Division of Water Resources Identification of Select Emerging Compounds in the Public Water Supply Reservoir Jordan Lake (2024)

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES
WATER SCIENCES SECTION

THIS REPORT HAS BEEN APPROVED FOR RELEASE

_____

Chris Johnson
Chief, Water Sciences Section

DATE: Oct 17, 2025

Division of Water Resources Identification of Select Emerging Compounds in Jordan Lake (2024)

Introduction

In response to the rising interest in the public health effects associated with per- and polyfluoroalkyl substances (PFAS) and 1,4-Dioxane in drinking water sources, the Intensive Survey Branch (ISB) conducted a special study alongside our Ambient Lakes Monitoring Program to characterize the presence and concentrations of these emerging compounds (EC) in public drinking water supply reservoir Jordan Lake. Beginning in January of 2024, ISB staff collected surface water samples for 1,4-Dioxane and 47 different per- and polyfluoroalkyl substances at three sampling locations on Jordan Lake (Appendix 1). Analytical results indicated the presence of at least six PFAS analytes above the laboratory practical quantitation limit (PQL) at each site during the 2024 sampling season. It is important to note that all analytical data presented in this document reflect levels of target analytes detected in untreated surface waters, as opposed to finished drinking water.

Methods

Selected sites were sampled in conjunction with regularly scheduled sampling events as part of ALMP monitoring. Samples were collected in accordance with ISB's Standard Operating Procedures Manual: Physical and Chemical Monitoring v2.1, Dec. 2013 and Ambient Lakes Quality Assurance Project Plan v2.0, March 2013, as well as ISB's Draft Standard Operating Procedures Manual: Per- and Polyfluorinated Alkyl Substances (PFAS) - Field Collection Method. Physical parameters were collected at surface (0.15 m) using an In-Situ multiparameter sonde. Chemical samples were collected as surface grab samples. All PFAS and 1,4-Dioxane samples were analyzed by the DWR central laboratory in Raleigh, NC. Appropriate QA/QC samples were collected during each sampling event including trip blanks, field blanks, duplicates, matrix spikes and matrix spike duplicates. Guidance on acceptable supplies, equipment, and personal care products is provided within the ISB Draft Standard Operating Procedures Manual: Per- and Polyfluorinated Alkyl Substances (PFAS) - Field Collection Method.

Results

PFAS analysis was conducted by DWR at the Central Laboratory in Raleigh, NC. Of the 47 PFAS compounds selected for this study, the following 11 compounds were found above the PQL on at least one occasion: PFOS, PFPeA, NEtFOSAA, PFHxA, PFOA, PFHxS, PFBA, PFBS, PFHpA, PFHpS, and PFTA. One or more of these compounds were found at all three sites during the 2024 sampling period (January – December). These results demonstrate the widespread distribution of detectable PFAS in public water supply reservoirs.

1,4- dioxane was not detected above the PQL (1 µg/L) throughout the sampling period.

Summary

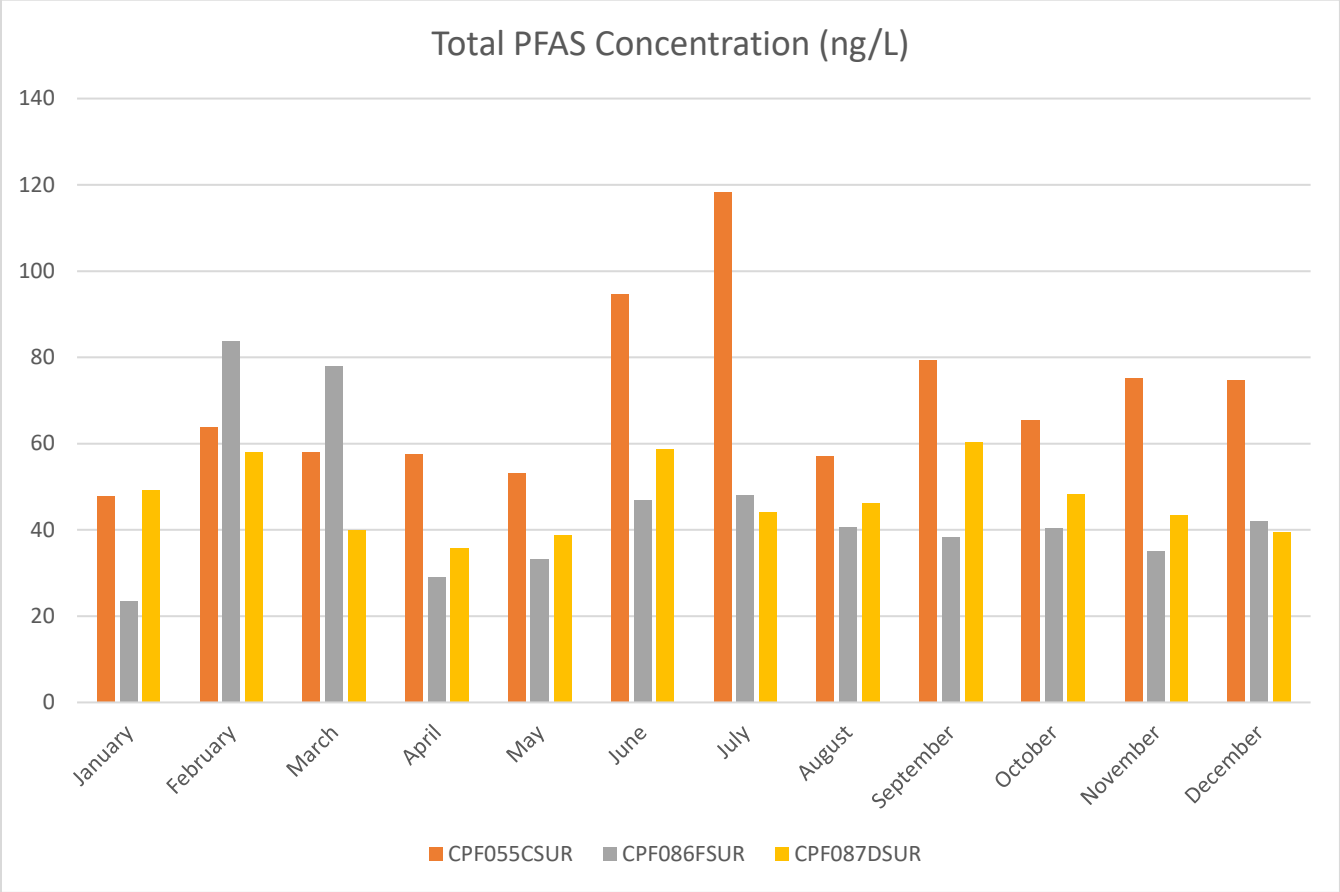
Evaluation of physical and chemical result from this study suggest that while there are detectable levels of target analytes at the public water supply reservoir, Jordan Lake, additional long-term monitoring would need to be conducted to evaluate persistence of these compounds and their associated effects on drinking water. Station CPF055CSUR exhibited the highest total single event PFAS concentration (118.4 ng/L) in July of 2024. CPF087DSUR displayed the greatest diversity of target analytes (n=10) in September of 2024. The most prevalent compounds that were detected at every site were PFOS, PFPeA, PFHxA, PFOA, PFHxS, PFBA, PFBS, and PFHpA. The compounds with the highest detected values were PFHpS (57 ng/L), PFHxA (24 ng/L), and PFOS (23 ng/L). Full PFAS sampling results are shown below in Table 1, with PFAS sums displayed in the graph in Figure 2.

***Appendix 1**. Station ID, Description, and coordinates of sampled sites.*

Station	Station Description	Latitude	Longitude
CPF055CSUR	ABOVE STINKING CK NR PITTSBORO NC	35.69131	-79.0791
CPF087DSUR	MOUTH WHITE OAK CK NR SEAFORTH NC	35.73864	-79.0242
CPF086FSUR	NEAR FARRINGTON NC	35.79700	-79.0108

***Figure 1.** Map of Jordan Lake with Stations.*

Figure 2. *Graph showing total PFAS concentration.*



Appendix 2*. List of PFAS Compounds.*

Abbreviation	CAS #
HFPO-DA (GenX)	13252-13-6
PFOS	1763-23-1
PFUnA	2058-94-8
N-MeFOSAA	2355-31-9
PFPeA	2706-90-3
PFPeS	2706-91-4
6:2 FTS	27619-97-2
N-EtFOSAA	2991-50-6
PFHxA	307-24-4
PFDoA	307-55-1
PFOA	335-67-1
PFDA	335-76-2
PFDS	335-77-3
PFHxS	355-46-4

PFBA	375-22-4
PFBS	375-73-5
PFHpA	375-85-9
PFHpS	375-92-8
PFNA	375-95-1
PFTeDA	376-06-7
8:2 FTS	39108-34-4
PFNS	68259-12-1
PFTrDA	72629-94-8
9Cl-PF3ONS	756426-58-1
4:2 FTS	757124-72-4
11Cl-PF3OUdS	763051-92-9
PFDoS	79780-39-5
ADONA	919005-14-4
PFEESA/PES	113507-82-7
PMPA	13140-29-9
PFECA B or NFHDA	151772-58-6
R-PSDA (Nafion Byproduct 4)	2416366-18-0
Hydrolyzed PSDA (Nafion Byproduct 5)	2416366-19-1
R-PSDCA (Nafion Byproduct 6)	2416366-21-5
R-EVE	2416366-22-6
PEPA	267239-61-2
PFESA-BP1 (Nafion Byproduct 1)	29311-67-9
PFO2HxA	39492-88-1
PFO3OA	39492-89-2
PFO4DA	39492-90-5
PFO5DA	39492-91-6
PFMOAA	674-13-5
EVE Acid	69087-46-3
PFESA-BP2 (Nafion Byproduct 2)	749836-20-2
Hydro-EVE Acid	773804-62-9
NVHOS	801209-99-4
PFECA G	801212-59-9

Table 1. *Values of detected PFAS compounds and detection date for sites with values above PQL.*

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF055CSUR	01/30/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA FBS PFHpA	14 4.2 5.5 7.6 3.9 4.8 J1 4.6 3.3	47.9
CPF086FSUR	01/30/2024	6	PFOA PFPeA PFHxA PFOA PFBA PFBS	4.2 Y 4.0 Y 4.2 Y 3.0 Y 4.5 J1, Y 3.5 Y	23.4
CPF087DSUR	01/30/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	7.1 7.4 7.7 5.3 2.6 8.3 J1 7.7 3.2	49.3
CPF055CSUR	02/19/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	18 Q2 6.8 Q2 8.1 Q2 10 J1, Q2 4.8 Q2 3.3 J1, Q2 5.9 Q2 4.3 J1, Q2 2.6 Q2	63.8

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF086FSUR	02/19/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpS	4.2 Q2 5.5 Q2 4.3 Q2 2.8 Q2 1.9 Q2 4.5 J1, Q2 3.5 Q2 57 Q2	83.7
CPF087DSUR	02/19/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	5.2 Q2 5.8 Q2 5.1 Q2 4.0 J1, Q2 2.3 Q2 4.1 J1, Q2 4.3 Q2 2.2 J1, Q2 25 Q2	58
CPF055CSUR	03/05/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	18 4.7 6.8 11 J1 4.7 3.2 J1 5.9 J2 3.7 J1	58
CPF086FSUR	03/05/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpS	4.8 5.6 6.1 3.7 J1 2.4 6.4 J1 2.9 46	77.9

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF087DSUR	03/05/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	5.8 6.2 6.4 4.3 J1 2.6 4.8 J1 3.4 2.1 J1 4.4	40
CPF055CSUR	04/10/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	15 5.8 7.9 9.9 4.3 3.0 J1 5.6 3.5 2.6	57.6
CPF086FSUR	04/10/2024	7	PFOS PFPeA PFHxA PFOA PFBA PFBS PFHpS	4.1 3.8 4.8 3.0 3.1 J1 2.2 8.0	29
CPF087DSUR	04/10/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	6.3 5.1 5.9 4.5 2.2 2.4 J1 3.6 2.0 3.7	35.7

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF055CSUR	05/22/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	14 Q2 5.6 Q2 8.0 Q2 8.9 Q2 4.0 Q2 3.4 J1, Q2 5.6 Q2 3.6 Q2	53.1
CPF086FSUR	05/22/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	5.4 Q2 5.0 Q2 7.1 Q2 4.1 Q2 2.1 Q2 4.4 J1, Q2 3.1 Q2 2.0 Q2	33.2
CPF087DSUR	05/22/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	6.9 Q2 5.0 Q2 7.4 Q2 5.0 Q2 2.5 Q2 3.7 J1, Q2 3.8 Q2 2.3 Q2 2.1 Q2	38.7
CPF055CSUR	06/06/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	23 Q2 12 Q2 14 Q2 13 J1, Q2 6.5 Q2 6.0 J1, Q2 14 Q2 6.3 J1, Q2	94.8

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF086FSUR	06/06/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	7.8 Q2 7.0 Q2 8.0 Q2 5.7 J1, Q2 3.1 Q2 5.3 J1, Q2 4.2 Q2 2.8 J1, Q2 3.1 Q2	47
CPF087DSUR	06/06/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	12 Q2 7.3 Q2 9.2 Q2 7.8 Q2 3.8 Q2 5.7 J1, Q2 7.8 Q2 3.4 Q2 1.8 Q2	58.8
CPF055CSUR	07/02/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	19 19 24 14 6.4 8.6 J1 18 9.4	118.4
CPF086FSUR	07/02/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	7.3 6.1 8.4 5.3 2.8 5.2 J1 3.9 3.7 5.3	48

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF087DSUR	07/02/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	7.6 5.6 7.6 5.3 2.8 4.8 J1 4.2 3.6 2.7	44.2
CPF055CSUR	08/27/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	16 V1 7.3 J1 7.3 J1 8.5 J1 3.9 J1 5.6 J1 4.8 J1 3.6 J1	57
CPF086FSUR	08/27/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	8.9 V1 6.0 J1 6.2 J1 5.5 J1 2.5 J1 4.5 J1 4.4 J1 2.6 J1	40.6
CPF087DSUR	08/27/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	11 V1 6.2 J1 6.7 J1 6.4 J1 2.9 J1 5.0 J1 4.8 J1 3.1 J1	46.1

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF055CSUR	09/25/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	23 13 J1, J2 8.7 J1 9.0 J1 4.7 J1 11 J1 5.8 J1 4.1 J1	79.3
CPF086FSUR	09/25/2024	8	PFOS PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	7.0 J1 5.8 J1 5.1 J1 2.7 J1 9.0 J1, J2 4.4 J1, J2 2.3 J1, J2 2.1 J1, J2	38.4
CPF087DSUR	09/25/2024	10	PFOS PFPeA NEtFOSAA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFTA	9.4 J1 6.4 J1, J2 3.2 J1 7.6 J1 6.4 J1 3.3 J1 11 J1 5.0 J1 4.7 J1 3.3	60.3
CPF055CSUR	10/22/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	16 J1 11 J1 7.3 J1 9.2 J1 4.1 J1 9.7 J1 4.8 J1 3.3 J1	65.4

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF086FSUR	10/22/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	6.1 9.0 J1 4.4 J1 4.5 J1 2.3 J1 8.0 J1 4.1 J1 1.9 J1	40.3
CPF087DSUR	10/22/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	7.9 9.0 J1 5.6 J1 5.3 J1 2.7 J1 8.7 J1 4.2 J1 2.3 J1 2.6	48.3
CPF055CSUR	11/19/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	18 V1 12 J1 11 J1 11 4.8 5.7 J1 5.2 5.3 2.1	75.1
CPF086FSUR	11/19/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	6.4 Y, V1 4.8 J1, Y 5.3 J1, Y 4.3 Y 2.2 Y 6.0 J1, Y 3.8 Y 2.3 Y	35.1

Station	Date	Analytes Detected	Analyte	Result (ng/L)	PFAS Sum (ng/L)
CPF087DSUR	11/19/2024	9	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA PFHpS	9.2 V1 5.7 J1 5.9 J1 5.5 2.9 5.3 J1 4.2 2.9 1.9	43.5
CPF055CSUR	12/17/2024	8	PFOS PFPeA PFHxA PFOA PFHxS PFBA PFBS PFHpA	19 Q2 8.2 Q2 8.9 Q2 11 Q2 5.2 Q2 5.1 J1, Q2 4.2 Q2 5.1 Q2	74.7
CPF086FSUR	12/17/2024	8	PFOS PFPeA PFHxA PFOA PFBA PFBS PFHpA PFHpS	4.8 Q2 5.7 Q2 5.6 Q2 3.3 Q2 6.8 J1, Q2 3.5 Q2 2.0 Q2 2.3 Q2	42
CPF087DSUR	12/17/2024	7	PFOS PFPeA PFHxA PFOA PFBA PFBS PFHpA	6.9 Q2 5.4 Q2 5.2 Q2 3.7 Q2 5.4 J1, Q2 3.6 Q2 2.2 Q2	39.4

Data Qualifier Codes:

J1 – Surrogate recovery limits have been exceeded.

J2 – The reported value failed to meet the established quality control criteria for either precision or accuracy.

Q2 – Holding time exceeded following receipt by lab.

V1 – The analyte was detected in both the sample and the method blank.

Y – Elevated PQL due to insufficient sample size.