Massachusetts Department of ENVIRONMENTAL PROTECTION

t e c h n i c a l u p d a t e

Averaging Area for Benthic Invertebrate Assessments

Update to: Section 9 of *Guidance for Disposal Site Risk Characterization – In Support of the Massachusetts Contingency Plan* (1996)

Introduction

This Technical Update limits the area over which sediment concentrations can be averaged for the purpose of evaluating the risk of harm to benthic invertebrates. The limit will apply mainly to average sediment concentrations calculated for comparison to screening criteria, sediment quality benchmarks, and Method 1or Method 2 Sediment Standards that may be developed in the future.

MCP risk assessments generally use the average concentration detected at the exposure point (within the exposure area) to estimate the exposure point concentrations for the receptor of concern. The exposure point concentration should be a conservative estimate of the average concentration to which a receptor (i.e., a member of an endpoint species) is exposed over time. The home range (an area encompassing an animal's activities) is usually used to delineate exposure points, within which concentrations can be averaged to estimate an exposure point concentration. This approach to estimating exposure point concentrations does not work well for benthic invertebrates, though, because most individuals are sessile. Further, the areas inhabited by benthic populations or communities cannot easily be used to delineate exposure points because they vary widely, from small patches to relatively large expanses of sediment. As a consequence, guidance on exposure points and averaging areas for evaluating benthic invertebrate exposures must be based on a consensus value or a policy decision about the area over which impairment of the community would be considered significant by DEP.

Recommendation

MassDEP recommends averaging sediment concentrations over areas no greater than 1000 square feet to evaluate benthic invertebrate exposures. One thousand square feet is an area over which impairment of the benthic community would be considered significant by MassDEP, so high concentrations within such an area should not be "diluted out" by averaging with lower concentrations over a larger area.

Although MassDEP believes that one thousand square feet is an appropriate limit for most situations, the agency recognizes that there may be cases where an averaging area that is smaller or larger than one thousand square feet is appropriate. Examples follow.

- A larger averaging area may be appropriate at locations where the physical nature and dynamics of the water body in question, history of the release and the site, and the available data together demonstrate very clearly that contaminant distribution is fairly even throughout the area of proposed averaging.

- A smaller averaging area may be appropriate if a limited area with high levels of contamination, analogous to a hotspot, exists in an area of sediment smaller than 1000 square feet.

If an averaging area larger than 1000 square feet is selected, the risk assessor must present a clear and compelling technical justification demonstrating that significant risk associated with average contaminant concentrations over any one thousand square foot area will be detected.

Note: The limit on the averaging area is not intended to affect decisions about sediment sampling plans. As has always been the case, sampling density should be sufficient to characterize the nature, extent, severity and distribution of the contamination at the site in question. The number of samples needed to characterize a particular site should be determined by professional judgment. This Technical Update does not establish a minimum required density of one sample per thousand square feet at every site, nor does it establish a maximum required density of one sample per thousand square feet.

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