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The use of sediment toxicity identification evaluation methods to evaluate clean up targets in an urban estuary

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ABSTRACT

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The Ballona Creek Estuary (BCE) in Los Angeles, California, is in a highly urbanized watershed and is contaminated by a variety of chemicals and has prevalent sediment toxicity. Sediment cleanup targets for BCE have been established for copper, cadmium, lead, zinc, chlordane, DDTs, PCBs and PAHs, based on sediment quality guidelines. A sediment toxicity identification evaluation (TIE) was conducted to examine how these targets corresponded to toxicity observed with the estuarine amphipod *Eohaustorius estuarius*. Whole sediment and pore water TIEs were used to identify the cause of toxicity. Passive samplers were deployed to determine the bioavailable fraction of contaminants. Spiked sediment tests were conducted to determine the thresholds of toxicity for selected constituents. Toxicity was found to be widespread but temporally and spatially variable. Whole sediment and pore water TIEs both indicated pyrethroid pesticides were the most likely contaminant group contributing to the toxicity. Concentrations of the chemicals listed for cleanup were found to often exceed target values, but were not observed at concentrations likely to cause toxicity. Bioavailable fractions of the target chemicals quantified using passive samplers did not exceed toxicity thresholds. Spiked sediment tests established 10 day LC50s for 4,4' DDE, 4, 4' DDT, alpha-chlordane and cyfluthrin at >3050, 266, >2120 and 0.33 μg/g organic carbon, respectively. The cyfluthrin LC50 was within the range of concentrations observed in the estuary sediments, but LC50s for the other three chemicals were orders of magnitude greater than observed levels. The combination of TIE, sediment chemistry and the results from spiked sediment exposures indicate pyrethroid pesticides are more likely the cause of the observed toxicity than any of the contaminants targeted for cleanup. The results of this study indicate the importance of using a TIE approach to determine chemicals of concern and dose- response information to set cleanup targets, rather than using sediment quality guidelines.