Exposure modeling for polychlorinated biphenyls in school buildings

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There is limited research on characterizing exposures from PCB sources for occupants of school buildings. PCB measurement results from six schools were used to estimate potential exposure distributions for four age groups (4-5, 6-10, 11-14, 14-18 year-olds) using the Stochastic Human Exposure and Dose Simulation (SHEDS) multimedia model. The model estimated total absorbed doses (as Aroclor 1254) for exposures occurring only while at school and the relative contributions from inhalation, non-dietary ingestion, and dermal absorption. Geometric mean total PCB concentrations for air, surface wipes, and soil were 230 ng/m^3, 0.15 µg/100 cm^2, and 0.52 ppm respectively. Indoor dust concentrations estimated using an air/solid partition coefficient had a geometric mean of 7.0 ppm. For 6-10 year-olds, the estimated absorbed doses would be predicted to be 0.022 and 0.041 µg/kg-day at the 50^{th} and 95^{th} percentiles, respectively. Estimated absorbed doses were lower for the other age groups. It was estimated that 74%, 18%, and 8% of the mean absorbed dose for 6-10 year-olds would result from inhalation, non-dietary ingestion, and dermal absorption, respectively. There are modeling uncertainties; for example, sensitivity tests showed varying the assumed 70% pulmonary absorption rate from 30% to 100% resulted in median absorbed dose estimates 49% lower to 35% higher. Occupants in schools with PCB sources are likely to be exposed to PCBs through their normal daily activities, and based on the levels in these buildings, some exposures occurring at school would be predicted to exceed the 0.02 µg/kg-day EPA IRIS reference dose for Aroclor 1254.