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8.6 Amendment Strategies and Permanence of Bioavailability

The use of amendments, especially activated carbons, to reduce the uptake of hydrophobic organic contaminants by benthic organisms has provided a new direction for the remediation of contaminated sediments (Ghosh, Talley, and Luthy 2001). Sorptive amendments such as activated carbons and biochars have also been successful in reducing PAH bioavailability in soils to ecological receptors including earthworms and plants (Beesley et al. 2011). Experience with activated carbons in sediments suggests that any bioavailability reduction is largely irreversible because these black carbon-like materials are highly sorptive and recalcitrant. Bioavailability to benthic organisms has been shown to decrease with time because the mass transfer of the contaminants onto the carbon particles progresses slowly over time (Oen et al. 2012; Beckingham and Ghosh 2011; Bogan and Sullivan 2003; Hatzinger and Alexander 1995). The effectiveness of amendments in reducing bioavailability to ecological receptors is well documented and because they are sorptive, these amendments are likely to also reduce the oral and dermal bioavailability of PAHs following human exposure. Emerging research has demonstrated that the addition of carbon to soils, in the form of charcoal, reduces the bioavailability of BaP as measured in vivo using rats (Roberts et al. 2016).