Interplay of Congeners and Total PCBs to Inform Remedial Decisions

Rick Fox (Rick.Fox@OBG.com) and Jeff Ramey (Jeff.Ramey@OBG.com) (OBG, Milwaukee, WI, USA)
Denise Kay (Denise.Kay@OBG.com) (OBG, East Lansing, MI, USA)
John Kern (kernstat@gmail.com) (Kern Statistical Services, Inc., Houghton, MI, USA)

Background/Objectives. Polychlorinated biphenyls (PCBs) in contaminated sediment can present an additional layer of complexity over sediment projects with other contaminants. PCBs are typically analyzed as technical mixtures (sold commercially as Aroclors) or as individual congeners. Increasingly, agencies are requiring more congener analyses. These two analytical measurements of PCBs each have their advantages and disadvantages and most projects would benefit from collecting a combination of Aroclor and congener data. Project managers at PCB contaminated sediment sites should continually evaluate the worth of performing congener-specific versus Aroclor sample analysis for the typical project stages (investigation/delineation, risk assessment, pre-design investigation, during– and post-construction monitoring, and allocation) in terms of best informing applicable remedial decisions. As a large or small sediment project progresses, the data needs and decision-making parameters change, but the end goal of informing remedial decisions with the least amount of uncertainty while balancing costs remains a goal.

Approach/Activities. This presentation provides a framework to inform decisions on when to analyze for Aroclors versus congeners, that can be applied to optimize sample density and estimate potential errors associated with translating between the two types of PCB data. The project stages of investigation/delineation, risk assessment, design/construction confirmation, allocation, and long-term monitoring are presented together with specific foresight to inform a Project Manager when selecting PCB analysis. This presentation will include discussion of: the future statistical benefits of early split sample quantification for congeners and Aroclors; the use of statistical tools; the use of Aroclors for delineation and confirmation sampling; and optimizing sample density.

Results/Lessons Learned. PCB analysis for investigation/delineation, preliminary design investigation, and post-construction monitoring can be informed by less specific Aroclor analysis (summed to total PCBs), while risk assessment and allocation are best informed by congener-specific analysis. Lastly, in this presentation we demonstrate calculated uncertainty of translating between PCB Aroclors and congeners, which may be significantly reduced if selective split sampling is planned and employed during delineation. It is desirable in early project planning to consider which PCB analysis is appropriate for each stage and to consider collecting synoptic samples that will include analysis of both Aroclors and congeners. This will help avoid unfillable data gaps, reduce statistical errors when translating between Aroclor and congener data, and ultimately provide a data set with less uncertainty resulting in better remedial decisions at later project stages.