Sediment Toxicity Testing Issues and Methods

Aquatic Ecotoxicology

2005

Sink and source for role in the aquatic ecosystem

- Organic, inorganic materials, cycling processes (C,N,P and S)
- Allocthonous and autochthonous decomposition
- Pesticides, PAHs, chlorinated hydrocarbons sorbed to sediment and organic material
- Effects from association with these processes

Effects from association with these processes

- Absence of or tolerance conversion of benthic communities
- Processes of decomposition and metabolic byproducts of benthos changed as a result
- Ecosystem functions of energy flow, productivity and decomposition changed
- Other indirect effects associated with cycling (ie N fixation)
- Direct effects from bottom-feeding fish on benthic inverts w/ associated pollutants (PAHs, PCB, mercury and pesticides)

- Bioavailability of sediment-associated contaminants is the fraction of the total contaminant in the interstitial water and on the sediment particles that is available for bioaccumulation.

- Chemical residue measures do not afford sufficient estimates of biota exposure

- Feeding by benthos typically limited to the fine grain material (material that sorbs most contaminants) = greater exposure than the bulk sediment estimate

Defining Bioavailability

- Comparison of the organism- and sediment-contaminant concentrations
- Determination of the uptake clearance of sediment-associated contaminants
- Factors affecting bioavailability
- Range of bioaccumulation factors
- Nonpolar organic compounds

Properties of sediments that enhance sorption or reduce bioavailability

- Organic carbon content
- Particle size distribution
- Clay type and content
- Cation exchange capacity
- pH

Sediment Quality Assessment Procedures

- **Equilibrium Partitioning**
- **Tissue residues**
- **Interstitial water toxicity**
- **Benthic Community Structure**
- **Whole-sediment toxicity and sediment spiking**
- **Sediment Quality Triad**
- **Apparent effects threshold**