# The Use of the Dilution Water Effect as a Water Quality Criterion

by

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A principal difficulty in the toxicology of marine organisms has been obtaining dilution water that is free from substances which may affect the response of a test organism to a toxin (WALDICHUK, 1973). Dilution water must be free of substances that place an additional stress on an organism which may in turn enhance its response to the toxic substance being tested. In other words, the dilution water must be "neutral" with respect to the toxin's effect.

The possibility of synergism between unknown chemical constituents in the dilution water and controlled additions of a toxin suggests and entirely different approach to assessing water quality. The dose-response relationship for a particular toxin or pollutant could be compared using relatively clean water as a control dilution water source and water suspected of being polluted as the test dilution water source. Thus what appears to be a technical problem in the generation of dose-response data may become a relatively simple means of assessing the potential of a marine body of water to receive additional amounts of a pollutant before toxic thresholds are reached.

A simple experiment was devised to illustrate the use of this technique. Brine shrimp nauplii are known to be an effective and convenient bioassay organism in seawater (TARPLEY, 1958). Freshly hatched nauplii were used as test organisms. Dilution water was taken from the Acushnet River estuary (harbor of New Bedford, Massachusetts) and from the relatively unpolluted of adjacent Buzzards Bay. Salinity, temperature, and dissolved oxygen content of the water sources were almost identical. Before use in the experiment, the water was filtered through membrane filters (0.45$\mu$ pore size) and allowed to stand to recover oxygen lost by the degassing which occurs during vacuum filtration. Methyl mecuric chloride was chosen as the test toxin and concentrations were made up ranging from 100 parts per $10^9$ to 1000 parts per $10^9$ in increments of 100 parts per $10^9$. Replicate determinations of brine shrimp mortality after 4 hours exposure were made for each concentration for each dilution water source. Test vessels were 125 ml flasks with 10-15 brine shrimp in 100 ml of medium. Concentrated methyl mecuric chloride stock was made up using artificial seawater.



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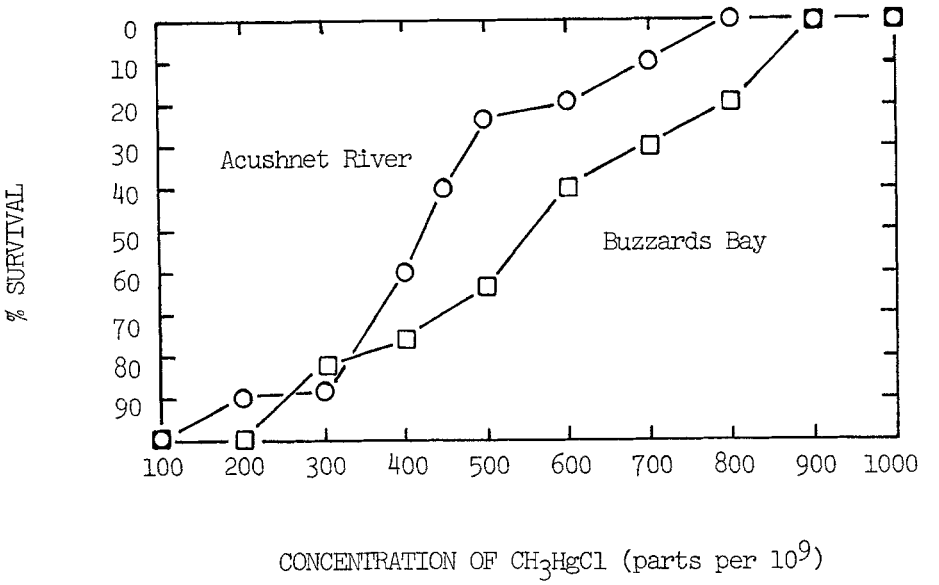


Figure 1. Effect of dilution water on the methyl mercuric chloride dose-response relationship of nauplii of Artemia salina. One intermediate dose was tested using the Acushnet River dilution water. Points shown are means of replicate determinations.

## References

TARPLEY, W.A. J. Econ. Ent. 18, 265 (1958).

WALDICHUK, M. Crit. Rev. Environ. Cont. 3, 167 (1973).