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Project Number 08005-WE04

Ms. Sarah Kloss (3HS11)
Remedial Project Manager
United States Environmental Protection Agency Region 3
1650 Arch Street
Philadelphia, Pennsylvania 19103

Mr. Colin Wade
Project Officer
Environmental Cleanup Program
Pennsylvania Department of Environmental Protection
2 East Main Street
Norristown, Pennsylvania 19401

Reference: Contract No. N6247016D9008
Contract Task Order No. WE04

Subject: Final 2019 Annual Summary Report for Private Well Sampling
Former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove
Horsham, Pennsylvania

Dear Ms. Kloss and Mr. Wade:

On behalf of the Base Realignment and Closure Program Management Office (BRAC PMO) of the United States Department of the Navy's Naval Facilities Engineering Command (NAVFAC), Tetra Tech is pleased to provide the attached draft annual summary report for private well sampling in the area of the former NASJRB Willow Grove. Laboratory data and data validation reports are provided on the enclosed CDs. This document is considered a draft secondary document in accordance with the Federal Facilities Agreement.

Please do not hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads 'Tricia E. Moore'.

Tricia E. Moore
Project Manager

TM/cg

Enclosure

c: Brian Helland (NAVFAC BRAC PMO)
Willie Lin (NAVFAC BRAC PMO) (w/o enclosure)
Roger Reinhart (EPA Region 3)
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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) has prepared this annual summary report for the Base Realignment and Closure Program Management Office of the United States Department of the Navy's Naval Facilities Engineering Command (NAVFAC) as part of contract task order number (CTO No.) WE04 under Comprehensive Long-Term Environmental Action Navy (CLEAN) contract number N6247016D9008. This report presents the 2019 drinking water well results for potable water samples from private drinking water wells located near the former Naval Air Station Joint Reserve Base (NASJRB) Willow Grove site in Horsham, Montgomery County, Pennsylvania. The objective of the sampling is to determine the concentrations of per- and polyfluoroalkyl substances (PFAS) in the drinking water.

There are currently no Pennsylvania or federal drinking water standards for PFAS under the Safe Drinking Water Act. A drinking water lifetime health advisory level (HAL) for combined perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) of 70 nanograms per liter (ng/L) (or parts per trillion) was set by the United States Environmental Protection Agency (EPA) in 2016. PFOS and PFOA are PFAS.

2.0 SAMPLING ACTIVITIES

From January 1, 2019, through December 31, 2019, 86 total private water well locations were sampled for PFAS, which included:

- 56 private water wells in the quarterly monitoring program. The Navy and regulatory agencies have agreed on quarterly resampling of wells with combined concentrations of PFOA and PFOS between 40 ng/L and 70 ng/L.
- 30 unmonitored private water wells sampled to obtain current information on PFAS concentrations.

Samples were collected in accordance with the *Draft Sampling and Analysis Plan (SAP) for Private Well Sampling* (Tetra Tech, 2017) and the October 2019 Field Task Modification Request Form (FTMR) (Tetra Tech, 2019). Each private water well sampling location was assigned a unique sample identifier to protect personal information such as street addresses and names of property owners.

Samples collected from January 3, 2019, through October 18, 2019, were analyzed by Eurofins TestAmerica Laboratories, Inc. (TestAmerica) of Sacramento, California, using EPA Method 537. The analytical laboratory is accredited by both the Department of Defense Environmental Laboratory Accreditation Program and the Pennsylvania Department of Environmental Protection (PADEP). The following six PFAS chemicals were reported by TestAmerica: perfluorobutane sulfonic acid (PFBS), perfluoroheptanoic acid (PFHpA), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), PFOA, and PFOS.

In a letter to TestAmerica dated August 28, 2019, the PADEP suspended TestAmerica's accreditation for PFAS analysis using EPA Method 537, effective September 6, 2019. NAVFAC subsequently rejected the sample results for all samples analyzed between August 28, 2019 (the original date of the PADEP notification), through October 18, 2019. The rejected results are not included in Table 1 Results Summary.

Tetra Tech prepared an FTMR for the Draft SAP in October 2019, which proposed the use of Battelle Norwell Operations (Battelle) of Norwell, Massachusetts, for drinking water sample analysis using EPA Method 537.1 (Tetra Tech, 2019). Vista Analytical Laboratory of El Dorado Hills, California, was identified as an alternative PADEP-certified laboratory.

NAVFAC approved the FTMR on November 12, 2019, and sampling activities resumed on November 26, 2019. Samples collected from November 26, 2019, through December 18, 2019, were analyzed by Battelle using EPA Method 537.1. Results

reported by Battelle included the six PFAS chemicals reported by TestAmerica plus the following 12 PFAS chemicals: 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS), 4,8-dioxa-3H-perfluorononanoic acid (ADONA), 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid (9Cl-PF3ONS), hexafluoropropylene oxide dimer acid (HFPO-DA), n-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA), n-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA), perfluorodecanoic acid (PFDA), perfluorododecanoic acid (PFDoA), perfluorohexanoic acid (PFHxA), perfluorotetradecanoic acid (PFTEA and PFTA), perfluorotridecanoic acid (PFTrDA), and perfluoroundecanoic acid (PFUnA). As of December 31, 2019, 23 of the 96 samples rejected by NAVFAC had been resampled. The resampling effort will continue into 2020 with Battelle conducting the analysis.

3.0 DATA VALIDATION

The data for these analyses were reviewed in accordance with the EPA guidance on methods 537 and 537.1 (USEPA, 2009, 2018) and the EPA National Functional Guidelines for Superfund Organic Data Review (USEPA, 2017), as applicable, and validated by Tetra Tech.

The validated data were compared against the EPA-issued lifetime HALs of 70 ng/L (or 0.07 micrograms per liter) for PFOS and PFOA (USEPA, 2016). One ng/L is equivalent to one part per trillion. When both PFOS and PFOA are found in drinking water, the combined concentrations are compared with the 70 ng/L HAL.

4.0 RESULTS

A summary of validated PFAS laboratory results is presented in Table 1. Preliminary analytical data packages and validated analytical data packages can be found on the enclosed CDs. A total of 128 PFAS samples were collected from 86 private water well locations. The combined PFOS and PFOA concentration in only one sample (82.1 ng/L in WGNA-040419-RW-4823) exceeded the HAL of 70 ng/L (Table 1).

Twenty-five of the 86 private water wells sampled contained combined concentrations of PFOS and PFOA greater than 40 ng/L. NAVFAC will continue to sample these 25 wells on an approximately quarterly basis. The combined PFOS and PFOA concentrations in samples collected from the remaining 61 private water well locations were less than 40 ng/L.

5.0 REFERENCES

Tetra Tech, 2017. *Draft Sampling and Analysis Plan (Field Sampling and Quality Assurance Project Plan) for Private Well Sampling Former Naval Air Station Joint Reserve Base Willow Grove, Horsham, Pennsylvania and Former Naval Air Warfare Center Warminster, Warminster, Pennsylvania*. Prepared for NAVFAC by Tetra Tech, Inc., Norfolk, VA.

Tetra Tech, 2019. *Field Task Modification Request Form #3228 for Draft Sampling and Analysis Plan (Field Sampling and Quality Assurance Project Plan) for Private Well Sampling Former Naval Air Station Joint Reserve Base Willow Grove, Horsham, Pennsylvania and Former Naval Air Warfare Center Warminster, Warminster, Pennsylvania*. Prepared for NAVFAC by Tetra Tech, Inc., Norfolk, VA.

USEPA (United States Environmental Protection Agency), 2009. *Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS), Method 537*. EPA/600/R-08/092. United States Environmental Protection Agency, Washington, DC.

USEPA, 2016. PFOA & PFOS Drinking Water Health Advisories Fact Sheet. United States Environmental Protection Agency, Washington, DC.

USEPA, 2017. *USEPA National Functional Guidelines for Superfund Organic Methods Data Review (SOM02.4)*. EPA-540-R-2017-002. United States Environmental Protection Agency, Washington, DC.

USEPA, 2018. *Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS), Method 537.1*. EPA/600/R-18/352. United States Environmental Protection Agency, Washington, DC.

**Table 1: 2019 Private Well Sampling Results
Former Naval Air Station Joint Reserve Base Willow Grove
Horsham, Pennsylvania**

Sample Number	Location	Sample Date	PFBS	PFHPA	PFHXS	PFNA	11CL-PF3OUDS	ADONA	9CL-PF3ONS	HFPO-DA	NEFOSAA	NMeFOSAA	PFDA	PFDOA	PFHXA	PFTFA	PFTDA	PFUNA	PFOA	PFOS	Combined PFOS + PFOA	
EPA Lifetime Health Advisory Level:			NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	70	70	70	
Units:			ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
WGNA-070919-RW-4852	4852	7/9/2019	5.22	3.43 J	3.1 J	1.24 J	-	-	-	-	-	-	-	-	-	-	-	-	-	9.79	6.81	16.6
WGNA-011519-RW-4853	4853	1/15/2019	1.83 J	3.02 J	2.65 J	2.91 J	-	-	-	-	-	-	-	-	-	-	-	-	-	10.5	11	21.5
WGNA-062419-RW-4853		6/24/2019	1.83 J	3.66 J	2.27 J	2.65 J	-	-	-	-	-	-	-	-	-	-	-	-	-	11.7	9.1	20.8
WGNA-051419-RW-4854	4854	5/14/2019	U	U	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	U	U	U
WGNA-051619-RW-4854		5/16/2019	1.28 J	U	0.757 J	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	1.87 J
WGNA-051319-RW-4855	4855	5/13/2019	10.4	3.27 J	6.25	1.33 J	-	-	-	-	-	-	-	-	-	-	-	-	-	13.9	15.8	29.7
WGNA-052919-RW-4857	4857	5/29/2019	1.64 J	3.58 J	6.89	0.606 J	-	-	-	-	-	-	-	-	-	-	-	-	-	4.77 J	8.27	13.04
WGNA-080819-RW-4857		8/8/2019	1.92 J	3.38 J	6.73	0.674 J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.97 J	7.98
WGNA-070119-RW-4858	4858	7/1/2019	8.53	6.71	5.5	1.87 J	-	-	-	-	-	-	-	-	-	-	-	-	-	23.3	21.6	44.9
WGNA-080119-RW-4859	4859	8/1/2019	5.28	3.16 J	4.2 J	0.505 J	-	-	-	-	-	-	-	-	-	-	-	-	-	9.03	2.88 J	11.91

Data Qualifiers:

J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample, due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit.

U = The analyte was analyzed for, but was not detected, at a level greater than or equal to the level of the adjusted method detection limit for sample and method.

Notes:

Bolded and shaded values exceed the EPA lifetime health advisory level.

D = Duplicate.

EPA = Environmental Protection Agency.

ng/L = Nanograms per liter.

NS = No standard.

11Cl-PF3OUdS = 11-chloroheptacosafuoro-3-oxaundecane-1-sulfonic acid.

9Cl-PF3ONS = 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid.

ADONA = 4,8-dioxa-3H-perfluorononanoic acid.

HFPO-DA = Hexafluoropropylene oxide dimer acid.

NEFOSAA = N-ethyl perfluorooctanesulfonamidoacetic acid.

NMeFOSAA = N-methyl perfluorooctanesulfonamidoacetic acid.

PFBS = Perfluorobutanesulfonic acid.

PFDA = Perfluorodecanoic acid.

PFDoA = Perfluorododecanoic acid.

PFHpA = Perfluoroheptanoic acid.

PFHxA = Perfluorohexanoic acid.

PFHxS = Perfluorohexanesulfonic acid.

PFNA = Perfluorononanoic acid.

PFOA = Perfluorooctanoic acid.

PFOS = Perfluorooctanesulfonic acid.

PFTA = Perfluorotetradecanoic acid.

PFTDA = Perfluorotridecanoic acid.

PFUnA = Perfluoroundecanoic acid.