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Surface Disposal of Waste Water Treatment Plant Biosludge – an Important Source of Perfluorinated Compound Contamination in the Environment?

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With more than a decade of intensive scientific research and increasing regulatory pressure worldwide, the sources of perfluoroalkyl acids (PFAA) in the environment and routes of human exposure still need to be fully characterized. Several studies have documented PFAA contamination associated with the agricultural use of biosolids and biosludges that have been contaminated with wastes from industrial chemical production facilities. Other studies have shown that even typical municipal waste water treatment plant (WWTP) biosolids can contain elevated levels of PFAAs and that these contaminants can migrate to food crops grown on biosolid amended soils. The current study describes an investigation in the Cape Fear River Basin in North Carolina where we track PFAA concentrations in surface water relative to municipal WWTP effluents and biosolid land application sites. Elevated PFAA concentrations (100s ng/L) were regularly measured downstream of specific WWTPs outfalls in the watershed. Subbasins with biosolid application sites from these particular WWTPs also had elevated PFAA concentrations in surface water, with levels often exceeding the EPA's provisional health advisory levels of 200 ng/L for PFOS and 400 ng/L for PFOA in drinking water. Sludge supernatants and settled solids from these particular treatment plants were also found to have elevated levels of PFOS and other PFAAs. In contrast, surface water in subbasins without permitted application sites tended to have low or background levels of PFOS, PFOA, and related PFAAs. These data suggest that land application of biosludges from specific municipalities in this Basin leads to the distribution of toxic, persistent, and bioaccumulative materials which may then contaminate drinking water sources, agricultural products, and wildlife resources.