

Is Something “Fishy” Going On?

Cynthia Cheatwood, MSPH (ccheatwood@eaest.com), Paul Caprio, PG (pcaprio@eaest.com), Jamie Suski, PhD (jsuski@eaest.com), and Erica Thieleman (ethieleman@eaest.com) (EA Engineering, Science, and Technology, Inc., PBC, Hunt Valley, MD, USA)

Background/Objectives. The Department of Defense (DoD) has focused on identification of PFAS releases related to historical AFFF uses at DoD facilities and mitigation of PFAS-impacted drinking water supplies. This has typically involved Site Inspection (SI) and more recently Remedial Investigation (RI)-level sampling of potential release areas (i.e., sources) and assessment of probable PFAS migration pathways in groundwater. However, it has become increasingly evident as more RIs are underway that PFAS are present at potential environmentally significant levels in stormwater/surface water discharges at DoD facility boundaries, providing another route of exposure to humans and biota via surrounding surface water bodies. EPA has not yet published final numerical Ambient Water Quality Criteria (AWQC) that are typically used for screening surface water for aquatic and human health during the RI. EPA’s goal is to publish aquatic life AWQCs by Winter 2022 and human health AWQCs by Fall 2024. In lieu of these published values, the current conventional practice at most DoD sites is to conservatively apply either the EPA Regional Screening Levels (RSLs) for tap water or site-specific ecological toxicity values gathered from the body of scientific literature to identify if PFAS are a potential contaminant of concern (COC) in surface water to ecological receptors or human receptors. Most numerical aquatic species ecological PFAS surface water screening criteria are much higher than human health-based EPA tap water RSLs. However, none of these values take bioaccumulation factors of PFAS in fish into consideration when evaluating risk to human health via fish consumption.

Approach/Activities. This presentation outlines real-world observations, ongoing research, and considerations taken during PFAS RIs to ensure that PFAS risk associated with the surface water-to-fish-to-human consumption pathway is not overlooked and is identified early in the RI planning process. Based on the high bioaccumulation factors associated with certain PFAS such as PFOA, PFOS and PFHxS, low part per trillion concentrations of these PFAS present in surface water can still accumulate in certain fish species at part per billion levels which is high enough for local health departments to issue fish consumption advisories. This has also been observed in surface water bodies where PFAS concentrations in surface water were well below either the EPA RSLs or site-specific ecological screening values. Thus, strict use of the currently available surface water screening values may cause practitioners to underestimate the potential for certain PFAS to bioaccumulate in some fish tissue at much higher levels than those found in surface water and present the potential of risk to humans from fish consumption.

Results/Lessons Learned. Presently there is no consistent approach to quantify PFAS risk from the surface water-to-fish-to-human consumption pathway, there is variability in stakeholder acceptance and methodology. Early and open conversation with stakeholders is vital to developing a sampling plan appropriate for each site. A wholistic approach utilizing the latest science on uptake and accumulation of PFAS in fish with traditional HHRA methodology, incorporating fish tissue sampling to augment other risk modeling methodology is ideal in quantifying risk associated with fish consumption from the surface water-to-fish-to-human consumption PFAS pathway. As with PFAS found in other environmental media, in areas where there are multiple potential sources of PFAS in surface water, forensics techniques can be utilized to help discern multiple sources of PFAS in fish tissue.