# A Modeling Approach for Estimating Background Concentrations in Large Urban Contaminated Sediment Sites

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**Background/Objectives.** Background is often used to define cleanup goals for sediment sites. Defining and determining background concentrations can be a complicated process. Typically, this involves identifying a similar area that is unimpacted by the activity of concerns and then collecting sample data . Determining an appropriate location for background sampling is important and complicated as the relevant background conditions need to be a similar as possible to the area in question. This is particularly challenging for large sediment superfund sites that typically span multiple miles of river sediment with varying attributes. For contaminants, such as polycyclic aromatic hydrocarbons (PAHs) and polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs), where background concentrations are highly influenced by urban activity, the selection of a background area can be even more complicated. For sediment sites, background samples are often collected upstream of the existing contaminated area, but this can cause issues when those upstream areas are less developed than the site in question. In these cases, non-point source discharges associated with urban areas but not associated with upstream background areas may result in background concentrations that are not representative of the site of interest, resulting in cleanup goals that may be unattainable. To address this issue, we present a sediment modeling approach for estimating background concentrations for sediment sites.

**Approach/Activities.** The SEDCAM model was developed to evaluate the need for source control and the ability of natural recovery of sediment in problem areas in Commencement Bay in Puget Sound (Jacobs et al 1988). This model relies on continuous contributions from various sources under average conditions over the chosen time-period to estimate sediment concentrations. We developed TIGSED, a modified version of this model that accounts for year-by-year variation and localized sediment conditions that can be applied to smaller-scales. TIGSED was coupled with stormwater and sediment modeling and a literature review of urban background concentrations in stormwater, aerial deposition, and overland flow to estimate the current and future background concentrations of sediments associated with inputs from these non-point sources.

**Results/Lessons Learned.** We will present a case study of the application of the TIGSED methodology to the estimation of urban PCDD/F background concentrations. The background modeling results show more variation in the expected background concentrations than utilization of a single aggregate value generated from sample collection and that upstream sampling has predictably lower average background concentrations than the sediment site due to the inputs associated with greater urban activity. The modeling also identifies areas where sediment concentrations from urban background might be higher than would be expected solely based on upstream sampling. This work will also discuss the potential ways of addressing areas where model estimated urban background exceeds pre-existing background-based cleanup levels. Desiccation can also change exposure pathways, such as exacerbating the exposure and inhalation risk posed by wind-blow contaminated particles. Higher temperatures, increased drought risk, and associated desiccation of sediment are an important consideration of climate resiliency and contaminated sediment sites.