Background Concentrations of Polychlorinated Biphenyls, Polychlorinated Dibenzo-p-dioxins, and Polychlorinated Dibenzofurans in Soil and Sediments at Superfund Sites

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Background/Objectives. Under the Superfund Program, a robust background data set may be important for a variety of risk assessment and remedy selection purposes. Where risk-based preliminary remediation goals (PRGs) are below, or close to, background, it may be important for selecting a Cleanup Level (CUL). Often, this is true of PRGs for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (dioxins), and polychlorinated biphenyls (PCBs). As part of an effort to understand how background levels are likely to affect Superfund remedy decisions, the Office of Superfund Remediation and Technology Innovation (OSRTI) reviewed Superfund sites with dioxins or PCBs as potential contaminants of concern in either soils or sediments for background datasets. The goal was to compile background concentrations near Superfund sites (including urban, rural, industrial, and residential areas) to understand the common challenges with developing and using background data. Additionally, the study sought to compare background values observed at Superfund sites to other published background studies for PCBs and dioxins.

Approach/Activities. The Superfund Program database (SEMS, previously CERCLIS) was queried to find Records of Decisions (RODs) for sites that were signed after 2002 and had PCBs or dioxins and furans (D/Fs) as potential contaminants of concern in either soils or sediments. Once this list of sites was compiled, the Remedial Investigation/Feasibility Study (RI/FS) reports, RODs, and other site documents were searched for information on background concentrations. The reported background concentrations and important meta-data, such as the number of samples collected, analytical methods, and detection limits, when available, were collated, summarized, and compared to the final CULs for the site.

Results/Lessons Learned. There has been a steady increase over the years in the number of background studies being conducted, although background sampling is more common at PCB sites than D/F sites. Ranges of background PCB and D/F concentrations in soil and sediment are wide; up to several orders of magnitude. Reported background concentrations for PCBs and D/Fs in sediment span a similar, but lower, range than that of the final CULs. Reported background concentrations for PCBs and D/Fs in soil, however, span a smaller range than that of final CULs. While background concentrations in the past tended to be lower than the CULs, recent changes in toxicity values, the consideration of additional exposure pathways, and incorporation of higher fish consumption values have lowered more recent CULs. As risk-based CULs decrease, background concentrations are likely to play a more important role in setting the CULs in the future. Most sites surveyed used background concentrations in the development of the conceptual site model and as part of a risk assessment. However, several recent sites also formally incorporated background concentrations into the PRG and CUL selection process and a few sites have set the CUL at background.