# Part I
# Interpretive Techniques for Assessing Trace Metal Levels in Estuarine Sediments

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Grain size variability and multiple sources of material make interpretation of trace metal data in the sedimentary environment quite complex. Surface sediments in the area of Hart-Miller Island, a dredged material containment facility in the northern Chesapeake Bay of Maryland, have been monitored since the mid-1970's by four separate groups. Four methods for examining trace metal behavior in sediments are: raw concentrations; ratio of metals; enrichment factors; and predicted metal concentrations based on metal correlation with grain size distribution. The most ambiguous data to interpret are the raw metals concentrations. Spatial distributions of trace metals primarily reflect the sediment distribution in the area; sandy sediments have low metal levels and clay-rich sediments have high metal levels (clay content around the island ranges from 0-67%).

Ratios of the metals to major elements, such as Fe and Al, reduce the effect of grain size variability; the extent of the reduction depends on the metal of interest. This approach can group the data by population and is useful in monitoring changes through time. However, it lacks a reference datum and is subject to changes in grain size. Enrichment factors are ratios which normalize the metal ratios to reference materials; e.g., crustal abundances. Normalization is done to place the data in a useful context. However, one reference cannot be applied over widely varying sediment types.

Grain size measurements, if correlated to the metals analyses, provide a sensitive tool to measure deviations of metal concentrations from established background level. This method relies on sediment variability and establishes base levels in the study area which are analyzed using Gaussian statistics. The results can then be related to proposed EPA trace metal criteria. Thus, the problems inherent in the other techniques are circumvented.