

PFAS Source Control Strategy

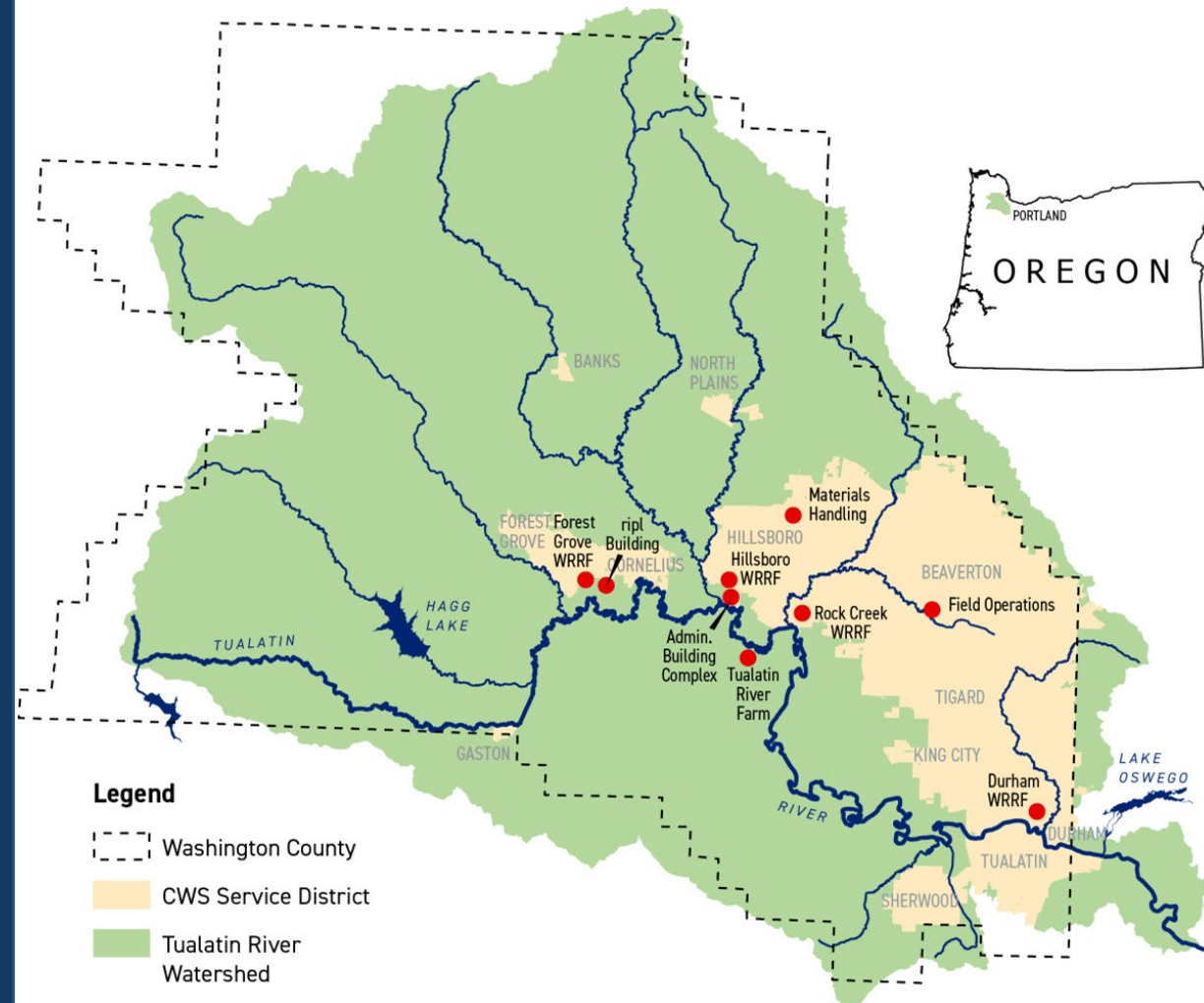
Amanda McGarry – Environmental Services Specialist

Ara Vickers – Environmental Services Specialist

2025 Pacific Northwest Pretreatment Workshop

Clean Water Services (CWS)

- 4 Water Resource Recovery Facilities
 - Durham
 - ❖ Average Dry Weather Flow: 20.6 MGD
 - Rock Creek
 - ❖ Average Dry Weather Flow: 32 MGD
 - Hillsboro
 - ❖ Average Dry Weather Flow: 3.3 MGD
 - Forest Grove
 - ❖ Average Dry Weather Flow: 4.3 MGD
- Services 600,000+ homes and businesses
 - Sanitary & Stormwater Conveyance Systems
 - ❖ 1,900 miles of sanitary sewer pipes
 - ❖ 529 miles of stormwater sewer pipes
- Tualatin River watershed
 - Slow moving and sensitive river



Environmental Services Program Overview

Pretreatment Program

- Industrial Pretreatment
 - 28 Local Program Industries
 - 32 SIUs
- Liquid Waste Program
 - 16 FOG Haulers
 - 41 Septage Haulers
- Commercial FOG Program
- Dental Program
- Operational Incident Response
- Temporary Discharge Requests

Stormwater Program

- 1200-Z Industrial Stormwater Agent
 - 74 Permitted Industries
 - 167 NECs
- Illicit Discharge Detection and Elimination Response
- Water Quality Investigation
- Commercial/ Industrial Stormwater Program
 - PFAS
 - 6PPD-Q
- Private Water Quality Facility Inspection



Per- and Polyfluoroalkyl Substances (PFAS)

- Large chemical class
 - ~15,000 compounds
 - 40 measurable by EPA Method 1633
 - ❖ Aqueous, Solid, Biosolids, and Tissue
- Developed in the 1940s
 - PFOA and PFOS
 - ❖ 2010/2015 Voluntary PFOA Stewardship Program
 - ❖ Restricted or banned globally
 - ❖ Transition to “shorter”-chained PFAS
 - Other PFAS chemicals still widely used and unregulated
- Characteristics
 - Thermal and chemical stability
 - Oil and water resistance
- Impact
 - Bioaccumulate
 - Highly mobile (short-chains)
 - Adverse health effects



PFAS Investigation Team – 2019 to Present

- Multi-disciplinary team
 - Water Quality Laboratory
 - Research & Innovation
 - Environmental Services
 - Communication and Community Outreach
 - Planning and Development Services
- Large scope of monitoring
 - Treatment plant and collection system
 - **Industrial and commercial**
 - Rivers, streams, and groundwater
 - Land-applied biosolids
 - Reuse
- Greater purpose
 - Understand occurrence and risk
 - Identify sources
 - Prepare for coming regulations



Source Control Approach

- Early conversations
 - Regulation is likely
 - ❖ Phase out now will help your business for the future
- 2019 - Initial efforts
 - Identify priority sectors
 - ❖ October 2019 – EPA Review of PFAS in Industrial Wastewater Discharged
 - Provided advanced sampling notice
 - Initial sampling round of IUs
 - ❖ 12 sites selected
- 2025 - Ongoing efforts
 - Continued quarterly sampling
 - ❖ PFAS mass discharged
 - ❖ Temporal stability analysis
 - PFAS BMP-type plan development
 - Sector specific outreach materials



Priority Sectors Selected

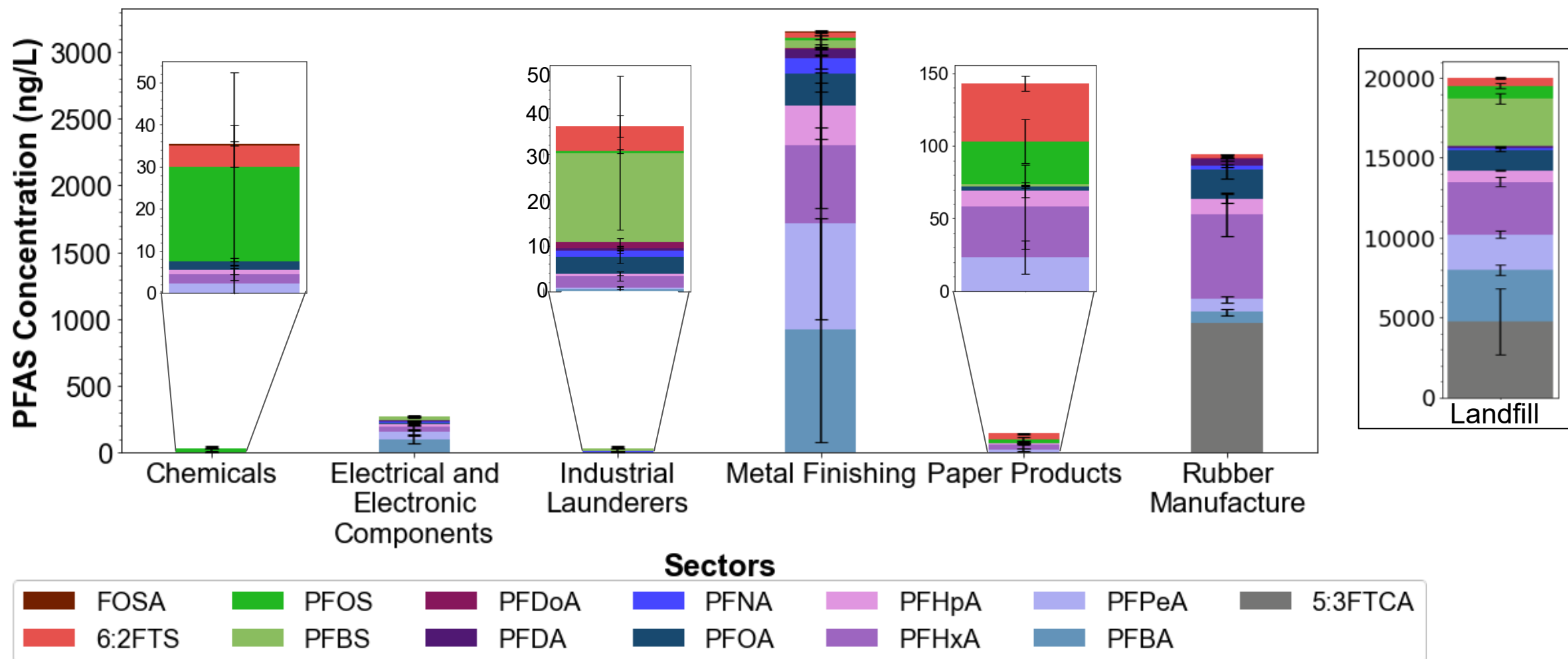
CWS Selected Sites

- **Landfills**
- **Semiconductor manufacturing**
- **Metal finishing and plating**
- **Printed circuit board manufacturing**
- **Industrial launderers**
- Airports
- Rubber manufacturing
- Ink blending and printing
- Chemical blenders

2019 EPA Literature Identified Sites

- Medical
- Organic chemical manufacturers
- Petroleum refineries
- Paper mills and recycling facilities
- Textile mills and leather production
- Automotive and Aviation manufacturing/ repair
- Consumer products
- Cable and Wiring
- Energy
- Fire station and training areas

PFAS Concentrations by Industrial Sector



PFAS Management Plans

Plan ID #XXXXX

PFAS Management Plan

INDUSTRIAL USER:

Industry Name

Address

City, OR zip

CLASSIFICATION:

Categorical/ Significant/ Non-Significant Industrial User: 40 CFR xxx & Local Limits

SOURCE COVERED:

Wastewater generated from xxxxxxx

The following information is required by permit number xxxxxx Section 3.A. Additional Permit Conditions and must be submitted for Clean Water Services approval no later than Month x, 20xx.

• PFAS Management Plan Requirements

- Identify sources
- Identify reduction strategies
- Sample and report
- Treatment *

• Purpose

- Characterize the wastewater
- Understand reduction feasibility
- Prepare industry for regulations

• Outcomes

- Pollution prevention
- Outreach

- 1) Provide a general description of facility operations.
- 2) Provide a detailed description of manufacturing processes that includes the following:
 - a) Manufacturing process diagram (e.g., all inputs from raw material to final product).
 - b) Identify in the manufacturing process where PFAS is known or suspected to be present.
 - c) Identify specifically where PFAS may be present in ancillary processes.
 - d) Identify any potential for PFAS contamination and introduction of PFAS into process wastewater.
 - e) Identify possible sample locations upstream of final discharge to identify where PFAS is introduced within the manufacturing process (e.g., vat 5, tank 3, process line A).
- 3) Provide a PFAS inventory with known or suspected PFAS compounds present, final deposition, and purpose of use.
 - a) Include chemical or product addition sources (e.g., coating, polymer, surfactant, lubricants, or other fluorinated products that impart a low reactivity, thermal stability, waterproofing, or other PFAS characteristic).
 - b) Include potential structural or mechanical sources (e.g., pipes, seals, tapes, or tubing containing PTFE, PVDF, PCTFE, ETFE or other fluorinated compounds).
 - c) Include products used at the facility that may potentially contain PFAS that could reasonably impact wastewater discharged.
 - d) Describe historic PFAS use that includes known or suspected product usage and process location area where PFAS was used.
- 4) PFAS monitoring and sampling plan that includes the following:
 - a) Sampling procedure and specific sampling location(s). Permitted outfall is required.
 - b) EPA Method 1633 with all PFAS compounds analyzed by the method required.
 - c) Grab sample is required.
 - d) Sampling frequency must be annually at a minimum.

Authority to Implement

- December 5, 2022 EPA Memorandum
 - *“Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs”*
- Non-Domestic Waste Ordinance
 - Require monitoring
 - “Pollutants that may pass-through...”
 - Disruption
 - ❖ Can be an enforcement tool in the absence of limits
- Nondomestic Waste Discharge Permits
 - *Additional Permit Conditions*
 - ❖ PFAS Management Plan development requirement



Outreach Materials – Metal Finishing and Semiconductor

- Sector-specific materials in development
 - Sanitary and stormwater focus
 - Highest PFAS-mass discharge sectors targeted
- Primary PFAS Sources in Metal Finishing processes
 - Cleaning components used in semiconductor processes
 - PTFE or other PFAS-containing bath additive for coating
 - Hexavalent chromium fume suppressant
- Primary PFAS Sources in Semiconductor processes
 - Photolithography
 - ❖ Photoresist, anti-reflective coatings, and develop rinse solutions and subsequent processing
 - Plasma-Etch
 - ❖ Generally used in Printed Circuit Board operations
 - ❖ Air abatement wastewater
 - Wet chemical processing
 - ❖ Wet etch, wafer cleaning, CMP processes, slurries and coatings



PFAS IN METAL FINISHING

WHAT ARE PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a large class of synthetic chemicals that are used in products and can provide chemical, heat, oil, or water resistance. Due to the effectiveness of PFAS, the chemicals are used in a variety of applications and have been used in manufacturing processes since the 1940s. PFAS are made to be durable and long-lasting and are often referred to as "forever chemicals." This means they can exist for a long time in the human body and the natural environment. There is growing evidence that exposure to PFAS can impact human health, and some PFAS are linked to cancer. Due to the potential environmental and human health impacts, the federal government is considering and implementing legislation regarding the use, disposal, and regulation of these chemicals. CWS is preparing for the likelihood of increased regulation in the future.

COMMON SECTOR SOURCES OF PFAS

- Hexavalent Chromium fume suppressant used during chrome plating
- Bath additive to impart a PTFE or other PFAS coating
- Plating solution surfactant
- Cleaning and surface finishing of metal components used in semiconductor processes

POTENTIAL STRATEGIES TO REDUCE PFAS INTRODUCTION INTO WASTEWATER

1. **Source identification:** Identify sources of PFAS. Reach out to chemical suppliers and engage with other industry representatives. Look out for chemical names that include the word "fluoro" as these chemicals may be PFAS. Look out for chemicals that have the characteristics of PFAS chemicals including chemical, heat, oil, or water resistance.

Perfluorooctanesulfonic acid (PFOS)



ABOUT CLEAN WATER SERVICES

Clean Water Services (CWS) is a water resources management utility that combines science and nature to clean water and return it to the Tualatin River so it can be used again. We work in partnership with others to safeguard the river's health and vitality, ensure the economic success of our region, and protect public health for more than 600,000 residents and businesses in urban Washington County, Oregon. Since 2019, CWS has collected samples from its water resource recovery facilities and across the sewershed in residential, commercial, and industrial locations, investigating sources of PFAS. CWS is actively surveying and sampling the sewershed and watershed to better understand impacts to public and environmental health.



PFAS IN SEMICONDUCTOR PROCESSES

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COMMON SECTOR SOURCES OF PFAS

1. Photolithography processes such as photoacid generators, surface protectors, photoresists, anti-reflective coatings, and develop rinse solutions.
2. Wet chemical processes such as wet etch, wafer cleaning, chemical mechanical planarization processes and slurries, surface modification treatments, and coatings.
3. Plasma etch processes such as fluorinated etching gases

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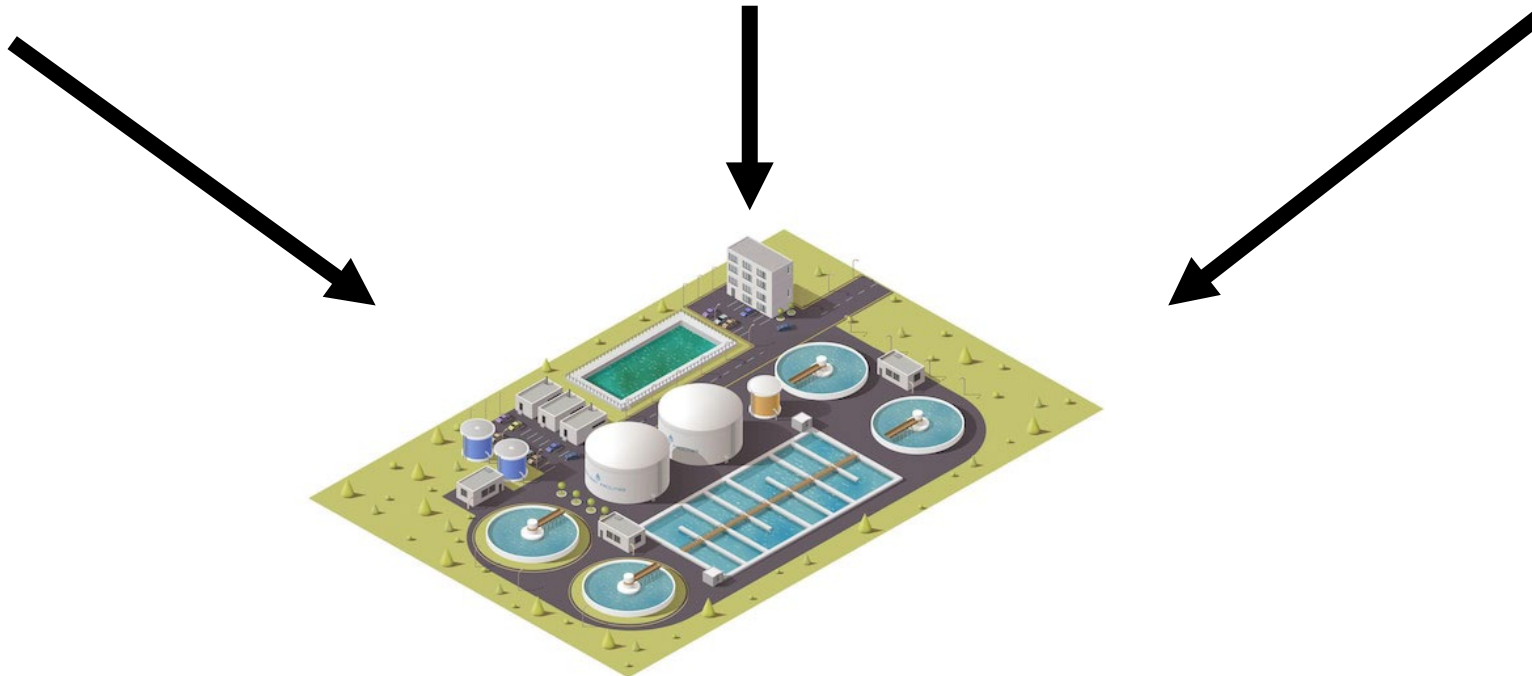
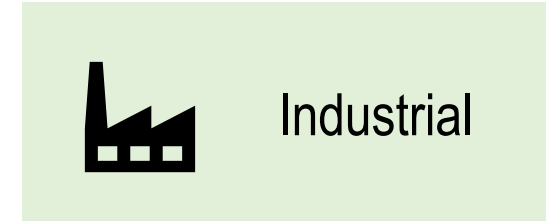


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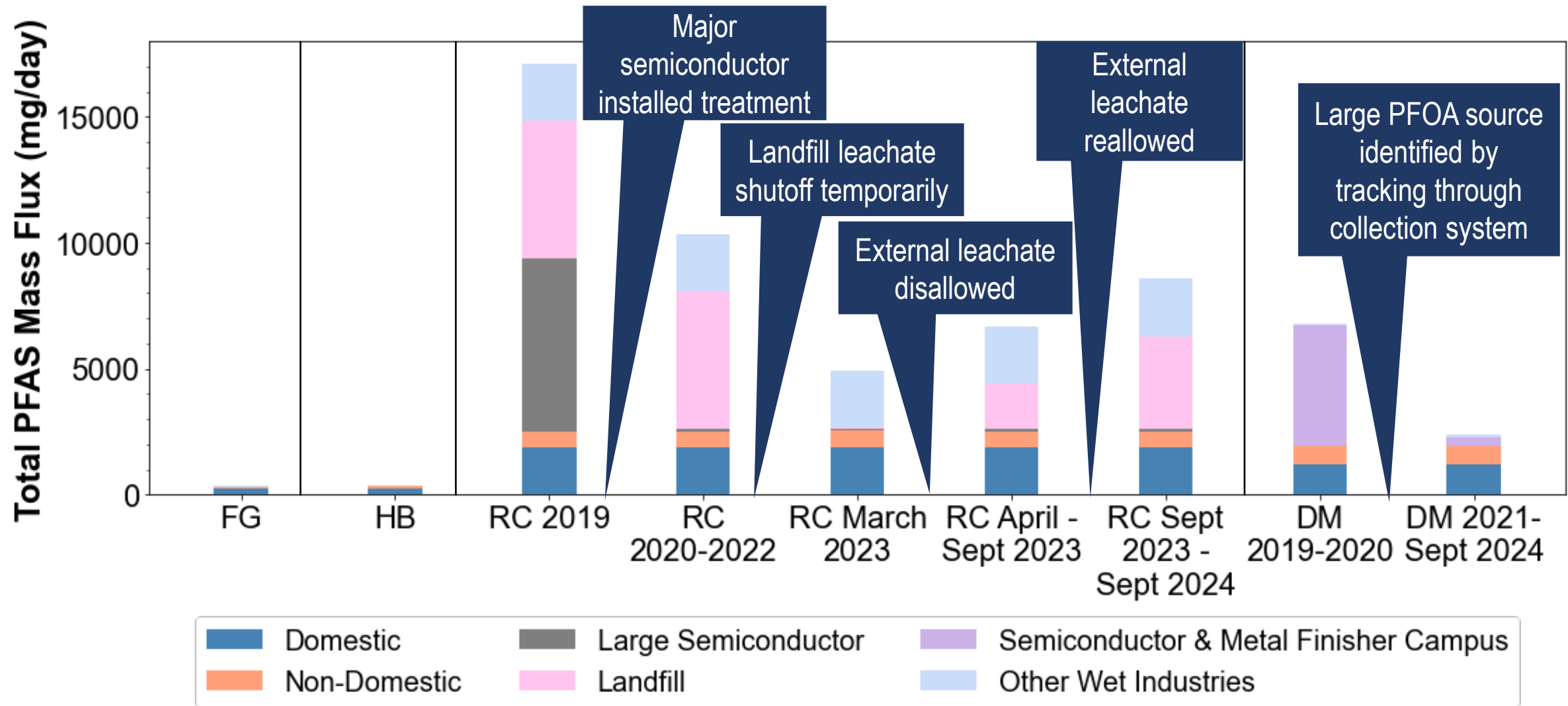
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Sources of PFAS to WRRFs

Dominant source varies by WRRF!

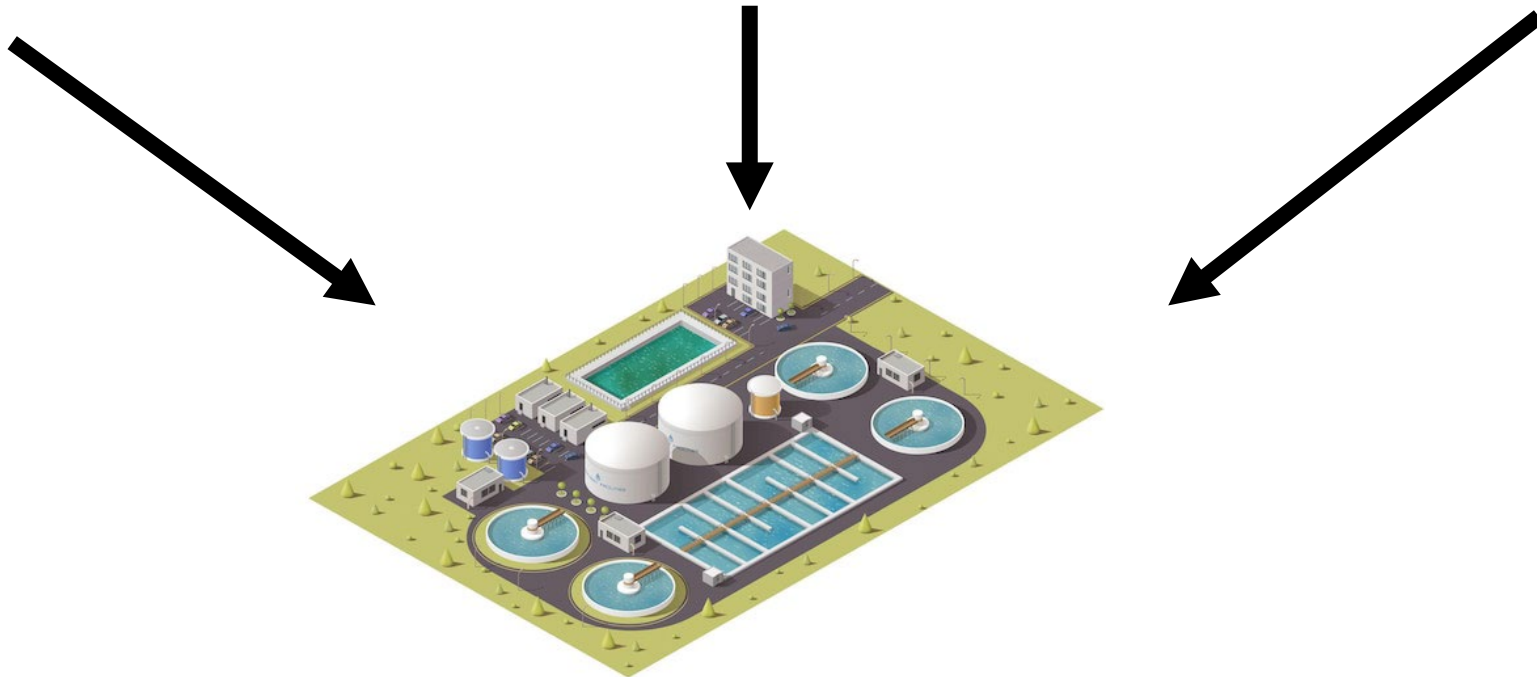
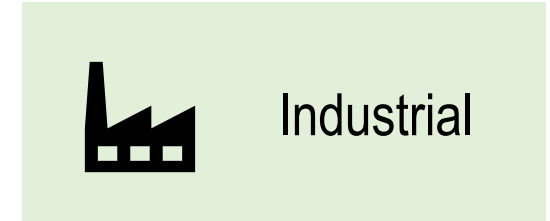


Effects of Source Control Efforts – PFAS Mass Reductions



Sources of PFAS to WRRFs

Dominant source varies by WRRF!



Commercial Approach

- Data Driven
 - Historic stormwater ambient sampling
- Identifying Potential Sources
 - PFAS: Sector-Specific Literature Review
 - 6PPD-Q: Ongoing Analysis
- Industrial and Commercial Facilities Stormwater Strategy (September 2024)
 - Expansion towards addressing emerging contaminants PFAS & 6PPD-Q



Commercial Sectors

- Commercial Priority Sanitary Sectors
 - Car Wash
 - Automotive
 - Painting Booths/Autobody
 - Cleaning Companies
- 8 Commercial Priority Stormwater Sectors
 - Car Wash
 - Construction
 - Automotive
 - Painting Booths/Autobody
 - Fire Departments
 - Cleaning Companies
 - Landscaping
 - Aviation

Appendix A.

Commercial Sources of PFAS Literature Review

Clean Water Services

Ara Vickers

July 8, 2024

Abstract

Per- and polyfluoroalkyl substances (PFAS) are emerging contaminants which threaten human health and natural resources. Clean Water Services is leading an innovative strategy to address PFAS within its jurisdiction. Work is underway to effectively minimize PFAS at an industrial level and opportunity exists to address PFAS contamination of stormwater from commercial sectors. This literature review identifies commonplace commercial sectors with the highest PFAS contamination potential. Commercial sources were analyzed and included based on their potential output of PFAS contamination, regardless of their potential exposure to stormwater, in order to provide a thorough overview of the commercial sector as a whole. However, for the purposes of the commercial stormwater program, potential stormwater exposure to PFAS is analyzed. 12 commercial sources are identified in this literature review from highest to lowest potential stormwater exposure, based on a qualitative analysis of each sector. Among all sources identified, the automotive sector, the autobody sector, the Fire Department, and the landscaping sector are of the highest concern regarding the potential disbursement of PFAS into the stormwater system from commercial sources.

Preparing the Commercial Sector for Regulation

- PFAS Sampling Work
 - Sector-specific stormwater impacts
 - Sector-specific sanitary impacts
 - Ongoing analysis & adaptive management
- Preparing Commercial Sector for Regulation
 - ACWA Outreach Materials
 - PPRC Outreach Materials
 - CWS' PFAS Outreach Materials
 - Sector-specific Checklists
- 6PPD-Q
 - Bias-Analysis
 - Further Analysis

PFAS IN BUSINESSES

WHAT ARE PFAS?

Per- and polyfluoroalkyl substances (PFAS), also known as "forever chemicals", are a family of human-made chemicals used to make products that resist heat, oil, stains, grease, and water. Many Oregon clean water agencies are working to educate their customers about the potential impacts of PFAS and how to reduce their exposure and contribution of PFAS, as PFAS are present in products people use every day.

WHY ARE PFAS CONCERNING?

PFAS are made to be strong and long-lasting. This means PFAS can stay in the human body and environment for a long time. There is growing evidence that PFAS exposure can lead to adverse health effects. Some PFAS compounds have been linked to cancer. Due to the potential environmental and human health impacts, state and federal governments and agencies are considering implementing legislation regarding the use, disposal, and regulation of these chemicals. CWS is preparing for the likelihood of increased regulation in the future.

HOW WILL THIS AFFECT BUSINESSES?

- **PFAS regulation for commercial entities is likely in the near future.** Research the products to see if they are likely to contain PFAS. Look at materials that are waterproof, resist heat, oil, or stains. Look out for words that contain "fluoro" in them, as these may be PFAS. **If you suspect that products have PFAS, make sure that they do not go down the drain and do not store them outside.**
- Contact Clean Water Services to learn more about the things that your business can do to protect public health and the environment from PFAS.
- **Benefits to early action** include preparing for likely regulations, such as wastewater regulation and product bans, by voluntarily changing your practices and products now.

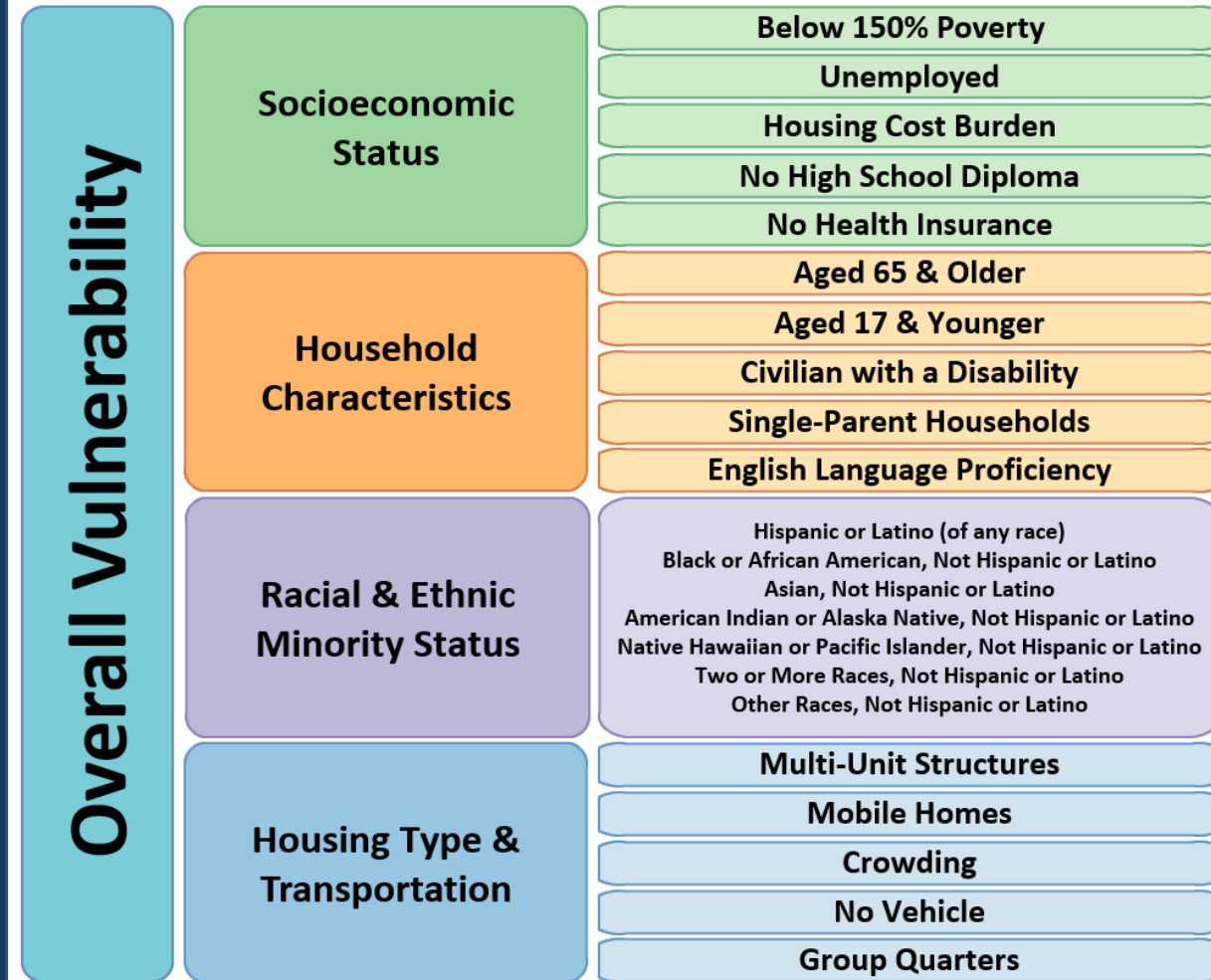


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Residential Approach

- Sanitary and Stormwater Analyzed
- Sampling Initiative
 - Collecting representative data of the sewershed
 - Demographic characteristics, basins, age of development, etc.
- Upcoming - Behavior Change Campaign
 - ACWA Consumer Products Guidance
 - CWS' Communications, Community & Engagement



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Amanda McGarry

McGarryA@cleanwaterservices.org

971-864-2852

Ara Vickers

VickersA@cleanwaterservices.org

971-392-5258



Resources



[Clean Water Services PFAS Webpage](#)



[PPRC PFAS Webpage](#)



[PFAS and Phthalate Reduction Project - ORACWA](#)