

## Federal PFAS Testing and Tribal Public Water Systems

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### Introduction

Systemic environmental health disparities exist for residents of Tribal Nations in the United States, who are disproportionately burdened by diseases and experience lower life expectancy compared to non-Native individuals.<sup>1</sup> Research on Tribal drinking water is limited but includes documentation of high rates of unsafe levels of inorganic contaminants, nitrates, and foul odor and taste.<sup>2</sup>

Per- and polyfluoroalkyl substances (PFAS), a large class of persistent, toxic, and water-soluble chemicals, are a leading concern for safe drinking water.<sup>3</sup> Exposure to PFAS has been associated with decreased antibody response, decreased fetal and infant growth, and increased risk of kidney cancer, and the evidence also suggests a relationship between PFAS exposure and the risk of breast cancer, testicular cancer, and thyroid disease.<sup>3</sup> An estimated 200 million U.S. residents receive PFAS-contaminated public drinking water,<sup>4</sup> but no federal regulatory drinking water standards currently exist.<sup>5</sup> Large gaps exist in knowledge about PFAS contamination on Tribal lands. To explore these gaps, we conducted a comparative analysis of past and future drinking water testing for Tribal and non-Tribal public water systems (PWS).

### Methods

From 2013 to 2015, the U.S. Environmental Protection Agency (U.S. EPA) conducted drinking water sampling through Unregulated Contaminant Monitoring Rule 3 (UCMR3) for 21 contaminants, including six PFAS, in community water systems and nontransient noncommunity PWS serving more than 10,000 people (large PWS), as well as 800 PWS serving <10,000 people (small PWS).<sup>6</sup> To analyze PWS tested for PFAS in UCMR3 and the populations they served, we obtained data on PWS that submitted data to the U.S. EPA's Safe Drinking Water Information System (SDWIS) and were listed as active in quarter 1 of 2013. We identified Tribal PWS as those with a Native American owner type in SDWIS in 2013.

The U.S. EPA's planned UCMR5 (2023–2025) will sample PWS serving >3,300 people and a random sample of 800 PWS serving ≤3,300 people.<sup>7</sup> To calculate the projected inclusion of Tribal PWS in UCMR5, we analyzed PWS that submitted data to SDWIS and were listed as active in quarter 2 of 2022, which was

the most up-to-date PWS data available at time of submission. We assumed that all PWS serving >3,300 people will be sampled. We projected the random sampling of 800 small PWS based on the proportion and average populations served by Tribal and non-Tribal PWS serving ≤3,300 people. Analysis was conducted in RStudio (version 2021.09.3; RStudio, PBC).

To determine the extent of additional PFAS testing on Tribal lands, we communicated with U.S. EPA representatives to identify sampling plans, engagement with state programs, and funding sources.

### Results

**Table 1** shows that 3.2% ( $n = 27$ ) of Tribal PWS were tested for PFAS in UCMR3, in comparison with 7.2% ( $n = 4,892$ ) of non-Tribal systems. A total of 27.8% ( $n = 352,790$ ) of the population served by Tribal PWS were included in UCMR3, in comparison with 79.1% ( $n = 242,265,582$ ) of the population served by non-Tribal PWS. No data were provided for 16.7% ( $n = 3$ ) of large Tribal PWS and 4.3% ( $n = 175$ ) of large non-Tribal PWS due to missing data or lack of sampling in UCMR3. Additionally, of PWS sampled in UCMR3, no PFAS results were provided for 18.2% ( $n = 6$ ) of Tribal PWS and 11.5% ( $n = 637$ ) of non-Tribal PWS due to missing data or lack of sampling for PFAS. The population served by Tribal PWS are disproportionately served by small systems, with 68.5% ( $n = 869,892$ ) of the population served by Tribal PWS receiving water from PWS serving ≤10,000 people, in comparison with just 18.8% ( $n = 57,726,562$ ) of the population served by non-Tribal PWS.

We projected that 12.7% ( $n = 109$ ) of Tribal PWS and 15.7% ( $n = 10,342$ ) of non-Tribal PWS will be sampled for PFAS in 2023–2025 (**Table 1**). Just 64.5% ( $n = 903,503$ ) of the population served by Tribal PWS will be included in UCMR5; in comparison, 91.5% ( $n = 294,899,544$ ) of the population served by non-Tribal PWS will be included in UCMR5. Over one-third (36.0%,  $n = 503,723$ ) of the population served by Tribal PWS receives water from PWS serving ≤3,300 people, in comparison with just 8.6% ( $n = 27,802,557$ ) of the population served by non-Tribal PWS.

Each U.S. EPA region has a Public Water System Supervision (PWSS) State and Tribal Support Program Grant that provides regulatory support and funding related to PWS and emerging contaminants on Tribal lands.<sup>8</sup> Per conversations with representatives, 6 of 10 U.S. EPA regions plan to conduct “limited, voluntary” sampling in Tribal PWS for PFAS in 2021–22 (**Table 2**).<sup>9</sup>

U.S. EPA representatives identified policy, funding, and staffing as limiting factors related to the implementation of such PFAS testing. Multiple regions anticipated challenges should PFAS be detected in Tribal PWS, citing the absence of current regulations for PFAS and insufficient remediation funding. Representatives also pointed to a lack of U.S. EPA-certified labs and the need to divide scarce resources between multiple priority contaminants (U.S. EPA Tribal Drinking Water Headquarters and Regions, personal communications, 2021–2022).

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**Table 1.** Analysis of completed (UCMR3) and planned (UCMR5) sampling inclusion of PWS serving Tribal and non-Tribal populations.

|                                                                         | Tribal                  |                            | Non-Tribal              |                            |
|-------------------------------------------------------------------------|-------------------------|----------------------------|-------------------------|----------------------------|
|                                                                         | Systems [ <i>n</i> (%)] | Population [ <i>n</i> (%)] | Systems [ <i>n</i> (%)] | Population [ <i>n</i> (%)] |
| Total PWS, 2013 SDWIS                                                   | 847                     | 1,269,153                  | 67,864                  | 306,347,928                |
| Serving >10,000 people                                                  | 18 (2.1%)               | 399,261 (31.5%)            | 4,258 (6.3%)            | 248,621,366 (81.2%)        |
| Serving ≤10,000 people                                                  | 829 (97.9%)             | 869,892 (68.5%)            | 63,606 (93.7%)          | 57,726,562 (18.8%)         |
| PWS sampled for PFAS in UCMR3 (2013–2015)                               | 27 (3.2%)               | 352,790 (27.8%)            | 4,892 (7.2%)            | 242,265,582 (79.1%)        |
| PWS serving >10,000 people reporting data for PFAS (% of same-size PWS) | 15 (83.3%)              | 305,466 (76.5%)            | 4,077 (95.7%)           | 239,356,389 (96.3%)        |
| PWS serving ≤10,000 people reporting data for PFAS (% of same-size PWS) | 12 (1.4%)               | 47,324 (5.4%)              | 815 (1.3%)              | 2,909,193 (5.0%)           |
| Total PWS, 2022 SDWIS                                                   | 855                     | 1,400,197                  | 65,904                  | 322,312,628                |
| Serving >3,300 people                                                   | 98 (11.6%)              | 896,474 (63.8%)            | 9,553 (14.5%)           | 294,503,029 (91.3%)        |
| Serving ≤3,300 people                                                   | 757 (88.5%)             | 503,723 (36.0%)            | 56,351 (85.5%)          | 27,802,557 (8.6%)          |
| PWS projected to be sampled for PFAS in UCMR5 (2023–2025)               | 109 (12.9%)             | 903,530 (64.3%)            | 10,342 (15.7%)          | 294,510,071 (91.5%)        |
| PWS serving >3,300 people to be sampled for PFAS (% of same-size PWS)   | 98 (100%)               | 896,474 (100%)             | 9,553 (100%)            | 294,510,071 (100%)         |
| PWS serving ≤3,300 people to be sampled for PFAS (% of same-size PWS)   | 11 (1.5%)               | 7,056 (1.4%)               | 789 (1.4%)              | 389,473 (1.4%)             |

Note: Sources include U.S. EPA.<sup>6–7</sup> PFAS, per-and polyfluoroalkyl Substances; PWS, public water systems; SDWIS, Safe Drinking Water Information System; UCMR, Unregulated Contaminant Monitoring Rule; U.S. EPA, U.S. Environmental Protection Agency.

## Discussion

Our study has several limitations. Missing or incomplete data from UCMR3 add uncertainty to our analysis of historical testing. Additionally, Tribal PWS are identified by owner type and not by the demographics of the population served, because demographic data are not available at the PWS level.

Comprehensive PFAS drinking water testing for Tribal communities is needed. Future research should examine other potential sources of PFAS exposure for Tribal communities. Assessing and managing environmental health risks must incorporate culturally significant practices and traditional ecological knowledge, as well as Tribally defined boundaries and traditional hunting and fishing areas.<sup>10,11</sup>

Our analysis shows that even systematic research may fail to equitably include certain populations. Therefore, we suggest that UCMR5 be amended to provide resources and support for the inclusion of more Tribal PWS and that the U.S. EPA should

support testing of additional Tribal water sources, such as private wells. Other measures, such as education and remediation, should be pursued in locations where contamination is detected, especially in Tribal communities that have historically been excluded from PFAS action. Small PWS may need targeted resources given the substantial remediation costs associated with PFAS contamination. State agencies could offer greater support for focused PFAS monitoring and remediation in Tribal Nations. Although developing data on environmental inequalities for Tribal communities is not a sufficient condition for addressing environmental injustice, it is a necessary step.

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**Table 2.** Tribal drinking water PFAS testing under Public Water System Supervision State and Tribal Support Program grants for emerging contaminants.

| U.S. EPA Region | PFAS sampling planned | Priority contaminants by region | Status of PFAS sampling                                        |
|-----------------|-----------------------|---------------------------------|----------------------------------------------------------------|
| 1               | No                    | NA                              | No planned PFAS sampling                                       |
| 2               | Yes                   | PFAS                            | Sampling will be conducted for two Tribes                      |
| 3               | No                    | NA                              | No Tribal PWS in region                                        |
| 4               | No                    | NA                              | Sampling may be conducted by U.S. EPA contractor               |
| 5               | Yes                   | PFAS                            | Sampling projected to begin early 2022                         |
| 6               | No                    | Manganese                       | No planned PFAS sampling                                       |
| 7               | Yes                   | PFAS                            | Sampling completed in 2021, results not yet available          |
| 8               | Yes                   | Manganese, PFAS                 | Sampling projected to begin early 2022                         |
| 9               | Yes                   | PFAS                            | Started sampling late 2021, projected to continue through 2022 |
| 10              | Yes                   | PFAS                            | Sampling projected to begin early 2022                         |

Note: Testing results may have been released since this paper was finalized. Results available at (reference 9). Source: U.S. EPA Tribal Drinking Water Headquarters and Regions, personal communications, 2021–2022. NA, not available; PFAS, per-and polyfluoroalkyl substances; U.S. EPA, Environmental Protection Agency.

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