



Department of Water and Power

# PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

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# OUTLINE

- PFAS
- PFAS Distribution
- Potential Effects
- Federal and State Regulations
- Sampling Methods
- PFAS Treatment
- PFAS in Corona



# PFAS

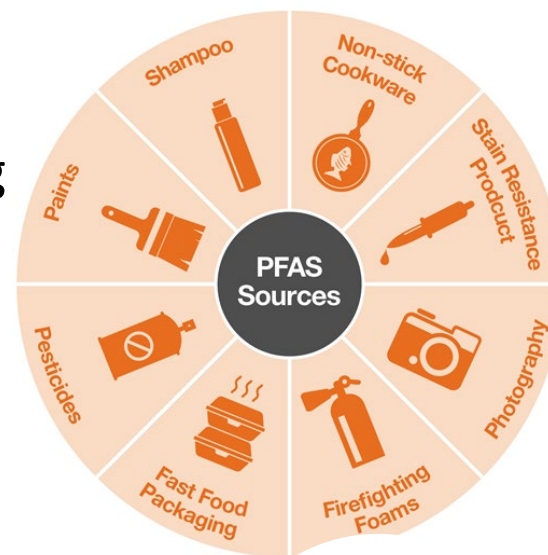
## Per- and Polyfluoroalkyl Substances (PFAS)

PFAS = family of thousands of chemicals, including the following:

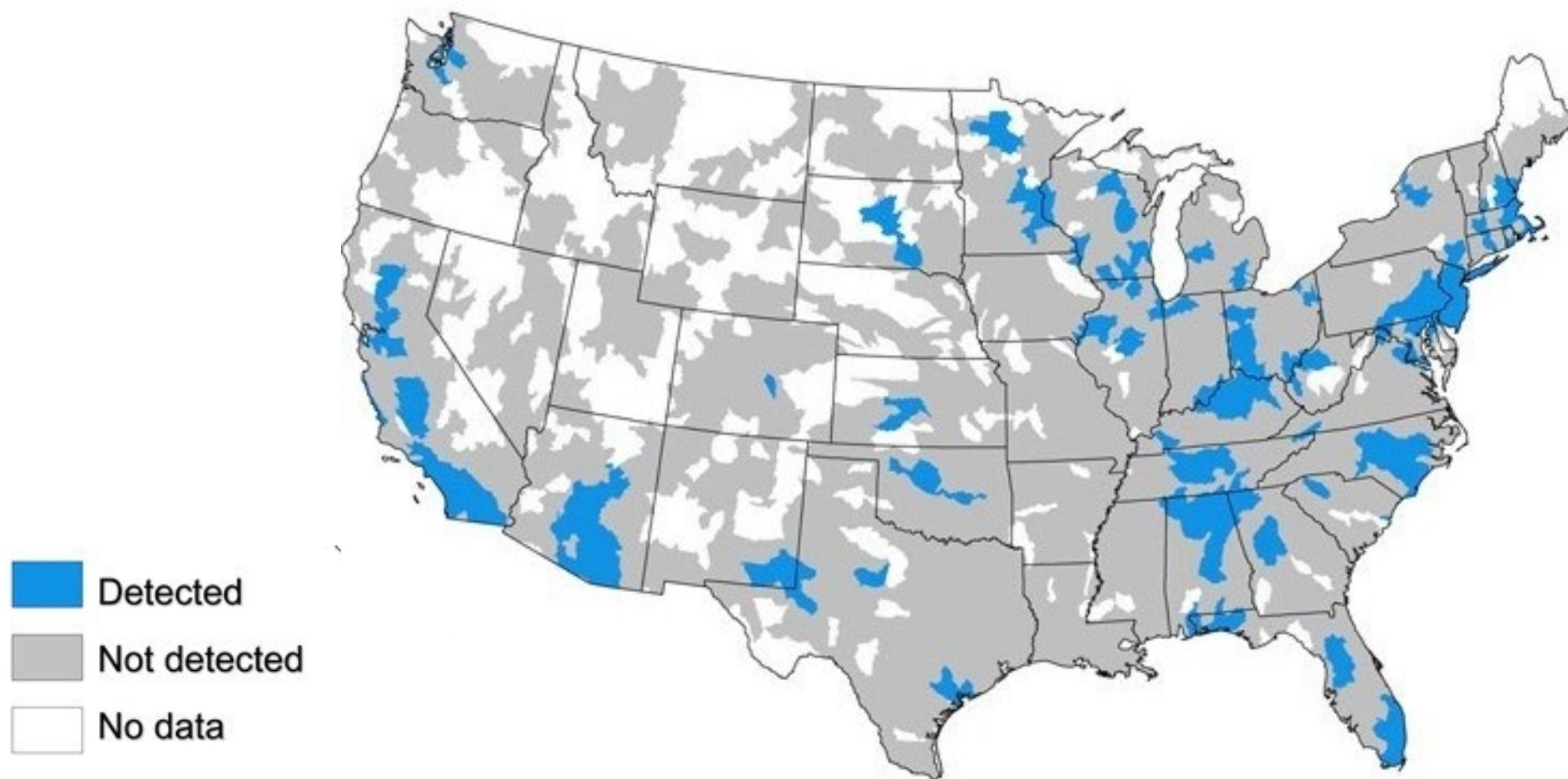
- Perfluorooctanoic acid (PFOA)
- Perfluorooctane sulfonic acid (PFOS)

## PFOA/PFOS Uses

- Aqueous film forming foams (fire fighting foams)
  - Military installations, airports, petroleum refineries, fire fighting training areas
- Production and manufacturing
  - Surfactants, resins, plastics, paper products, textiles, cosmetics
  - Semiconductor industries, chrome plating industries



# PFAS OCCURRENCE IN DRINKING WATER



Source: Hu et al. 2016. Detection of PFAS in U.S. Drinking Water Linked to Industrial Sites. Copyright American Chemical Society.

# POTENTIAL HEALTH EFFECTS

- The persistence, toxicity, and bioaccumulation of individual PFAS compounds can vary widely, and this can make decision-making regarding appropriate actions quite complex.
- Research has shown that there may be health effects associated with exposure to some PFAS but health effects have not been quantified.
- Currently no Federal Regulations for PFAS under the Clean Water Act or Safe Drinking Water Act.

# REGULATIONS

U.S. EPA	U.S. EPA	U.S. EPA	State Water Board – Division of Drinking Water	State Water Board – Division of Drinking Water
2009	2013-2015	2016	2018	2019
Provisional Health Advisory	UCMR 3 – Third Unregulated Contaminant Monitoring Rule	Lifetime Health Advisory	Notification Levels PFOA = 14 ppt PFOS = 13 ppt	Notification Levels PFOA = 5.1 ppt PFOS = 6.5 ppt
PFOA = 400 ppt PFOS = 200 ppt		PFOA+PFOS combined = 70 ppt	Response Level PFOA+PFOS combined = 70 ppt	Response Level PFOA+PFOS combined = 70 ppt

# ANALYTICAL METHODS AND SAMPLING PROCEDURES

- Sampling methods are approved by U.S. EPA after rigorous research
- U.S. EPA only recently approved the newest Method 537.1 for PFAS in drinking water
- PFAS-specific sampling procedures are important
  - For the person pulling the sample and the lab staff analyzing the sample
- Online analyzers for instant reads are not currently available for PFAS



SWRCB DDW PFAS Sampling Guidance  
April 2019

system or to waste (if it has not been in operation recently) at least 15 minutes before sample collection.

Use of a laboratory accredited to analyze for PFAS using EPA Method 537.1 or EPA Method 537 Revision 1.1 is required for samples reported to the Division of Drinking Water. A list of laboratories accredited by the California Environmental Laboratory Accreditation Program (ELAP) can be found at this internet site:

[https://www.waterboards.ca.gov/drinking\\_water/certlic/drinkingwater/PFOA\\_PFOS.html](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/PFOA_PFOS.html)

## AVOID SAMPLE CROSS-CONTAMINATION

PFAS compounds are detected at very low levels (parts per trillion). Therefore, there could be materials used by the sampler, or present at the sampling site, that could contaminate the sample. PFAS are used in many personal care products and in food packaging and wrappers, especially fast food and snack products. As a precaution, all persons involved in the sampling event should minimize exposure to the following products, and ensure proper hand washing at each site and wearing powderless nitrile gloves:

- Minimize use on the day of the sample event, preferably **24 hours prior to the event**:
  - Cosmetics, moisturizers, sun blocks, insect repellants, fragrances, creams, or other personal care products (including hair products). Exceptions: Products that are known to be 100% natural.
- Other items that are likely to contain PFAS and need to be avoided include:
  - Pre-packaged food, fast food or items wrapped in aluminum foil
  - New or unwashed clothing
  - Clothing washed with fabric softeners or dried with anti-static sheets
  - Synthetic water-resistant/or stain-resistant materials (such as waterproof clothing and shoes such as Gore-Tex), waterproof or coated Tyvek® material (special attention to boots)
  - Teflon® and other fluoropolymer containing materials
  - Waterproof /treated paper on field notebooks
  - Waterproof markers (such as Sharpie®, etc.). Indelible pens that are ball point or gel and pencils are acceptable.
  - Adhesive paper products (such as Post-It ®Notes or scotch tape)
  - Sealable bags (e.g., zip-lock ® plastic bags) that are not provided by the laboratory. (Note: only ultra-clean polypropylene or HPDE material sealable bags are allowed)
  - Chemical or blue ice, which may contain PFAS and may not reduce and maintain the temperature of the samples adequately
- Avoid sampling during rain if possible (if necessary please use, vinyl or PVC rain gear)
- Fill gasoline in the vehicle the day before sampling
- No food or beverage should be consumed in the sample site area. If food, drink or other activities, such as smoking, are necessary during the sampling event, first move away

# CORONA WELLS – RAW UNTREATED WATER

Well	PFOS	PFOA	Combined
Well 3			
Well 7A	150	130	280
Well 8A	130	130	260
Well 9A	120	100	220
Well 11A	25	26	51
Well 12A	ND	ND	ND
Well 13			
Well 14	ND	ND	ND
Well 15	22	25	47
Well 17A	210	180	390
Well 19	53	43	96

Well	PFOS	PFOA	Combined
Well 20			
Well 21			
Well 22	42	34	76
Well 25	41	35	76
Well 26	15	14	29
Well 27	ND	ND	ND
Well 28	26	26	52
Well 29			
Well 31	25	27	52
Well 33	ND	4.1	4.1

Values in Parts Per Trillion (ppt). Results listed are the most current results for each sample site; as of 5/21/19. ND or Non-Detect is the lowest value the lab can measure for the particular method used. For PFOA and PFOS the non-detection level is anything less than 2 ppt.

# TREATMENT TECHNOLOGIES

- ✓ Reverse Osmosis
- ✓ Ion Exchange Selective Resin Treatment
  - Resin attracts PFAS molecules based on molecular charge
- ✓ Blending
  - Granular Activated Carbon (GAC)

# CORONA – TREATED WATER

Constituent	Range
PFOA	ND – 6.2 ppt
PFOS	ND – 8.2 ppt
Combined	ND – 14.4 ppt

Values in Parts Per Trillion (ppt). Results listed are the most current results as of 5/21/19. ND or Non-Detect is the lowest value the lab can measure for the particular method used. For PFOA and PFOS the non-detection level is anything less than 2 ppt.

# SUMMARY

- Abundant
- Persistent
- Variable properties and toxicities
- Undeveloped regulatory standards, very low guidance levels
- Sampling and analysis
- Treatment
- Resource allocation

# QUESTIONS?

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