too general and appears to be exaggerated with respect to standards such as 100x IMO. Our previous comments have addressed this in two different ways. *First*, as noted on page 3 of our comments dated January 25, 2011, the SAB should not equate the 100x IMO discharge standard with a "zero or near zero discharge" standard. The ballast discharge from a vessel complying with 100x IMO may allowably contain up to 1000 or more organisms >50 μm, and up to 1 billion or more organisms in the 10-50 μm size class. These are not zero or near-zero numbers, yet the SAB continues to imply that the 100x standard is unachievable because some unspecified number of living organisms remain untreated – because they are harbored in discharge pipes and orifices – and are routinely discharged along with the treated ballast. If the SAB believes that the number of harbored organisms will inevitably prevent the achievement of the 100 x IMO standards, it needs to support this view with reasonably quantitative logic and data. *Second*, as also noted on page 3 of our comments dated January 25, 2011, any concerns about biological contamination in the piping aboard "imperfect ships" can be substantially alleviated by employing a combination of ballast water treatment and ballast water exchange. Mid-ocean exchange or flushing will reduce any such contamination lurking in pipes. In addition, it will also provide a relatively uniform and organism-sparse flow of water into ballast water treatment systems, thereby reducing the log-reduction task needed from ballast water treatment.

6. In general, the SAB should more clearly identify the benefits of combining ballast water exchange with ballast water treatment. The benefits are acknowledged near the end of the draft report dated March 3, 2011 (pp. 103-107) but should also be acknowledged, for example, in response to charge question 3a ("For those systems identified in questions 1 a. and 2, are there reasonable changes or additions to their treatment processes which can be made to the systems to improve performance?"). Performing ballast water exchange in combination with ballast water treatment falls within the scope of "reasonable changes or additions" to treatment processes.

Thank you for the opportunity to comment, and please let me know if you have any questions about this matter.

Sincerely yours,

Scott Crisafulli, Chief
Water Bureau, OGC

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