



January 7, 2016

United States Coast Guard (USCG)  
Department of Homeland Security

**Re: Coast Guard decision on use of Most Probable Number method**

Dear USCG,

This is in regard to the recent decision by the USCG to exclude the most probable number (MPN) method for evaluating the efficacy of ultraviolet (UV) treatment technologies, and the Type approval process. To me, this decision cannot be supported by the science and engineering principles of water treatment.

It is well established that UV irradiation can inactivate organisms at relatively low doses; at very high doses it can “kill” them. However, the low doses and the resulting inactivation are sufficient to meet the goal (preventing invasions, because organisms cannot reproduce). This is in essence the same as what happens in water treatment, organisms are inactivated (no reproduction). It is the infection (rapid multiplication) that causes the problem, not the passive presence of inactivated organisms.

Another example related to the efficacy of UV at inactivating pathogens is the case of protozoan parasites, such as *Cryptosporidium parvum* or *Giardia lamblia*. Several years of rigorous scientific studies involving actual infectivity assessment demonstrated that these parasites are very sensitive to UV irradiation and can lose their infectivity at very low doses of UV, even though they are not killed.

There is no doubt that USCG has the best interests of the public and environment in mind. However, the exclusion of a well-established and robust culturing technique (e.g., MPN) does not seem to serve the environment best. Culturing method can provide a measure that is equivalent to live/dead, because non-reproductive organisms pose no threat (infection/invasion analogy). In other words, for invasive species to succeed in their invasion, it would be required that a certain number of such organisms be introduced to the system and that the organisms are able to replicate. If any treatment process is capable of elimination the ability of these organisms to reproduce and replicate in the environment, then they lose their ability to invade. A culturing technique such as MPN can show this very reliably.



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In summary, I strongly urge you and hope that you reconsider your decision and allow the culturing technique to be included as an acceptable assay for determining the performance of ballast water treatment processes.

Please contact me if you have any question or concern.

Yours sincerely,

A handwritten signature in cursive script, appearing to read 'M. Mohseni'.

Madjid Mohseni, Ph.D., P.Eng.  
Professor  
Department of Chemical and Biological Engineering,  
University of British Columbia  
Phone: (604)822-0047  
e-mail: [madjid.mohseni@ubc.ca](mailto:madjid.mohseni@ubc.ca)