Deposition and Accumulation of Emerging Contaminants in the Sediments of the Palos Verde Shelf, California

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The Palos Verdes shelf is located off the Southern California coast and has been receiving wastewater effluents from the Los Angeles County municipal sanitation Districts since 1937. Currently, a large segment of the Palos Verdes shelf is listed as a U.S. EPA Superfund site due to long-term discharge of DDT and PCBs which have resulted in highly contaminated sediments. Although the fate and behavior of these "legacy contaminants" has been extensively studied, little information exists on the presence and historical trends of newer classes of pollutants that are classified as contaminants of emerging concern. Antimicrobial compounds and brominated flame retardants, both of which are used extensively in consumer based products, are two such classes of chemicals. In this study, triclosan, a phenolic antimicrobial additive, and polybrominated diphenylethers (PBDEs), which are used as flame retardants, were measured in a 50-cm long sediment core collected from the Palos Verdes shelf in 2009. Measurable triclosan is present to the base of the core and increases progressively up core to a maximum of 29 ng g^{-1} at 5 cm depth, which is consistent with contemporary levels observed in sediments at other marine locations impacted by wastewater effluents. Measurable PBDEs first appear at a depth of 43-45 cm and are comprised of major congeners associated with penta formulations (e.g., PBDE-47, 99, 100), and decabromodiphenylether (PBDE-209). The congeners used in the penta-PBDE formulation account for the majority of PBDEs present throughout the length of the core. In contrast, PBDE-183, a major component of the octa-PBDE technical mixtures is present only at extremely low concentrations. At 31 cm depth, PBDE-209 is the most abundant congener measured, with concentrations increasing up core, demonstrating its increasing use over time. Within 5 cm of the sediment-water interface, all congeners show a decline suggesting that regulations in California banning

the use and production of PBDEs along with voluntary phase outs may be responsible for reducing the amount of PBDEs being released to surficial sediment of the Palos Verdes Shelf.

PURPOSE STATEMENT

Palos Verdes is a U.S. EPA Superfund site located off the coast of Southern California. Currently, this is the only Superfund site in the nation which is located on a continental shelf and contamination is due exclusively to municipal wastewater treatment plant discharges. This presentation presents results on the temporal trends of several classes of emerging contaminants for which limited information exists.