

DMMO sediment testing update: PCB congener analysis

Background

In the past, many San Francisco Bay area dredging projects screened for PCBs in their sediments by analyzing for Aroclors. There are several Aroclors, each made up of differing mixtures of individual PCB congeners, and the individual congeners overlap to some degree among the different Aroclors. Thus, Aroclor analysis tends to over-estimate actual PCB concentrations in Bay sediments.

In 2010, the U.S. Environmental Protection Agency approved a TMDL for PCBs in San Francisco Bay.¹ In addition to setting long-term goals for reducing PCBs in the Bay and in its fish and wildlife, the TMDL established a maximum concentration of PCBs that may be contained in dredged material discharged at the in-Bay open water disposal sites. This maximum sediment concentration is based on the Bay's ambient sediment PCB concentration, measured annually via the Regional Monitoring Program (RMP) conducted by the San Francisco Estuary Institute (SFEI). The RMP program tracks PCB levels by analyzing 40 individual PCB congeners, rather than Aroclor mixtures.² (For 2012, the TMDL limit for total PCBs is 26.4 ppb dw (parts per billion dry weight), while the long-term TMDL goal for San Francisco Bay sediments is 1 ppb dw.)

More recently, in June, 2011, the LTMS agencies reached a programmatic Essential Fish Habitat (EFH) agreement with the National Marine Fisheries Service covering most dredging projects proposed in the San Francisco Bay area.³ The EFH agreement established a threshold concentration of PCBs in sediments, above which bioaccumulation testing of the sediments would generally be required (if the sediments were proposed for in-Bay disposal). The EFH agreement's "bioaccumulation trigger" concentration for PCBs is below the TMDL limit for PCBs in dredged material, but it is based on the same annual calculation of San Francisco Bay ambient sediment concentrations that the TMDL uses. Therefore it is important that dredging projects evaluate the same list of 40 PCB congeners, using similarly sensitive methods, as the RMP. (For 2012, the EFH agreement's bioaccumulation trigger concentration for total PCBs is 17 ppb dw.)

DMMO sediment testing guidance for PCBs

Target Reporting Limit for PCBs:

The total PCB concentration in a sediment sample is considered by DMMO to be the sum of the detected congeners from the RMP list of 40 congeners. In order to confirm that the sediment total PCB concentration measured in this way is below the current TMDL limit (26.4 ppb) or the EFH bioaccumulation trigger (currently 17 ppb), it is important that the laboratory reporting limits for the individual PCB congeners average approximately 0.5 ppb or less. DMMO has therefore established 0.5 ppb as the per-congener target reporting limit.⁴

¹ The TMDL and an implementation plan to achieve it are now officially incorporated into the San Francisco Bay Regional Water Quality Control Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), the region's master planning document for protecting water quality. See http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbstmtl.shtml

² The 40 PCB congeners evaluated under the RMP are listed at: http://www.sfei.org/sites/default/files/Updated_DMMO_PCB_Congener_and_PAH_Analyte_Lists.pdf

³ The LTMS programmatic EFH consultation agreement with NMFS is available at: <http://www.spn.usace.army.mil/conops/LTMS%20EFH%20full%20signed%20agreement%20FINAL%206-9-2011.pdf>

⁴ DMMO considers the target reporting limit as synonymous with the Practical Quantitation Limit (PQL), the concentration below which the lab "J-flags" a result as positively detected above the Method Detection Limit (MDL) but with an estimated value. The PQL value is set at or above the level of the lowest standard in the lab's multi-point linear calibration curve, and is generally at least 2-3 times higher than the MDL.

Default Laboratory Analytic Method for PCBs:

Unless otherwise approved by DMMO in advance (see below), PCB congeners in San Francisco Bay area sediments should be analyzed using EPA Method 8082a with GC-ECD (Gas Chromatography, Electron Capture Detection). This method can routinely achieve the DMMO target reporting limits. In general, methods with GC-SIM (Gas Chromatography, Selected Ion Monitoring) may not routinely achieve the target reporting limits. [Note that high-resolution analysis using EPA Method 1668a is capable of measuring all 209 PCB congeners and achieving even lower target reporting limits, but at much greater cost than Method 8082 (GC-ECD). DMMO does not typically require routine maintenance dredging evaluations to use this high-resolution method.

Use of Alternative Laboratory Analytic Methods:

Projects that provide DMMO with results using analytic methods other than those pre-approved in Sampling and Analysis Plans risk the possibility that DMMO will reject the results, and that re-analysis (and perhaps even re-collection of sediment samples) may have to be performed at the project's (or its laboratory's) expense. DMMO will consider the use of alternative laboratory analytic methods, based on provision in advance of reasonable evidence that the alternative method is capable of routinely achieving the per-congener target reporting limits noted above. Reasonable evidence must include the results of a blind performance evaluation using a third party laboratory certified reference material (soil or sediment) that includes a mix of PCB congeners at low concentrations. Side-by-side methods comparisons may also be provided to DMMO, but will generally not be considered as adequate evidence without inclusion of results from a blind performance evaluation.