Responses to Questions/Issues Discussed with OMB on November 27, 2019

This document provides responses to address three general issues related to the EPA planned analyses of both water and dust samples collected as part of AHHS II:

1) Methods to be used, including sensitivity and specificity
2) Plans for reporting data
3) Plans for EPA use of data

1) Methods
    a. Water methods - The analytical methods proposed for this effort have been developed for research purposes to inform PFAS research efforts and are not regulatory methods. EPA will apply both targeted and non-targeted analyses for tap water samples. Targeted analysis uses chemical standards so concentrations can be calculated. For this AHHS effort targeted analyses will be focused on PFOA, PFOS, and other PFAS for which standards are available. Reporting will be limited to PFOA and PFOS concentrations, as these are the only PFAS with EPA health benchmarks. The concentrations for PFOA and PFOS will be calculated in relation to commercially available isotopic internal standards ^{13}C-PFOA and ^{13}C-PFOS. The lowest concentration minimum reporting level (LCMRL) will be reported at the values stated for Method 537 (5.1 ng/L for PFOA and 6.5 ng/L for PFOS). The QAPP titled "Targeted Analyses of Per- and Polyfluoroalkyl Substances (PFAS) for liquid samples will be used to assure that quality data objectives are met in accordance to the QAPP including a replicate analysis precision within +/- 20% and a percent accuracy of spiked QA samples within 20% of the theoretical concentrations. PFAS lacking analytical standards will be analyzed using non-targeted analyses (NTA). The NTA method uses high-resolution mass spectrometry which have shown detection of PFAS at a level of 10 ng/L with an accuracy of +/- 30%. The appendix below includes a listing of scientific publications relevant to the analytical methodology that will be used. The methods will be modified for the analysis of the tap water.

    b. Residential/House Dust method - The primary focus of this effort is to use non-targeted analysis (NTA) for the analysis of house dust samples using samples collected from vacuums (both bag and bagless). NTA allows the researchers to acquire data points related to PFAS samples. It does not provide specific analytical standards to report back concentrations. As above, precision for NTA is typically +/- 30%. The data will provide an understanding of the potential PFAS present in a sample and allows for an educated designation of analytical formulae and structures. To strengthen the validity of the analytical method, it is worth noting that the EPA researchers were chosen by NIST to perform house dust analysis, report the results and come into consensus on the concentrations found in the dust provided. This effort resulted in the development of the Standard Reference Material (SRM) NIST SRM 2585 for house dust. The SRM is used to demonstrate laboratory quality control and quality assurance for the measure of PFAS analytes.

The appendix below includes a listing of scientific publications relevant to the analytical methodology that will be used.

2) Plans for reporting data
    a. Water Samples – Results from targeted analyses of PFOA and PFOS in tap water samples will be reported to the appropriate state governments for awareness in accordance to EPA's guidance if the combined concentration of PFOA and PFOS exceed EPAs Health Advisory of 70 parts per trillion. The non-targeted analyses methods do not allow for the calculation of concentrations; therefore, all findings will be used to increase general knowledge about PFAS in tap water. None of the NTA findings will be reported back to the public or states; they will be published in the scientific literature in the same fashion as all on-going research projects.

    b. Dust Samples – Result from dust sample analyses will not be reported to the states or the public because there are no health benchmarks for PFAS in dust and because quantified concentrations will not be available.

3) Plans for EPA use of data
    a. Water Samples - The AHHS tap water samples will provide a better understanding of the concentrations of these compounds in a diverse set of tap water samples and how they may compare to concentrations found in environmental water samples. Data from the samples will be used to inform our knowledge on PFAS prevalence, assist us in understanding the data from different matrices and provide input data to research models. There will be no characterization of any results as being nationally representative.

    b. Dust Samples – Finding from dust sample analyses will be published along with the method focusing on the results. Data from the samples will be used to inform our knowledge on PFAS prevalence, assist us in understanding the data from different matrices and provide input data to research models. The data will not be characterized as nationally representative.

Appendix – Relevant Publications

James McCord and Mark Strynar; Identification of Per- and Polyfluoroalkyl Substances in the Cape Fear River by High Resolution Mass Spectrometry and Nontargeted Screening Environmental Science & Technology 2019 53 (9), 4717-4727 DOI: 10.1021/acs.est.8b06017

McCord, J., Strynar, M. J; Identifying Per- and Polyfluorinated Chemical Species with a Combined Targeted and Non-Targeted-Screening High-Resolution Mass Spectrometry Workflow. Vis. Exp. (146), e59142, doi:10.3791/59142 (2019)

Chuhui Zhang, Zachary R. Hopkins, James McCord, Mark J. Strynar, and Detlef R. U. Knappe; Fate of Per- and Polyfluoroalkyl Ether Acids in the Total Oxidizable Precursor Assay and Implications for the Analysis of Impacted Water. Environmental Science & Technology Letters Article ASAP DOI: 10.1021/acs.estlett.9b00525

Melanie L. Hedgespeth, Nancy Gibson, James McCord, Mark Strynar, Damian Shea, Elizabeth Guthrie Nichols; Suspect screening and prioritization of chemicals of concern (COCs) in a forest-water reuse system watershed. Science of The Total Environment, Volume 694, 2019,133378, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2019.07.184

McEachran, A.D., Hedgespeth, M.L., Newton, S.R., Rebecca McMahen, Mark Strynar, Damian Shea, Elizabeth Guthrie Nichols. Comparison of emerging contaminants in receiving waters downstream of a conventional wastewater treatment plant and a forest-water reuse system. *Environ Sci Pollut Res* (2018). https://doi.org/10.1007/s11356-018-1505-5

James McCord, Seth Newton, Mark Strynar. Validation of quantitative measurements and semi-quantitative estimates of emerging perfluoroethercarboxylic acids (PFECAs) and hexafluoroprolyene oxide acids (HFPOAs). *Journal of Chromatography A*, Volume 1551,2018, Pages 52-58, ISSN 0021-9673,https://doi.org/10.1016/j.chroma.2018.03.047

Seth R. Newton, Rebecca L. McMahen, Jon R. Sobus, Kamel Mansouri, Antony J. Williams, Andrew D. McEachran, Mark J. Strynar. Suspect screening and non-targeted analysis of drinking water using point-of-use filters. *Environmental Pollution*, Volume 234,2018, Pages 297-306, ISSN 0269-7491,https://doi.org/10.1016/j.envpol.2017.11.033

Seth Newton, Rebecca McMahen, James A. Stoeckel, Michael Chislock, Andrew Lindstrom, and Mark Strynar. Novel Polyfluorinated Compounds Identified Using High Resolution Mass Spectrometry Downstream of Manufacturing Facilities near Decatur, Alabama. *Environmental Science & Technology* 2017 51 (3), 1544-1552 DOI: 10.1021/acs.est.6b05330

Jon R. Sobus, John F. Wambaugh, Kristin K. Isaacs, Antony J. Williams, Andrew D. McEachran, Ann M. Richard, Christopher M. Grulke, Elin M. Ulrich, Julia E. Rager, Mark J. Strynar & Seth R. Newton. Integrating tools for non-targeted analysis research and chemical safety evaluations at

the US EPA. *Journal of Exposure Science & Environmental Epidemiology* (2017) doi:10.1038/s41370-017-0012-y

Mei Sun, Elisa Arevalo, Mark Strynar, Andrew Lindstrom, Michael Richardson, Ben Kearns, Adam Pickett, Chris Smith, and Detlef R. U. Knappe Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina Environmental Science & Technology Letters 2016 3 (12), 415-419 DOI: 10.1021/acs.estlett.6b00398 **Selected as one of Four Best papers for ES&T Letters 2016**

Mark Strynar, Sonia Dagnino, Rebecca McMahen, Shuang Liang, Andrew Lindstrom, Erik Andersen, Larry McMillan, Michael Thurman, Imma Ferrer, and Carol Ball. Identification of Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs) in Natural Waters Using Accurate Mass Time-of-Flight Mass Spectrometry (TOFMS). *Environmental Science & Technology* 2015 *49* (19), 11622-11630 DOI: 10.1021/acs.est.5b01215

Furl C., C. Meredith, M. Strynar and S. Nakayama. Relative importance of wastewater plants and non-point sources of perfluorinated compounds to Washington state rivers. *Science of the Total Environment* 409 (2011) 2902-2907

Andrew B. Lindstrom, Mark J. Strynar, Amy D. Delinsky, Shoji F. Nakayama, Larry McMillan, E. Laurence Libelo, Michael Neill, and Lee Thomas. Application of WWTP Biosolids and Resulting Perfluorinated Compound Contamination of Surface and Well Water in Decatur, Alabama, USA. *ES&T* (2011) ASAP DOI: 10.1021/es1039425

Shoji F. Nakayama, Mark J. Strynar, Jessica L. Reiner, Amy D. Delinsky, and Andrew B. Lindstrom. Determination of Perfluorinated Compounds in the Upper Mississippi River Basin. *Environ. Sci. Technol. 2010, 44, 4103–4109*

S. Nakayama, M. Strynar, L. Helfant, P. Egeghy, X.Ye, and A.B. Lindstrom, (2007) Perfluorinated Compounds in the Cape Fear Drainage Basin in North Carolina. *Environmental Science and Technology*, 41:5271-5276

Alicia J Fraser, Thomas F Webster, Deborah J Watkins, Mark J Strynar, Kayoko Kato, Antonia M Calafat, Verónica M Vieira, Michael D McClean. Polyfluorinated compounds in dust from homes, offices, and vehicles as predictors of concentrations in office workers' serum Environment International, Volume 60, 2013, Pages 128-136, ISSN 0160-4120, https://doi.org/10.1016/j.envint.2013.08.012

Strynar, M.J. and A.B. Lindstrom. (2008) Perfluorinated Compounds in House Dust from Ohio and North Carolina, USA. *Environ. Sci. Technol*. 42, 3751–3756.

Jessica L. Reiner, Andrea C. Blaine, Christopher P. Higgins, Carin Huset, Thomas M. Jenkins, Christiaan J. A. F. Kwadijk, Cleston C. Lange, Derek C. G. Muir, William K. Reagen, Courtney Rich, Jeff M. Small, Mark J. Strynar, John W. Washington, Hoon Yoo, Jennifer M. Keller.

Polyfluorinated substances in abiotic standard reference materials. Anal Bioanal Chem (2015) 407: 2975.

Julia E. Rager, Mark J. Strynar, Shuang Liang, Rebecca L. McMahen, Ann M. Richard, Christopher M. Grulke, John F. Wambaugh, Kristin K. Isaacs, Richard Judson, Antony J. Williams, Jon R. Sobus. Linking high resolution mass spectrometry data with exposure and toxicity forecasts to advance high-throughput environmental monitoring. Environment International, Volume 88, 2016, Pages 269-280, ISSN 0160-4120, https://doi.org/10.1016/j.envint.2015.12.008.