PFAS

Introduction to Per- and Polyfluoroalkyl Substances



WHAT ARE PFAS?

 Per- and Polyfluoroalkyl Substances (PFAS) are a class of man-made fluorinated organic chemicals that includes **Perfluorooctane sulfonic acid (PFOS)** and **Perfluorooctanoic acid (PFOA),** and many other chemicals.





WHAT ARE PFAS?

Chemical	Chemical	Chemical		
N-ethyl perfluoroocatnesulfonamidoacetic acid	Perfluorononanoic acid	Perflurobutanoic acid		
N-methyl perfluorooctancesulfonamidoacetic acid	Perfluorooctanesulfonic acid	Perfluorononanesulfonic acid		
Perfluorobutanesulfonic acid	Perfluorooctanoic acid	Perfluoroheptanesulfonic acid		
Perfluorodecanoic acid	Perfluorotetradecanoic acid	Perfluoropentanesulfonic acid		
Perfluorododecanoic acid	Perfluorotridecanoic acid	Perfluorooctanesulfonamide		
Perfluoroheptanoic acid	Perfluroundecanoic acid	Fluorotelomer sulphonic acid 8:2		
Perfluorohexanesulfonic acid	Perfluoropentanoic acid	Fluorotelomer sulphonic 6:2		
Perfluorohexanoic acid	Perfluorodecanesulfonic acid	Fluorotelmer sulphonic acid 4:2		



CHEMICAL STRUCTURE





SOURCES AND CHARACTERISTICS

- Incredibly stable, meaning they break down very slowly in the environment
- Bioaccumulate, meaning they take a long time (years) to leave the body.
- Highly resistant to water, grease and stains, a characteristic that explains why they were widely used in carpets, clothing, furniture fabric, food packaging, and cookware
- PFOA was used to make Teflon
- PFOA and PFOS are components of firefighting foam used at airfields







REGULATIONS

- PFAS are unregulated contaminants
- Water Research Study 2009
- Unregulated contaminants require that GLWA collect data and report that data to MDEQ and EPA. They then combine that data with other research to make a determination about potential future drinking water regulations regarding the contaminants
- May 2016 EPA established a Lifetime Health Advisory (LHA) for PFOS and PFOA at 70ppt
- UCMR results since 2013





RESULTS

In our 2017-2018 round of drinking water system screenings, GLWA is pleased to assure the public that these chemicals were not detected. This means that PFAS levels were below that which is measurable under the EPA's standard analytical methodology for the detection of the compounds.

od 537	ified EPA Meth	Modi							Blank	Sample ID: Method J
					ratory Data	Lab				Client Data
	BEILC18	Column:	BLK1	B8A0140-	sample:	Lab	Aqueous	Matrix:	akes Water Authority	Name: Great I
									Project: GLWA-PFAS Lake Huron WTP	
Dilutio	Analyzed	Samp Size	Extracted	Batch	Qualifiers	RL		Cone. (ng/L)		Analyte
1	30-Jan-18 20:44	0.2501.	25-Jan-18	B8A0140		2.00		ND		PEBA
1	30-Jan-18 20:44	0.2501.	25-Jan-18	B8A0140		2.00		ND		PFPeA
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		PFBS
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		PETIXA
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		PEHpA
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		PFHxS
1	30-Jan-18 20:44	0.2501.	25-Jan-18	B8A0140		2.00		ND		6:2 FT8
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		ργολ
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		PFIInS
1	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140		2.00		ND		PEOS
1	30-Jan-18 20-44	0.2501.	25-Jan-18	B8A0140		2.00		ND		PENA
1	30-lan-18 20-44	0.2501.	25-Jan-18	B8A0140		2.00		ND		PEDA
1	30-hn-18 20-44	0.2501	25-Jan-18	B8A0140		2.00		ND		8-2 FTS
i	30-hn-18 20:44	0.2501	25-hn-18	B8A0140		2.00		ND		PEOSA
i	30-Jan-18 20-44	0.250 L	25.Jan. 18	B8A0140		2.00		ND		MeFOSAA
i	30-Jan-18 20-44	0.2501	25-Jan-18	B8A0140		2.00		ND		PEDS
i	30-lan-18 20:44	0.2501	25.100.18	B8A0140		2.00		ND		PELINA
1	30 Jan 18 20-44	0 250 1	25 Jun 18	129 40140		2.00		ND		L'HANNE & A
i	30- han-18 20:44	0.2501	25 Jan 18	138A0140		2.00		ND		PITDA
1	30-Jan-18 20:44	0.250 L	25. Lun. 19	D0/10/140		10.0		ND		MEOSA
- 1	30-Jan-18 20:44	0.250 L	25-Jan-18	D0/10140		10.0		ND		MEOSE
1	30 Jan 18 20:44	0.250 L	25 Jan 19	D0/10140		2.00		ND		DETADA
_	20 ha 18 20.44	0.2501.	25-Jun-18	129 4 01 40		10.0		NID		CT III ZA
1	30-Jun-18 20.44	0.250 L	25-Jun-18	129 4 0 1 4 0		10.0		ND		DUPOSE D
- 1	30-321-18 20:44	0.2501	25-Jun-18	D8A0140		2.00		ND		DETUDA
1	30-Jan-18 20:44	0.250 L	25-Jan-18	D8A0140		2.00		ND		PF ICUN DEULIDA
Dilution	Analyzed	Samp Size	Extracted	Batch	Qualifiers	2.00	Limits	% Recovery	Туре	Labeled Standards
1	30-Jun-18 20:44	0.2501	25-Jan-18	B8A0140			60 - 130	99.0	15	I3C3-PERA
1	30-lan-18 20:44	0.2501	25. Jan. 18	B8A0140			60 - 150	104	IS	13C3-PEPeA
i	30-Jan-18 20:44	0.2501	25.Jan-18	138A0140			60 - 150	109	15	13C3-PEBS
1	30-lon-18 20:44	0.2501	25. hm. 18	138 4 0 140			70 - 130	112	15	13C7_PH11vA
1	30-lan-18 20-44	0.250 I	25. Jan. 19	B8A0140			60 - 150	91.4	15	13C4-PEHpA
- î	30-Jan-18 20:44	0.250 L	25-Jan-18	B8A0140			60 - 130	91.3	IS	802-PEHxS
î	30-lan-18 20:44	0.2501	25. Jan-18	B8A0140			40 - 150	79.3	15	3C2-6-2 FTS
- i	30- Jan - 18 20:44	0.2501	25. hn. 18	ISA0140			60 - 130	42.1	15	3C2-PECIA
i	30-lan-18 20:44	0.2501	25. hn. 18	B8A0140			60 - 130	103	15	ISCR-PHOS
- i-	30-lan-18 20:44	0.2501	25. Jan-18	B8A0140			50 - 130	99.7	15	ISCS-PENA
- 1	30-hm-18 20-44	8 250 1	25. Jan. 19	DRAG140	Н		60 - 130	56.4	15	I3C2-PEDA

Source: <u>https://www.glwater.org/update-feeds/statement-glwa-pfas-testing-for-drinking-water-system/</u> "08/01/2018 STATEMENT: GLWA PFAS testing for drinking water system"



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Wastewater PFAS Evaluation Investigation and Reduction



BACKGROUND

- WRRF effluent sample results
 - April & September 2018
 - PFOA 7.5 ng/l, 12 ng/l
 - PFOS 15 ng/l, 13 ng/l
 - *The concentration found in our effluent equate to 29-31 grams of PFOS. (1 nickels weigh 5 grams)
- February 20, 2018
 - MDEQ notified GLWA's IWC to perform a *PFAS Source Evaluation and Reduction* :
 - <u>Evaluate</u> potential sources of PFAS;
 - <u>Investigate</u> probable sources of PFAS;
 - <u>Reduce/Eliminate</u> the sources of PFAS found; and
 - Take other actions to protect surface water quality as needed.
- Water Quality Standards for two PFAS Compounds
 - Perflourooctonoic Acid (PFOA) 420 ng/l (drinking water sources)
 - Perfluorooctane sulfanate (PFOS) 11 ng/l (drinking water sources)
- Available Analytical Methods: ASTM D7979 and USEPA Method 537 (modified)
- GLWA Total Significant industrial User (275 Users)



INVESTIGATION

- Survey Results
 - 15 Users confirmed historical use
 - 10 non responsive
 - GLWA and MDEQ agreed to additional 95 sites based on nature of the industries.
- Procured contract for Laboratory testing
- Developed three categories
 - Potential Significant source
 - Probable Significant Source
 - Significant Source
- Data gathering & Monthly reporting to MDEQ



GROUP 1: LANDFILLS

- 13 Landfills identified as SIUs
 - 5 participating in MDEQ state initiative for landfills with report expected by March 1, 2019
 - 2 landfills sampled to date (Significant sources)
 - 6 additional landfills scheduled for self-monitoring or GLWA sampling

Expectation that all landfills will show positive results for PFOS and/or PFOA



GROUP 2: OTHER SIUS

Industry	# of SIUs	# Sample Collected	# Significant Source	# Not Significant Source	# Pending Results
Petroleum Refining	1	1	1		0
Electroplating & Metalfinishing	23	23	11	8	4
Central Waste Treatment	4	4	4		0
Tank Cleaning	1	1	1		0
Chemical	4	4	2	2	0
Leather Processing	1	1	1		0
Airfields	2	1	1	0	1
Landfills	2	2	2	0	0
Laundry	3	3	2	1	0
Other	4	4	0	4	0
Total w/Data	45		25	15	5



GROUP 3: OTHER

3M – Stores PFAS materials on-site; Disposal to Minneapolis

Racer Trust – Groundwater cleanup in Livonia/ Former GM plating site / PFAS treatment/reduction/elimination plan in progress

Detroit FD – Stores PFAS material at various sites; Disposal of material – currently uses non-PFAS foams for firefighting

Melvindale Event – July release from Norfolk/Southern Property. Enforcement Pending



SO WHAT'S NEXT?

- 1. Continue monthly reporting to the State
- 2. Complete initial sampling and evaluation of Users
- 3. GLWA to host a meeting in December with the industrial users regarding treatment/reduction/elimination plans and requirements
- 4. Develop numerical limits for users and incorporated in to the permits.
- 5. Continue monitoring of WRRF effluent in accordance to MDEQ requirement (Quarterly)
- 6. Developed "Regulatory Language" for PFAS Compounds controls among classes of Users
- 7. Continue close correspondence with MDEQ
 - A. Based on an statewide initiative AECOM will be conducting influent, effluent and biosolids monitoring in the near future



REDUCTION & ELIMINATION STRATEGY - DRAFT

PFAS compounds refer to perfluoroalkyl and polyfluoroalkyl substances that the MDEQ has identified as emerging contaminants. These compounds are not susceptible to municipal treatment resulting in their pass-through to the receiving stream. General discharge prohibition #4 prohibits the discharge of toxic pollutants that cause pass-through. Strategy is:

- Users who discharge detectable levels of PFAS compounds¹ in excess of 420 ngms/l in their wastewater, other than PFOS or PFOA, or store materials containing PFAS compounds, but discharge below the MDEQ Water Quality Standard of 11 ngms/l for PFOS or 420 ngms/l for PFOA, shall be considered as a *potential significant source* of PFAS compounds and a contributor to PFAS pass-through;
- Users who discharge above the MDEQ Water Quality Standard 11 ngms/l for PFOS or 420 ngms/l for PFOA are considered as a *significant source* of PFAS compounds and a *contributor to PFAS pass-through*;
- Both *potential significant sources* and *significant sources* are required to develop and implement a *Best Management Practice Plan* (see below);
- Any contributor to PFAS pass-through who discharges above the compliance standard of 60 ngms/l of PFOS is required to implement appropriate treatment as part of their *Best Management Practice Plan*;
- Any contributor to PFAS pass-through who discharges above the compliance standard of 60 ngms/l of PFOS and elects to ship contaminated wastewater for off-site treatment shall (i) Maintain manifests and other records recording the volume and destinations for treatment; (ii) Develop a self-monitoring schedule to demonstrate effectiveness of elimination of PFAS contaminated waste stream(s); (iii) Implement, as appropriate, on-site treatment, as part of their *Best Management Practice Plan*:
- All other Users are encouraged to develop a *Best Management Practice Plan* applicable to their facility to manage the contribution of PFAS compounds to the sewer system, as appropriate.
- Individual Permits will be modified to incorporate these requirements and any additional requirements, as may be appropriate.

"**Best Management Practice Plan**" or (BMP) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the prohibitions listed in 40 CFR 403.5(a)(1) and (b). BMPs include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.

The term "**Best Management Practice Plan**" includes similarly defined activities including Pollution Prevention Plans and Best Management Practices defined by City of Detroit Ordinance 08-05.

¹ PFAS Compounds refer to the 24 analytes determined by ASTM D7979 or EPA 537 modified



PER- AND POLY- FLUOROALKYL SUBSTANCES (PFAS)

User Class	Permit Controls	Monitoring Requirements	BMP Plan	SPP Plan	Other TBD		
Fire-fighting Foam	Х	Х	Х	Х	Х		
Past-Usage	Х	Х	Х	Х	Х		
Waste Industry	Х	Х	Х	Х	Х		
Storage	Х	Х	Х	Х	Х		
Consumer & General Products					None		
Rules	Developed – Pending Adoption						
X – indicates possible regulatory response							



