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Occurrence of 2,3,7,8-TCDD/Fs and PCBs in Sediments and Mussel Tissues from Kentucky Lake, USA. Loganathan, B.G.[1]*, Senthil Kumar, K.[2], Iseki, N. [2], Masunaga, S.[2] [1]Department of Chemistry and Center for Reservoir Research, Murray State University, Murray, KY. [2]Graduate School of Environment and Information Sciences, Yokohama National University, Yokohama, Japan. The westernmost Kentucky is endowed with the highest densities of major rivers and reservoirs of any region in the world, variety of industries and state-of-the-art agricultural operations. However, little is known on the levels of highly toxic dioxins, furans and dioxin-like polychlorinated biphenyls in sediments and biota of this watershed. The objective of the study was to determine the concentrations of 2,3,7,8-chlorine substituted TCDDs, TCDFs and non- and mono-*ortho*-chlorine substituted PCBs in surface sediment and mussels tissues collected from selected locations of Kentucky Lake and Kentucky Dam Tailwater. Standard analytical protocols including, Soxhlet extraction, K-D concentration, column chromatography clean-up were used. Quantitation of analytes were performed using HRGC-HRMS. In sediments, total TCDDs/Fs ranged from 199-1912 pg g^{-1} dry wt. and dioxin-like PCBs were found between 95-1689 pg g^{-1} dry wt. with relatively higher concentrations of the pollutants in samples from Kentucky Dam Tailwater. In mussel tissues, total TCDD/Fs and dioxin-like PCB concentrations were ranged from 2288-13,345 pg g^{-1} fat wt. and 17.48-95.14 ng g^{-1} fat wt. respectively. The results provide evidence that the occurrence of highly toxic dioxins, furans and dioxin-like PCBs in Kentucky Lake sediment and mussel tissues and bioaccumulation in freshwater mussels.