NATURAL RESOURCES DEFENSE COUNCIL
And
CLEAN WATER ACTION

April 8, 2024

Bruno Piggot, Principal Deputy Assistant Administrator for Water
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Unregulated Contaminant Monitoring Rule 6; Methods Request [EPA–HQ–OW– 2023–0469]

Dear Mr. Piggot,

We write on behalf of our millions of members and supporters to comment on key provisions in the Unregulated Contaminant Monitoring Rule 6; Methods Request (UCMR 6), 89 Fed. Reg. 8584 (Feb. 8, 2024).

I. Overview of Comments

In summary, we urge that EPA:

1. **Approve Methods and Require Monitoring in UCMR 6 for a Broader Array of PFAS Including a Method to Measure Total Organofluorine *And* a Revised Method 533**
2. **Approve Methods and Require Monitoring in UCMR 6 for Both a Broad Assay for *Legionella spp*. and a Specific Assay for *L. pneumophila*.**
3. **Approve Methods and Require Monitoring in UCMR 6 for Microplastics**.
4. **Require Monitoring in UCMR 6 for Hexavalent Chromium**
5. **Ensure that EPA-Approved Method for Four Haloacetonitriles Have Low MRLs, and Require Monitoring for them in UCMR 6.**

II. Legal Authority

Section 1445(a)(2) of the Safe Drinking Water Act (SDWA) requires EPA to establish the Unregulated Contaminant Monitoring Rule (UCMR). This section requires that once every five years, EPA must issue a list of not more than 30 unregulated contaminants to be monitored by PWSs. The America's Water Infrastructure Act of 2018 (AWIA), Pub. L. 115–270 §2021, 132 Stat. 3765 at 3861, amended the SDWA to require that, subject to the availability of EPA appropriations for such purposes and sufficient laboratory capacity, EPA's UCMR program must require all PWSs serving between 3,300 and 10,000 people to monitor for the contaminants in a particular UCMR cycle, and ensure that a nationally representative sample of systems serving between 25 and 3,299 people are required to monitor for those contaminants. PWSs serving a population larger than 10,000 people must monitor under the UCMR.

III. Approve Methods and Require Monitoring in UCMR 6 for a Broader array of PFAS including a method to measure Total OrganoFluorine and a revised Method 533

a. Complete validation of an expanded Method 533 covering at minimum the 40 PFAS included in Method 1633, preferentially the 70 PFAS covered by multiple commercial labs, and use in lieu of the current proposal of existing EPA validated methods, Method 537.1 and Method 533; and also,

UCMR 6 presents an opportunity to test for an expanded list of PFAS to better understand the extent of PFAS contamination in our public drinking water systems. Several commercial laboratories advertise the capability to test between 40-70 PFAS using a comparable, expanded version of Method 533 and EPA has validated Method 1633 that tests for 40 PFAS (including all PFAS covered by Method 533 and Method 537.1) in multiple matrices other than drinking water. Given that Method 1633 is validated for wastewater, surface water and groundwater, all more complex than drinking water, there should be no technical limitations to covering these same PFAS in drinking water.

Several commercial laboratories in the United States use a comparable version of EPA Method 533 to target a larger number of PFAS than the 25 PFAS covered in Method 533 currently. For example, Eurofins TestAmerica[1] and Enthalpy[2] can test up to 75 PFAS, and Pace Analytical laboratory can test up to 40 PFAS.[3] As we noted in our comments for UCMR5, these companies can test for the compounds in both EPA Method 537.1 and EPA Method 533, therefore the use of an expanded Method 533, instead of the two tests, could reduce the cost of testing proposed by UCMR 5 significantly. In fact, there are only 4 PFAS that are missing from Method 533, that require the use of Method 537.1 to cover the 29 PFAS listed for UCMR 5. We are unaware of any technical barriers to utilizing Method 533

to detect these 4 PFAS, let alone the additional PFAS commonly tested for by commercial labs with their 533 comparable methods. Furthermore, Method 533 is more accurate and robust than Method 537.1. The isotope dilution quantitation used in Method 533 reduces bias compared to the internal standard quantitation used in Method 537.1. Furthermore, EPA has already validated Method 1633 in collaboration with the U.S. Department of Defense to test for 40 PFAS compounds in wastewater as well as surface water, groundwater, leachate, soil, sediment, biosolids, and fish tissue. While this method is not specific for drinking water, all of these matrices are more complex than drinking water, which further supports there should be no technical limitations to covering these same PFAS in drinking water.

The importance of expanding the PFAS covered by EPA methods and in UCMR 6 is demonstrated by our recent study in which we tested drinking water from 44 locations in the US using Eurofins expanded test for 70 PFAS.[4] We identified 12 PFAS that were not monitored for in UCMR 5. Eleven of these 12 PFAS are also not covered by Method 1633, which further indicates the need for EPA to validate the largest feasible analyte list. Importantly, our study and others have highlighted the high detection frequencies of ultrashort chain PFAS.[5] Recent data shows similar hazard concerns as short and long chain PFAS.[6]

NRDC recommends that EPA validate a revised Method 533 that expands the number of PFAS covered to include those commonly covered by commercial laboratories – at least 40, and preferably 70 compounds - and negate the need for Method 537.1. This could be done by revising Method 533 as written today but validated for additional compounds. Either EPA could conduct a new third-party lab validation study or it could have individual labs validate the expanded list by Method 533 themselves. Either approach generates the same data, with the latter not requiring EPA's coordination. Additionally, special attention should be paid to the inclusion of ultrashort chain PFAS in PFAS monitoring, as preliminary data suggests that they are highly pervasive in our environment but not captured well with traditional sampling methods.

b. Complete validation of a sensitive total organofluorine method, a tool that is urgently needed to better characterize PFAS contamination of drinking water, in time to be included for UCMR 6. EPA should refer to the California State Water Resources Control Board's pilot comparing various different broad spectrum/aggregate test methods to select and validate the most comprehensive and sensitive method to measure total organofluorine.

It is important to include a sensitive broad-spectrum PFAS test in the UCMR because there are hundreds of PFAS in use, and by the latest accounting over 14,000 known PFAS. Testing for only 29 PFAS will not give us a clear picture of the problem we are facing. Unless EPA requires a broader spectrum test for PFAS, it is likely that many water

systems that are contaminated with PFAS other than the 29 detected by current approved EPA Methods 533 and 537.1 will have PFAS contamination that will go undetected, and/or the scope of their contamination will remain unknown. In such cases, the water systems, state and federal authorities, and the public served by those water systems will not understand the full extent of their PFAS contamination.

Broad spectrum or aggregate methods, such as Absorbable Organic Fluorine (AOF) and Extractable Organic Fluorine (EOF), are needed to give us a better understanding of the totality of PFAS contamination. EPA has validated Method 1621, and AOF method, for use in the Clean Water Act. However, the reporting limit for this method is in the part per billion range, not ideal for use in drinking water monitoring.

The California State Water Resources Control Board (SWRCB) has recently conducted a pilot study to compare the performance of several broad-spectrum methods for measuring PFAS in drinking water. As part of this study they have identified an AOF method with significantly more sensitive reporting limits than Method 1621, around 500 ppt (detection limits around 200 ppt). The pilot test shows that there are multiple preferable characteristics of AOF over EOF in drinking water, including not capturing inorganic fluorine and more comprehensive PFAS coverage. Please refer to the forthcoming summary of the pilot by the SWRCB for additional details.

We urge EPA to examine the SWRCB's pilot to select and validate the most comprehensive and sensitive method to measure total organofluorine content as quickly as possible, ideally in time to be added to UCMR 6.

c. Set Minimum Reporting Limits (MRLs) so that low-level PFAS contamination is reported to EPA and the public.

As part of the UCMR 5 Laboratory Approval Program, the EPA found that for PFOA and PFOS, "49 of the 54 laboratories seeking EPA approval included a lowest PFAS calibration standard level at 1 ppt or lower, with the median lowest calibration level among all laboratories at 0.5 ppt."[7] This shows that the MRLs set for UCMR 6 can and should be set lower than those set for UCMR 5.

IV. Approve Methods and Require in UCMR 6 Both a Broad Assay for *Legionella spp.* and a Specific Method for *L. pneumophila*.

The National Academies' consensus panel on *Legionella* and drinking water has recommended that there be a significant increase in *Legionella* monitoring by drinking water systems since these bacteria are linked to as many as 70,000 disease cases per year and afflict and kill more people than any other reported waterborne disease.[8] Moreover, as highlighted in Figures 1 & 2 below, the data show that this is a serious environmental

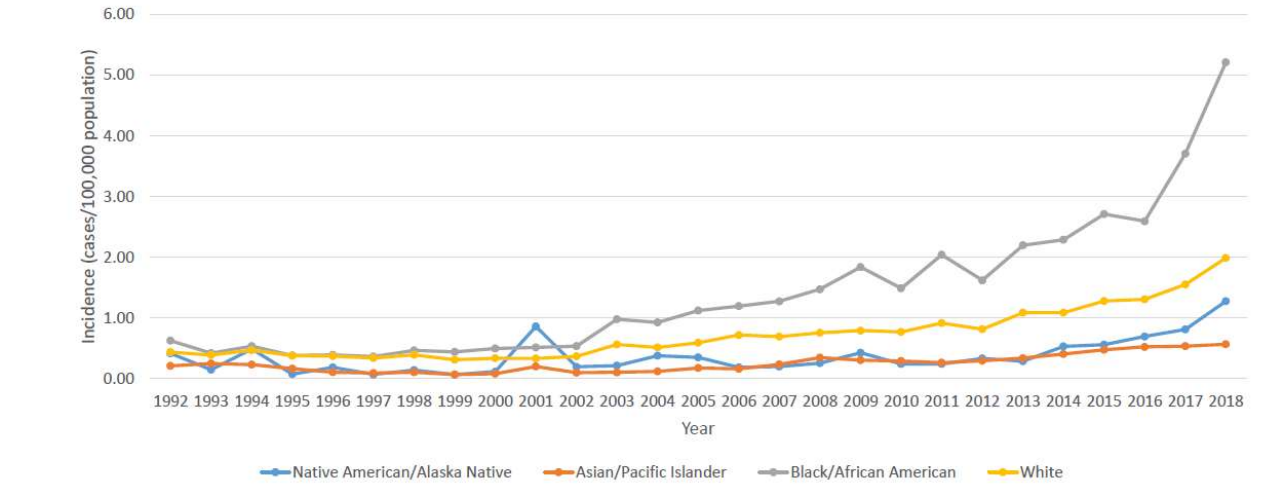
justice problem. The epidemiological data show that African Americans suffer from *Legionella* infections at a rate of at least 2.5 that of white Americans. Newer, faster and less-expensive methods such as Legioalert can detect *L. pneumophila* which reportedly causes the vast majority of reported deaths from Legionnaires' disease outbreaks and of Legionnaires' disease cases, based on data from cultures of 4,719 patients over 7 years in 17 countries.[9]

We noted in our May 10, 2021 comments on UCMR 5[10] that it was crucial that EPA require monitoring to determine the scope of *Legionella* contamination of drinking water. We further recommended that if such monitoring could not be completed in time to be useful for the MDBP revisions rule, the agency should at a minimum promulgate an ICR to require a statistically valid sampling of public water systems to monitor for this important contaminant. EPA chose to ignore our advice, and instead presented limited occurrence data to the National Drinking Water Advisory Council's Microbial and Disinfection Byproduct (MDBP) Working Group, despite the agency's awareness of the need for these data. The Working Group was, we believe it is fair to say, dissatisfied with the limited *Legionella* occurrence data available, a shortcoming which continues to impede the agency's ability to effectively address what the National Academies, EPA and CDC say is the most prevalent known source of waterborne disease incidence and deaths. EPA cannot continue to ignore the need for comprehensive *Legionella* occurrence data and should finalize approval of *Legionella* methods as a high priority for UCMR 6.

We note that EPA says in the February 2024 Federal Register notice that, with respect to its *Legionella* methods in development, one assay under consideration will detect all *Legionella* species (there are 53 recognized species). EPA reports that there are two other assays under consideration for *L. pneumophila* detection. For these methods, extracted DNA is analyzed using three qPCR assays utilizing a qPCR instrument. The targeted bacterial DNA is quantified using a standard curve generated from genomic DNA.

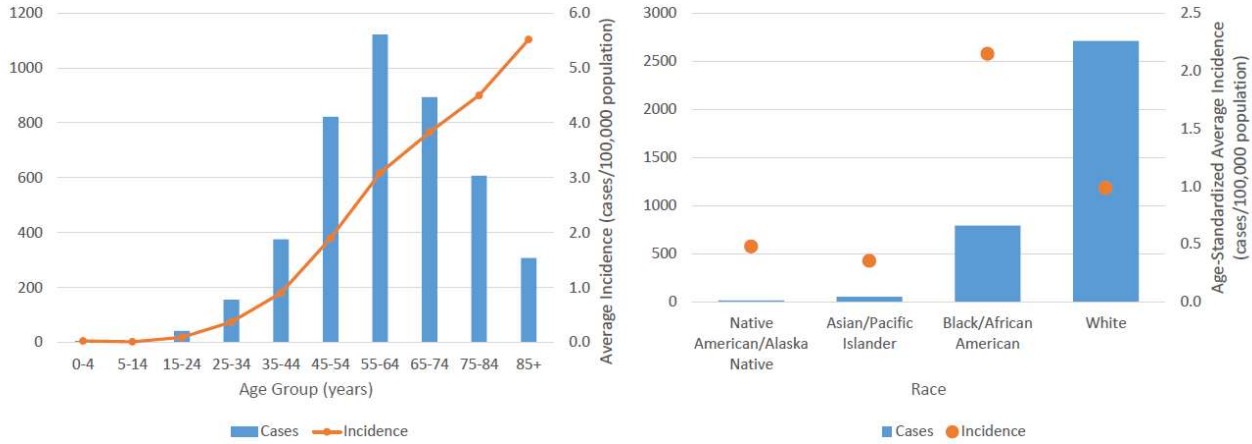
EPA has invited comments to support the development of a *Legionella spp.* method and a *L. pneumophila* method. We strongly support the agency's development and certification of both a *L. pneumophila* specific method and a broader spectrum *Legionella spp.* method. In the MDBP regulatory discussions in 2023-2024, it was made clear by several experts including from CDC, Dr. Joan Rose (who chaired the National Academies Legionella panel), Dr. Jeffrey Griffiths of Tufts Medical School (former Chairman of the EPA Science Advisory Board's Drinking Water Committee and a water infectious disease expert) that *L. pneumophila* is an important species of Legionella, but that other species also are likely important disease vectors. We urge that EPA develop and approve methods for both the single species and the broader spectrum *Legionella spp.* method and require monitoring for them in UCMR 6.

Figure 1: Age-Standardized Incidence of Legionella by Race & Year



Barskey AE, et al. Rising Incidence of Legionnaires' Disease and Associated Epidemiologic Patterns, United States, 1992–2018. *Emerg Infect Dis*. 2022 Mar;28(3):527-538. 22

Figure 2: Legionella Cases & Incidence by Age & Race



Barskey AE, et al. Rising Incidence of Legionnaires' Disease and Associated Epidemiologic Patterns, United States, 1992–2018. *Emerg Infect Dis*. 2022 Mar;28(3):527-538. 21

V. Approve Methods and Require Monitoring in UCMR 6 for Microplastics.

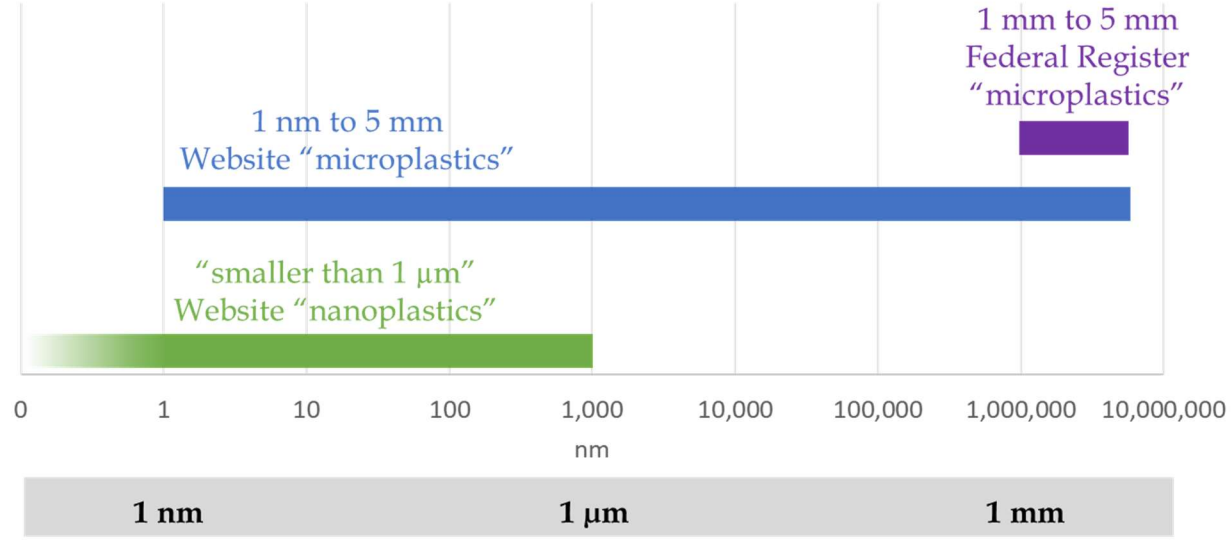
Microplastics are ubiquitous, persistent, and mobile in the environment.[11] Microplastics are also a growing human health concern as they have been detected throughout the body, including in blood, lung, vascular, colon, liver, kidney, spleen, placenta, testis, breast milk, stool, sputum, and semen samples.[12] Based on a growing body of animal

toxicological research, scientists contributing to the California State Policy Evidence Consortium (CalSPEC) report concluded that exposure to microplastics is suspected to be a hazard to the human reproductive system and suspected to be a digestive hazard to humans, including cancer.[13]

In addition to the growing toxicological evidence, a growing body of human epidemiological evidence further raises concerns regarding the potential for microplastics to be hazardous for human health. For example, scientists found that patients with inflammatory bowel diseases had more microplastics in stool samples than healthy subjects; patients with liver cirrhosis had more microplastics in their liver than patients without underlying liver disease; and women with intrauterine growth restricted pregnancies had more microplastics in their placenta than women with healthy pregnancies.[14] Most recently, a prospective epidemiological study found microplastics in the carotid plaque of one third of patients (n=312). The presence of microplastics in the carotid plaque was associated with a 4.53 times greater risk of subsequent cardiac event including myocardial infarction, stroke or death.[15]

Importantly, the Federal Register states that "EPA's water research definition of microplastics is particles ranging in size from 5 mm to 1 mm" and provides a link to an EPA webpage (*https://www.epa.gov/water-research/microplastics-research)*. The definition provided in the Federal Register, however, is inconsistent with the information on the linked webpage, which states "Microplastics (plastic particles ranging in size from 5 mm to 1 nm) and nanoplastics (plastic particles smaller than 1 μm)." While this may have been an unintentional typo in the Federal Register notice, this is a very significant issue given that 1 nanometer (nm) is 1,000,000 times smaller than 1 millimeter (mm). The difference in scope of the definition is presented on a logarithmic plot below in Figure 3.

Figure 3. Range of Particle Sizes Covered by Different Definitions of Microplastic Provided in This Federal Register Announcement



EPA should ensure that the definition for microplastics is consistent in all further communications. For comparison, the state of California defines microplastics as "solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are greater than 1 nm and less than 5,000 micrometers (µm)."[16] Similarly, Illinois Environmental Protection Agency and the Interstate Technology Regulatory Council (ITRC) also define microplastics as particles between 1 nm and 5,000 µm.[17] This definition is consistent with the definition of microplastics EPA provided on the website.

We strongly encourage EPA to include microplastics in the 1 nm to 1 mm range (which are covered by the definition on the EPA's microplastic research website but not by the definition in the Federal Register). Smaller microplastics (<20 µm) and nanoplastics (<1 µm are more likely to remain in drinking water after standard water treatment processes of coagulation and filtration.[18] Moreover, smaller microplastics are thought to be more readily taken up by the body and therefore may pose a greater hazard to human health.[19] Definitions and methods biased towards only the largest microplastics (> 1 mm) will result in a dramatic underestimation of exposure to those microplastics that are likely to be the most harmful. In fact, some have estimated that exposure to micro-nano plastics from bottled water may be two to three orders of magnitude higher than previously reported based on detection limits that only captured larger microplastics.[20]

California's State Water Control Board (CA SWCB) has conducted an inter-laboratory comparison study ("Method Study") to evaluate and refine methods for infrared and Raman spectroscopy.[21] Twenty-two laboratories participated in the Method Study in which spiked samples contained known amounts of microplastics of various sizes, colors

and polymer types. Through this Method Study, CA SWCB has determined that microplastics can be reliably detected and counted with microscopy down to the 50 µm size. Both FTIR and Raman spectroscopy were effective for quantifying and characterizing microplastics in drinking water down to 20 µm, however Raman spectroscopy was found to be more reliable for identifying smaller microplastics between 3 and 20 µm. The importance of a harmonized spectral library among testing laboratories was raised from the Method Study and we argue that any spectral libraries developed and/or used by EPA for microplastics testing should be made publicly available so that the capabilities and limitations of the methods can be known. We also refer EPA to several important works derived from the Method Study that pertain to how to establish detection limits for environmental microplastics analysis and how to establish an accreditation process for laboratories measuring microplastics in drinking water for regulatory monitoring.[22]

Though this Method Study and other similar studies are promising, some limitations are noted where EPA could further support the development of standardized methods. To begin, the processes for microplastic detection are currently labor and time intensive. In the Method Study, it took an average of 4 minutes per particle to identify particles microscopically and a further 10 or 12 minutes per particle to identify particles spectroscopically with FTIR or Raman, respectively. For samples with many particles, this time can add up to more than 50 hours needed to process a single sample. Thus, it would be beneficial for EPA to develop and validate methods that are efficient. Hyperspectral simulated Raman microspectroscopy is one method that has shown promise for more rapid microplastic detection and identification.[23]

Another limitation of the Method Study is that it did not evaluate the ability of the analytical techniques to identify and quantify weathered particles or tire-road wear particles, both of which are abundant in the environment and may pose unique hazards and analytical challenges. [24] Given that recent research has suggested that tire wear particles may compose the vast majority of microplastics entering stormwater, and found in rivers, estuaries, and the ocean, it is particularly important that EPA support standardized methods to identify and quantify tire wear particles in water.[25] In fact, this was a key recommendation from the EPA's April 2023 workshop, "Where the Rubber Meets the Road: Opportunities to Address Tire Wear Particles in Waterways."[26]

Weathered microplastics may be secondary microplastics resulting from the environmental breakdown of larger pieces of plastic or may result from breakdown and fragmentation during standard drinking water treatments like UV oxidation.[27] Tire-road wear particles may pose unique analytical challenges due to the differences in polymer types and chemical composition. However, promising new approaches such as the integration of optical tweezers with Raman spectroscopy or hyperspectral simulated Raman spectroscopy may be useful, not only for more rapid identification of microplastics, but also for identifying a broader range of particles, including tire-road wear particles, weathered microplastics and nanoplastics.[28]

NRDC recommends that EPA approve methods and require monitoring in UCMR 6 for microplastics. Approved methods should be inclusive of all microplastics to the smallest size possible (at least 1 nm), should include tire-road wear particles, and be able to reliably identify weathered microparticles.

VI. Require Monitoring in UCMR 6 for Hexavalent Chromium

Health effects linked to exposure to hexavalent chromium include cancer, liver toxicity, reproductive, developmental, and gastrointestinal effects, and immunotoxicity.[29] California's Public Health Goal for hexavalent chromium in drinking water is 0.02 ppb. This very low health threshold is based on the estimated "one in one million" lifetime cancer risk level and underscores the need for monitoring and public health protections.[30]

Hexavalent chromium can be present in water naturally and as result of extensive industrial use. Nationwide monitoring through UCMR3, completed a decade ago in 2013-2015 and with a minimum reporting level of 0.03 ppb (higher than the California Public Health Goal), found 4,401 public water systems with hexavalent chromium out of 4,919 tested.[31] In other words, nearly 90 percent of water systems tested were found to be contaminated with hexavalent chromium at a level above California's Public Health Goal. A more recent analysis by OEHHA shows that hexavalent chromium has been detected in over 2,000 California public drinking water supply wells within the last three years, with the highest level detected being 240 ppb.[32] Considering this recent analysis and hexavalent chromium's potential for harm, and the need for EPA to take action to protect public health against the widespread risk of chromium 6 contamination of tap water, it is important to update our understanding of its nationwide occurrence. EPA validated methods are already available, Method 218.6 and 218.7, facilitating the addition of hexavalent chromium to UCMR6.[33] We urge EPA to perfect one or both of these methods and to adopt an MRL at least as low as the California Public Health Goal (0.02 ppb).

VII. Ensure that EPA-Approved Method for Four Haloacetonitriles Have Low MRLs and Require Monitoring for them in UCMR 6.

Our 2021 comments urged that EPA require monitoring for four haloacetonitriles (dichloroacetonitrile, dibromoacetonitrile, trichloroacetonitrile, and bromochloroacetonitrile) in the UCMR 5 or through an ICR in time for the MDBP revisions rule. EPA admits that these chemicals are "generally considered more cytotoxic and genotoxic than the regulated" disinfection byproducts. They also are likely to widely occur. We urged that EPA should either include these four compounds in the UCMR 5 or, if such monitoring could not be completed in time for its fruitful consideration during the MDBP revisions rulemaking, that the agency should promptly promulgate an ICR requiring statistically valid sampling of public water systems in time for the data to be considered as part of that rulemaking.

Again, EPA chose to ignore our advice, and instead presented very limited data on occurrence of these four haloacetonitriles to the MDBP Working Group. The Working Group was disappointed by the lack of more comprehensive data. EPA Method 551.1 is an existing validated method approved for measuring regulated total trihalomethanes in drinking water and is also capable of measuring these unregulated haloacetonitriles.[34]

We urge EPA to confirm the use of EPA Method 551.1 and to ensure that MRLs for these four HANs are sufficiently low to detect levels of these chemicals at concentrations of public health concern.

VIII. CONCLUSION

The goal of our recommendations is to assure more comprehensive testing methods are employed in UCMR 6 for hazardous and likely widespread contaminants. If such testing is not done, we are concerned that the public and often the water utilities themselves will not be aware of contamination of their water supplies. They will not be made aware of the need for treatment, source water protection, and other measures to address the threats posed. Moreover, a lack of more comprehensive data may hinder EPA's and states' ability to adopt effective regulatory measures to protect the public. Thank you for your attention to our comments and to these important issues.

Sincerely,

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Katie Pelch, PhD, Scientist
Erik D. Olson, Senior Strategic Director for Health
Natural Resources Defense Council
Andria Ventura, Legislative and Policy Director
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cc: **EPA Docket** EPA–HQ–OW– 2023–0469
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NOTES

[1] Eurofins, PFAS Analyte List, https://www.eurofinsus.com/environment-testing/pfas-testing/pfas-analyte-lists/

[2] Enthalpy Analytical, PFAS Compound List, https://enthalpy.com/wp-content/uploads/2022/01/Enthalpy-PFAS-Compound-List-v012022.pdf.

[3] Pace Analytical, EPA 1633: MATRICES: WASTEWATER, SURFACE WATER, GROUNDWATER, SOILS, BIOSOLIDS, BIOLOGICAL TISSUES, LANDFILL LEACHATE, AND SEDIMENT, https://www.pfas.com/pfas-testing/.

[4] Pelch, Katherine E., Taryn McKnight, and Anna Reade. "70 Analyte PFAS Test Method Highlights Need for Expanded Testing of PFAS in Drinking Water." Science of The Total Environment 876 (April 12, 2023). https://doi.org/10.1016/j.scitotenv.2023.162978.

[5] Zheng, Guomao, Stephanie M. Eick, and Amina Salamova. "Elevated Levels of Ultrashort- and Short-Chain Perfluoroalkyl Acids in US Homes and People." Environmental Science & Technology 57, no. 42 (October 24, 2023): 15782–93. https://doi.org/10.1021/acs.est.2c06715; Ateia, Mohamed, Amith Maroli, Nishanth Tharayil, and Tanju Karanfil. "The Overlooked Short- and Ultrashort-Chain Poly- and Perfluorinated Substances: A Review." Chemosphere 220 (April 1, 2019): 866–82. https://doi.org/10.1016/j.chemosphere.2018.12.186.

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[7] US EPA. "PFAS National Primary Drinking Water Regulation Rulemaking." Federal Register, Proposed Rules, 88, no. 60 (March 29, 2023): 18638.

[8] National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Division on Earth and Life Studies; Board on Population Health and Public Health Practice; Board on Life Sciences; Water Science and Technology Board; Committee on Management of Legionella in Water Systems. Management of Legionella in Water Systems. Washington (DC): National Academies Press (US); 2019 Aug 14. PMID: 32200596.

[9] IDEXX, Reducing Legionnaire's Disease Risk, 2021, citing Centers for Disease Control and Prevention. Table 1, Waterborne disease outbreaks associated with treated recreational water and untreated recreational water, by year and jurisdiction—waterborne disease and outbreak surveillance system, United States, 2011–2012. www.cdc.gov/healthywater/surveillance/recreational/2011–2012-tables.html. Updated March 28, 2018. Accessed March 24, 2019; Centers for Disease Control and Prevention. Table 1, Waterborne disease outbreaks associated with treated recreational water or untreated recreational water, by year and jurisdiction—waterborne disease and outbreak surveillance system, United States, 2013– 2014. www.cdc.gov/healthywater/surveillance/recreational/2013–2014-tables.html. Updated May 16, 2018. Accessed March 24, 2019; Centers for Disease Control and Prevention. Outbreaks associated with environmental and undetermined water exposures—United States, 2011–2012. MMWR Morb Mortal Wkly Rep. 64(31);849-851. www.cdc.gov/MMWR/preview/mmwrhtml/mm6431a3.htm. Accessed March 24, 2019; Centers for Disease Control and Prevention. Waterborne disease outbreaks associated with environmental and undetermined exposures to water—United States, 2013–2014. MMWR Morb Mortal Wkly Rep. 66(44);1222–1225. www.cdc.gov/mmwr/volumes/66/wr/mm6644a4.htm. Accessed March 24, 2019; Centers for Disease Control and Prevention. Surveillance for waterborne disease outbreaks associated with drinking water—United States, 2011–2012. MMWR Morb Mortal Wkly Rep. 64(31);842–848.www.cdc.gov/mmwr/preview/mmwrhtml/mm6431a2.htm. Accessed September 14, 2018; Centers for Disease Control and Prevention. Surveillance for waterborne disease outbreaks associated with drinking water—United States, 2013–2014. MMWR Morb Mortal Wkly Rep. 66(44);1216– 1221.

www.cdc.gov/mmwr/volumes/66/wr/mm6644a3.htm. Accessed September 14, 2018.
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