Massachusetts Department of ENVIRONMENTAL PROTECTION

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

# Revised Sediment Screening Values

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

The sediment screening values presented in this Technical Update are intended for use in Stage I Screening at sites where oil or hazardous material has been released or migrated to sediment. Stage I is used to evaluate the need for a quantitative Stage II Environmental Risk Characterization, and to eliminate from further evaluation those situations in which either (1) the exposures are clearly unlikely to result in environmental harm or (2) harm is readily apparent. Exposure pathways that are not eliminated in Stage I are carried through the quantitative Stage II Risk Characterization.

Sediment screening values are used to evaluate the potential risk of harm to the environment from sediment contamination. If each detected sediment contaminant concentration is equal to or less than the sediment screening criterion for the contaminant, no further evaluation of the risk of harm from the sediment is required. In other words, a Stage II Risk Characterization is not required if no contaminant concentration exceeds the applicable screening value. If the concentration of even one contaminant exceeds the screening criterion, then a Stage II Risk Characterization must be done.

This Technical Update revises the Stage I sediment screening criteria for metals (except mercury). The current screening criteria for metals are based on the Threshold Effects Concentrations (TECs) that have been developed as consensus-based sediment quality guidelines by MacDonald et al. (2000). The revised criteria presented in this Technical Update are based on the Probable Effects Concentrations (PECs) developed by the same researchers, which are typically several times higher than the TECs. Based on ten years of experience with lower screening levels, it has become apparent that Stage II site-specific risk assessments generally find a condition of "no significant risk of harm" to the environment for sediment contaminated with metals at levels below the PECs.

Tables 1, 2 and 3 summarize the screening criteria for metals (revised), polynuclear aromatic hydrocarbons, and PCBs and pesticides respectively.

**Table 1**
**Stage I Freshwater Sediment Screening Criteria for Metals**
**(Revised July 2005)**

| Metals | Screening Criterion mg/kg dry wt. | Basis |
|---|---|---|
| | | PEC (1) |
| **Arsenic** | 33 | PEC (1) |
| **Cadmium** | 5.0 | PEC (1) |
| **Chromium** | 110 | PEC (1) |
| **Copper** | 150 | PEC (1) |
| **Lead** | 130 | PEC (1) |
| **Mercury** | 0.18 | TEC (1) |
| **Nickel** | 49 | PEC (1) |
| **Zinc** | 460 | PEC (1) |

**Table 2**
**Stage I Freshwater Sediment Screening Criteria for**
**Polycyclic Aromatic Hydrocarbons**

| Chemical | Screening Criterion µg/kg dry wt. | Basis |
|---|---|---|
| | | |
| **Anthracene** | 57 | TEC (1) |
| **Fluorene** | 77 | TEC (1) |
| **Naphthalene** | 180 | TEC (1) |
| **Phenanthrene** | 200 | TEC (1) |
| **Benzo(a)anthracene** | 110 | TEC (1) |
| **Benzo(a)pyrene** | 150 | TEC (1) |
| **Chrysene** | 170 | TEC (1) |
| **Dibenz(a,h)anthracene** | 33 | TEC (1) |
| **Fluoranthene** | 420 | TEC (1) |
| **Pyrene** | 200 | TEC (1) |

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**Table 3**
**Stage I Freshwater Sediment Screening Criteria for PCBs and Pesticides**

| Chemical | Screening Criterion µg/kg dry wt. | Basis |
|---|---|---|
| | | |
| **Total PCBs** | 60 | TEC (1) |
| **Chlordane** | 3.2 | TEC (1) |
| **Dieldrin** | 1.9 | TEC (1) |
| **Sum DDD** | 4.9 | TEC (1) |
| **Sum DDE** | 3.2 | TEC (1) |
| **Sum DDT** | 4.2 | TEC (1) |
| **Total DDT** | 5.3 | TEC (1) |
| **Endrin** | 2.2 | TEC (1) |
| **Heptachlor epoxide** | 2.5 | TEC (1) |
| **Lindane (gamma-BHC)** | 2.4 | TEC (1) |

***Reference:***

1. MacDonald, D. D., C. G. Ingersoll, T. A. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater systems. *Archives of Environmental Contamination and Toxicology* 39, 20-31. January 13, 2000.

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