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**Metal Distribution and Metal Site Partitioning, Mobile Bay Surface Sediments**

Bulk concentrations of 35 metals in 87 Mobile Bay sediment samples were determined by ICP-MS analysis in order to evaluate the possible extent of metal contamination in the bay. Metal site partitioning for Cr, P, Pb, and Zn in 12 of the sediment samples was performed to assess potential metal availability for sorption by the biota.

Bulk concentrations of most metals have a similar distribution. Al, As, Ba, Be, Cr, Co, Cu, Fe, La, Pb, Mg, Mn, Ni, P, Nb, K, Sc, Na, Th, Sn, Ti, U, V, Y, Zn, and Zr generally display higher values in northern and southern mid-bay zones extending east-west across the bay, as well as in patches in eastern Bon Secour Bay (SE Mobile Bay) and north of the Morgan Peninsula beach ridges (central southernmost Mobile Bay). These are all parts of the bay that are floored by fine-grained sediments (clays and silty clays), evidencing the known relation between clay minerals and elevated metal content. Plots of concentrations of the metals listed above (except for uranium) vs. the percentage of clay in the sediment further confirm that metal values tend to increase as clay percent increases. Ca and Sr show elevated values in three areas spatially related to living or dead oyster reefs. Molybdenum and cadmium values generally are low throughout the bay, but Mo values are somewhat higher off Dog River. Sb, Bi, Au, Ag, and W were all below detection limits.

A sequential extraction procedure modified from Brannon et al. (1976) was used to partition selected sediment samples into pore water, soluble salts, exchangeable/adsorbed, carbonate, reducible/sulfide, oxide, and residual fractions. Higher concentrations of Cr, P, Pb, and Zn were distributed among the latter three (most insoluble) fractions. Cr, P, and Pb were most concentrated in the residual fraction, but highest Zn values were found in the oxide fraction. One anomalous sample (a silty clay from industrialized Dog River) had unusually high zinc values in all fractions except the pore water and residual phases, both of which contained essentially no Zn. The partitioning results indicate that Cr, P, and Pb in most samples are not readily available for bioaccumulation, but zinc held in an oxide phase could be mobilized under low Eh conditions.