PFAS Groundwater and Drinking Water Tested Analytes at Twelve (12) Release/Use Sites in the United States from 2016 - 2018

Prepared by CSWAB.org – Updated May 26, 2018

Tested and/or Detected Analyte	EPA Drinking Water Method 537 (14)	U.S. Army Reserve Fort McCoy, WI *(3 AFFF Fire Training Burn Pits)*		Naval Air Station Whidbey Island Coupeville, WA *(multiple AFFF sites)*		Ansul/Tyco Fire Training Center,WI *(AFFF fire training, manufacture)*		Peterson Air Force Base, Colorado Springs, CO *(AFFF)*		Pease Air Force Base, Portsmouth, NH *(AFFF)*		Wurtsmith Air Force Base, Oscoda, MI *(AFFF fire training & other)*		Grayling Army Airfield, Grayling, MI *(AFFF & other)*		George Air Force Base, Victorville, CA *(AFFF fire training)*		Eglin Air Force Base, Valparaiso, FL *(AFFF & other)*		Eielson Air Force Base, Fairbanks, AK *(AFFF)*		Saint-Gobain Perfomance Plastics, Merrimack NH *(NON-AFFF site)*		Volk Field Air National Guard (Camp Douglas), WI *(AFFF)*	
		Ground-water (8)	Drinking Water* (6)	Ground-water (14)	Drinking Water (14)	Ground-water (19) *All detected*	Drinking Water (6)	Ground-water (3)	Drinking Water (18)	Ground-Water (23)	Drinking Water (23)	Ground-water (14)	Drinking Water (21)	Ground-water (21)	Drinking Water (21)	Ground-water *14 planned*	Drinking Water	Ground-water (16)	Drinking Water	Ground-water (18)	Drinking Water (2)	Ground-water (33)	Drinking Water (33)	Ground-water (18)	Drinking Water
PFBA		X				X			X	X	X		X[A]	X	X					X		X	X	X	
PFBS	X	X	X	X	X	X	X	X	X[B]	X	X	X	X	X	X	X		X		X		X	X	X	
PFPeA		X				X			X	X	X		X[A]	X	X							X	X		
PFPeS																						X	X		
PFHxA	X	X		X	X	X			X	X	X	X	X	X	X	X		X		X		X	X	X	
PFHxS	X	X	X	X	X	X	X		X[B]	X	X	X	X	X	X	X		X		X		X	X	X	
PFHpA	X	X	X	X	X	X	X		X[B]	X	X	X	X	X	X	X		X		X		X	X	X	
PFHpS						X			X	X	X		X	X	X							X	X		
PFOA	X	X	X	X	X	X	X	X	X[B]	X	X	X	X	X	X	X		X		X	X	X	X	X	
PFOS	X	X	X	X	X	X	X	X	X[B]	X	X	X	X	X	X	X		X		X	X	X	X	X	
PFNA	X		X	X	X	X	X		X[B]	X	X	X	X	X	X	X		X		X		X	X	X	
PFNS																						X	X		
PFDA	X			X	X	X			X	X	X	X	X	X	X	X		X		X		X	X	X	
PFDS						X			X	X	X		X	X	X					X		X	X	X	
PFUnA/PFUnDA	X			X	X	X			X	X	X	X	X	X	X	X		X		X		X	X	X	
PFUnS/PFUnDS																									
PFDoDA/PFDoA	X			X	X	X			X	X	X	X	X	X	X	X		X		X		X	X	X	
PFDoDS/PFDoS																						X	X		
PFTrDA/PFTriA	X			X	X	X			X	X	X	X	X	X	X	X		X		X		X	X	X	
PFTrDS																									
PFTeDA/PFTeA/PFTA	X			X	X	X			X	X	X	X	X	X	X	X		X		X		X	X	X	
PFTeDS																									
PFOSA/FOSA						X			X	X	X		X	X	X					X		X	X	X	
4:2 FTS																									
4:2 FTTAoS						See note																			
6:2 FTS						X			X	X	X			X	X			X		X				X	
6:2 FTTAoS						See note																			
8:2 FTS						X			X	X	X			X	X			X		X				X	
8:2 FTTAoS						See note																			
NEtFOSAA/EtFOSAA	X			X	X							X	X[A]			X		X				X	X		
NMeFOSAA/MeFOSAA	X			X	X							X	X[A]			X		X				X	X		
EtFOSA										X	X														
EtFOSE										X	X														
MEFOSA										X	X														
MEFOSE										X	X														
PFHxDA													X[A]	X	X							X	X		
PFODA													X[A]	X	X							X	X		
6:2 FTTHN																									
6:2 FTSaB																									
8:2 FTSAa																									
10:2 FTSaB																									
12:2 FTSaB																									
6:2 FTSaAm																									
8:2 FTSaAm																									
5:1:2 FTB																									
7:1:2 FTB																									
9:1:2 FTB																									
5:3 FTB																									
7:3 FTB																									
9:3 FTB																									
4:2 FTSA																						X	X		
6:2 FTSA																						X	X		
8:2 FTSA																						X	X		
PFPA																				X				X	
10:2 FTSA																						X	X		
NEtPFOSA																						X	X		
NMePFOSA																						X	X		
NMePFOSAE																						X	X		
NEtPFOSAE																						X	X		
HFPODA																						X	X		

Analyte List undecided pending groundwater PFAS test results.

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Work plans and analysis of susceptible drinking water wells currently pending.

TABLE KEY:

AFFF = Aqueous Film Forming Foam

Black cell with white text Polyfluorinated chemicals that are known constituents of fluorotelomer-based AFFFs. Source: SERDP Final Report, ER-2128/ER-2128, page 17.

Blank cell = not tested

PFAS = per- and polyfluoroalkyl substances

Red font = Six PFAS included in EPA UCMR testing of public drinking water supplies

X = media tested for this parameter

X[A] = Tested by State, not military

X[B] = PFAS analytes that are monitored by nearby local and county water districts (6 of 18 monitored by the Air Force)

***** Fort McCoy North Post drinking water system last tested in 2013 by EPA. South Post never tested for PFAS

Reference for PFAS Acronyms: https://pfas-1.itrcweb.org/acronyms/?print=pdf

NOTE on FTTAoS: FTTAoS are present in several widely used Aqueous Film Forming Foam (AFFF) formulations made by at least three manufacturers (i.e., Ansul, Chemguard, and Angus) and were used as early as 1984. At sites where the application of FTTAoS-containing AFFF was known to occur, concentrations of FTTAoS in groundwater may differ from measured concentrations of fluorotelomer sulfonates (FTS). Notably absent from testing at the Ansul site.

General References:

- ATSDR https://www.atsdr.cdc.gov/pfas/atsdr_sites_involvement.html
- Harding-Marjanovic, K.S. et al, *Aerobic Biotransformation of Fluorotelomer Thioether Amido Sulfonate (Lodyne) in AFFF-Amended Microcosms*, 2015.
- https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Groundwater/Emerging-Issues/ER-2128/ER-2128,click on "Final Report", Table 3 page 17.
- https://denix.osd.mil/edqw/home/april-2015-emdq-workshop/april-2015-what-s-new/field/
- https://dspace.library.colostate.edu/bitstream/handle/11124/78289/McGuire_mines_0052N_10087.pdf?sequence=1
- https://pdfs.semanticscholar.org/a866/41130e0674647d6bba2064bf6e5af025a1b0.pdf
- EPA Region 5. http://apps.nelac-institute.org/nemc/2017/docs/pdf/Tuesday-Characterization%20of%20Polyfluoroalkyl%20Substances%20in%20the%20Environment-9.1-Zintek.pdf
- http://www.newmoa.org/events/docs/239/PFAS_FateTransportWebinarNov2016.pdf
- http://www.emergingcontaminants.eu/application/files/8114/5217/1298/08_Presentation_PFAS_Analytical_CH2M_2015.pdf (slide 8)
- Department of Army sites: https://denix.osd.mil/army-pfas/home/homepage-documents/pfas-factsheet/
- Six PFAS EPA UCMR: https://www.epa.gov/pfas/pfas-laws-and-regulations
- "Detection method in UCMR3 is not low enough for health relevant levels." See: https://www.northeastern.edu/environmentalhealth/wp-content/uploads/2017/03/Source-identification-Sunderland.pdf

Naval Air Station Whidbey, WA

- https://www.navfac.navy.mil/content/dam/navfac/NAVFAC%20Atlantic/NAVFAC%20Northwest/PDFs/About%20Us/PFAS%20Groundwater%20and%20Drinking%20Water%20Investigation/nw_Final_Expedited_SAP_Ault_Field_2.5.2018_Redacted.pdf, 2017 work plan, page 33 indicates EPA Method 537.1.1.
- https://www.navfac.navy.mil/content/dam/navfac/NAVFAC%20Atlantic/NAVFAC%20Northwest/PDFs/About%20Us/PFAS%20Groundwater%20and%20Drinking%20Water%20Investigation/nw_Final_Off-Base_Drinking_Water_%20PFAS_SAP_redacted.pdf, October 2017

Peterson Air Force Base, Colorado Springs, CO

- D.M. Rodriguez, Deputy Base Civil Engineer, Department of the Air Force, 21st Space Wing, correspondence to Susan Gordon, RE: Testing of Water following Granula Activated Carbon – Installation Results, 3 April 2017.
- U.S. Army Corps of Engineers, Final Site Inspection Report of Aqueous Film Forming Foam Areas at Peterson Air Force Base, El Paso County, Colorado, July 2017.

Wurtsmith Air Force Base, MI

- http://www.michigan.gov/documents/mdch/Letter_to_DEQ_Drinking_Water_498033_7.pdf
- http://afcec.publicadmin-record.us.af.mil/LI7OLvqYUfD0QjP_Fn7W3ARYGpSOA6EJIOqzaUnSwm81/540414.pdf

Camp Grayling, MI

- Per email to L. Olah, CSWAB from state environmental regulators

George Air Force Base, CA

- https://geotracker.waterboards.ca.gov/regulators/deliverable_documents/4724318563/AR_541840_Pt1.pdf
- https://geotracker.waterboards.ca.gov/regulators/deliverable_documents/2918457508/George%5FUFPQAPPAddendum%5FDraftFinalRedline%2Epdf
- https://geotracker.waterboards.ca.gov/regulators/deliverable_documents/4724318563/AR%5F541840%5FPt1%2Epdf
- U.S. Air Force, Draft Final, Former George Air Force Base, Site Inspection of Potential Perfluorinated Compound, QAPP Worksheet #11, March 2017.

Eglin AFB, FL

- Site Inspection of AFFF Release Areas, Final Installation -Specific Work Plan, Eglin AFB, Page 26, December 2017.

Eielson Air Force Base, Fairbanks, AK

- Email communications with Alaska Dept of Environmental Conservation, April 2018.

Pease Air Force Base, NH

- Airforce Civil Engineer Service, Draft Optimization Completion Report, Site 8, AT008, Fire Department Training Area 2 (NHDES Site No. 100330508) Groundwater Treatment System, Former Pease Air Force Base, New Hampshire, Table 5, February 2016.
- City of Portsmouth, Summary of PFC Analytical Results, Public Water Supply Monitoring Program, Table 1, Former Pease Air Force Base, New Hampshire http://files.cityofportsmouth.com/publicworks/PeaseWellPFCResultsthru01_26_2016.pdf

Saint-Gobain Performance Plastics, NH

- Jim Martin, New Hampshire Department of Environmental Services, telephone conversation with L. Olah, CSWAB, May 8, 2018.
- DES Waste Management Division, Work Plan for 2018 Stormwater and Surface Water Investigation, Saint-Gobain Performance Plastics, 701 Daniel
- Webster Highway, Merrimack, New Hampshire 03054, NHDES Site No.: 199712055, Project Number: 36430

Volk Field Air National Guard, WI

- https://cswab.org/wp-content/uploads/2018/03/Volk-Field-Air-National-Guard-PFAS-Firefighting-Foam-Release-Report-2017.pdf

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Citizens for Safe Water Around Badger

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Community Priorities and Objectives

for Test Methods and Remedies at Known and Potential PFAS Sites

prepared by CSWAB.org for the

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BACKGROUND:

Observed Deficiencies and Inequities in Drinking Water and Groundwater Testing for PFAS (*see enclosed table*)

- Applied test methods were all designed to measure a discrete list of only a handful of the estimated 3,000 PFAS in production. Additionally, the variance in the number of PFAS analytes was significant – ranging from only 2 to 33.
- In many communities, analysis of groundwater was far more comprehensive than drinking water analysis. In the case of the Ansul/Tyco site in Wisconsin, all 19 tested PFAS analytes were detected in groundwater yet nearby drinking water wells were only tested for 6 PFAS analytes. In such cases, the potential for under-identifying affected drinking water wells and errors in defining groundwater contaminant plume margins could be significant.
- While this survey is limited in terms of the number of sites, it is evident that certain communities are not being afforded equitable and thorough analysis of their drinking water for PFAS.
- The results beg the question: Are advantaged communities getting better testing than disadvantaged communities?
- There is no standard for the measure of "safe" for drinking water tainted with PFAS – analysis for as little as 2 to 6 analytes is often the determinate for identifying communities, soldiers, and workers that are at risk from exposure via drinking water.

Examples of Areas of Immediate Concern

- **Harmful exposures to PFAS are occurring NOW** via drinking water and other direct routes of exposure.
- **Miscommunication and underestimation of risk** (ie, wells tested for as little as 2 PFAS analytes and are deemed "safe").
- **Lack of transparency**. For example, industry is shielded from disclosing PFAS content, arguing it is proprietary.
- **Disadvantaged and rural communities** are not monitored, tested or investigated equitably.
- **The Department of Defense** is still requiring the use of fluorinated products.

COMMUNITY PRIORITIES AND OBJECTIVES:

1. **Drinking water sources will be tested for all detectable PFAS analytes and precursors** utilizing tools such as the Total Oxidizable Precursor (TOP) Assay to help measure the concentration of non-discrete and difficult to measure PFAS compounds, in addition to conventional analytical methods. Currently is it not unusual for the military and other responsible parties to rely on testing for as few as two PFAS analytes (PFOA/PFOS) as the basis for critical decision-making. (See enclosed table.)
2. **When off-site contamination is discovered or suspected, the military and responsible parties will no longer be shielded from disclosing PFAS content.**
3. **All communities will receive immediate and commensurate protection and analysis.** For example, the vast majority of public drinking water systems for communities with 10,000 residents were not included in UCMR monitoring.
4. **Congress will mandate, by a date certain, that the Department of Defense (DoD) convert to all non-fluorinated alternatives.** DoD is the appropriate place to start as 75% of known PFAS sites are military and significant federal funding is currently being directed to DoD. Technological advancements made by DoD will benefit industry and communities alike.
5. **Affected communities will be empowered and engaged by designating a percentage of federal funding** for communities to hire INDEPENDENT scientific, technical and health consultants. (In order to remove the burden of administering federal funds, partnerships with ITRC, universities, or other could be considered.)
6. **Environmental test methods will achieve the lowest possible level of detection.**
7. **PFAS cleanup methods and remedies will be** fully protective of human and ecological health, prevent toxic emissions, be readily and effectively monitored, provide long term effectiveness and permanence, will not create more toxic by-products and PFAS wastes that do not already have an authorized treatment plan, and will be accepted by communities, tribes and indigenous peoples who are both directly and indirectly impacted.
8. **Responsible parties will be accountable for life-time costs associated with selected remedies.**