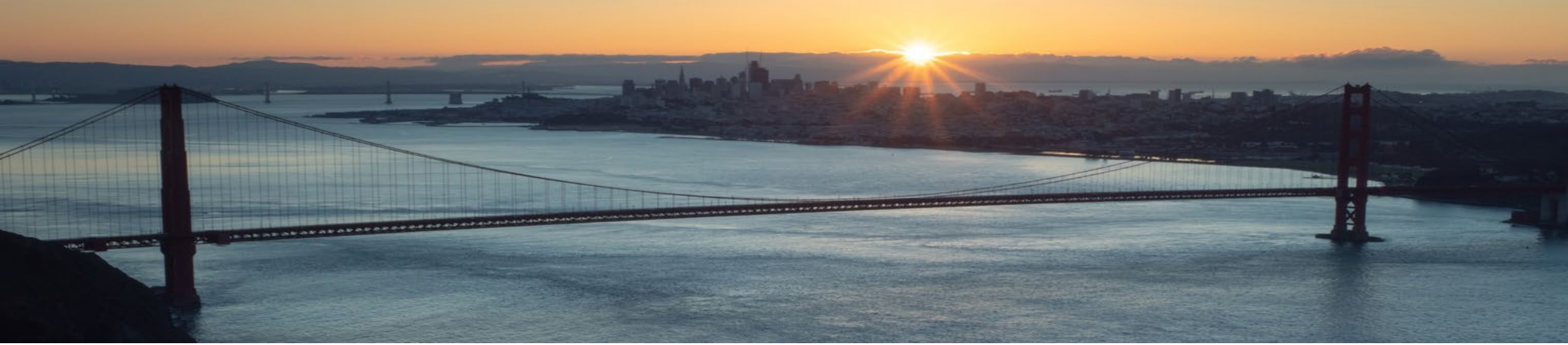

BACWA Hot Topics

PFAS Study:
Phase 1 Results and Phase 2 Goals

Diana Lin and Miguel Mendez

BACWA Annual Meeting

May 6, 2022

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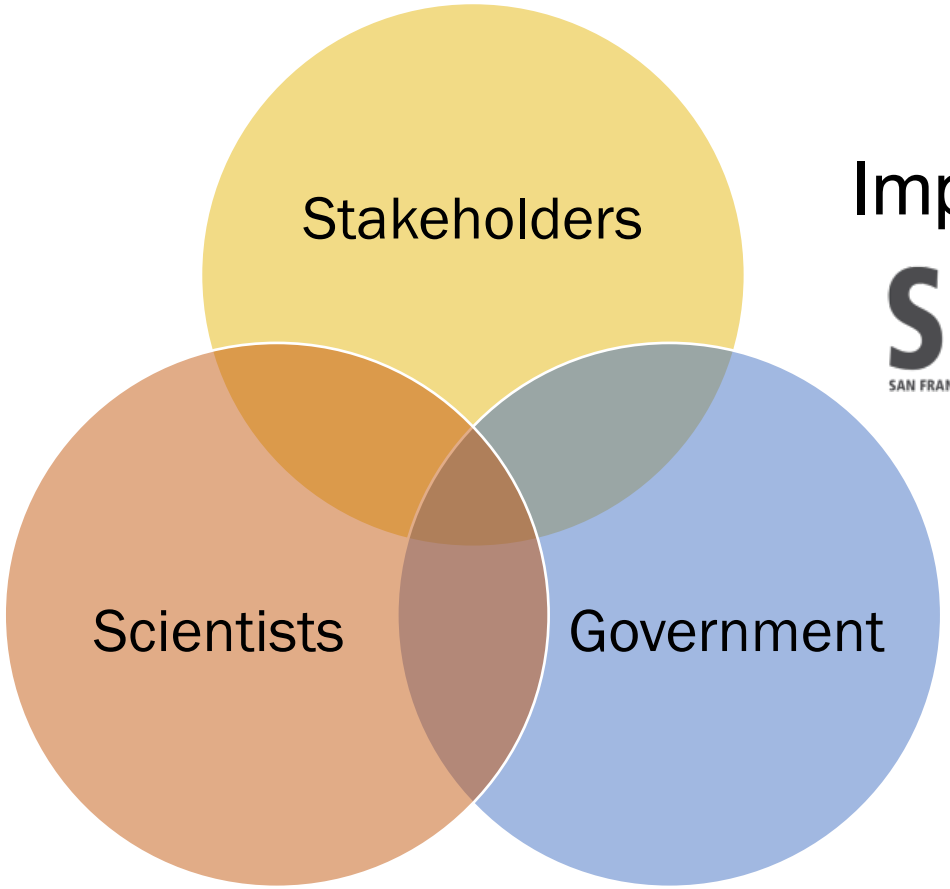
BACWA
BAY AREA
CLEAN WATER
AGENCIES

SWB requires PFAS sampling in California

- State Water Board has issued 13267/13383 Orders to:
- Drinking water systems (& drinking water near military facilities
- Airports and Landfills
- Chrome platers
- Bulk fuel terminals/refineries
- POTWs: 4x influent, effluent, and biosolids ⇒ except in Region 2

Regional Monitoring Program (RMP)

- Partnership to monitor the health of San Francisco Bay in support of management decisions



Implemented by

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Monitoring San Francisco Bay

Bivalves

Fish

Bird Eggs

Mammals

Advantages of R2/RMP Combined Study

- Leverage RMP experience and inform region wide understanding
- (Nearly) all effluent goes to the Bay
- Develop study design that is efficient and informs management actions
  - Study design
  - QA/QC sample collection
  - Coordination with laboratory
  - Data QA
  - Data interpretation

Why is the R2/RMP study important?

- POTWs are PFAS receivers, not PFAS sources
- POTWs have limited ability to control PFAS sources or destroy PFAS
- We can use this study to better understand the sources, transport, and fate of PFAS to best target management actions and source control efforts

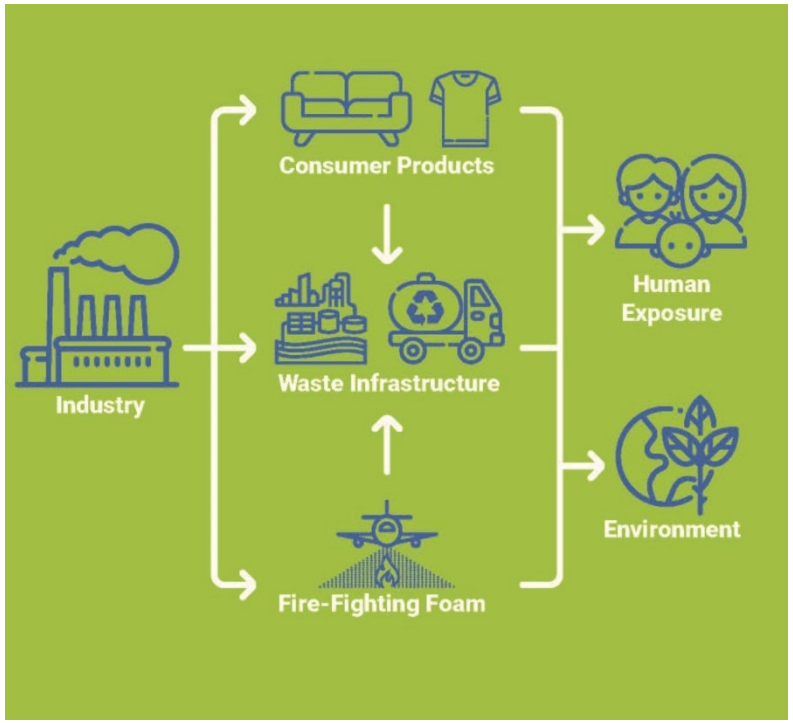


Image credit: CASA

Project Overview

Phase 1

Study design based on Statewide Investigation Order

- Monitor representative subset of facilities in Q4 2020
- Include additional analytes and analytical methods

Phase 2

Design study based on Phase 1 results

- Conduct more in-depth investigations

in progress

BACWA
BAY AREA
CLEAN WATER
AGENCIES

Phase 1 Study Design: Sampling and Analysis

- Monitor representative subset of facilities
  - Sample influent, effluent, biosolids at 15 facilities
  - Include diversity in size, service population, and treatment type
- Apply Target PFAS method
  - 40 PFAS compounds
  - Influent, effluent, biosolids, reverse osmosis concentrate
- Apply Total Oxidizable Precursors (TOP) assay
  - Indirectly quantify PFAS precursors through oxidation of precursors to terminal PFAS
  - Influent, biosolids

Vallejo Flood & Wastewater District

SFO

City of Palo Alto

City of San Jose
Capital of Silicon Valley

City of San Mateo, California

EBMUD

EBDA
East Bay Dischargers Authority

Valley Water

Fairfield-Suisun Sewer District

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

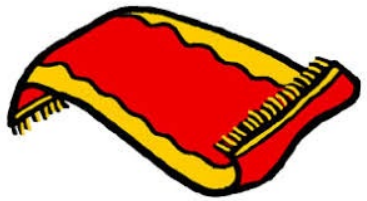
Central San
Central Contra Costa Sanitary District

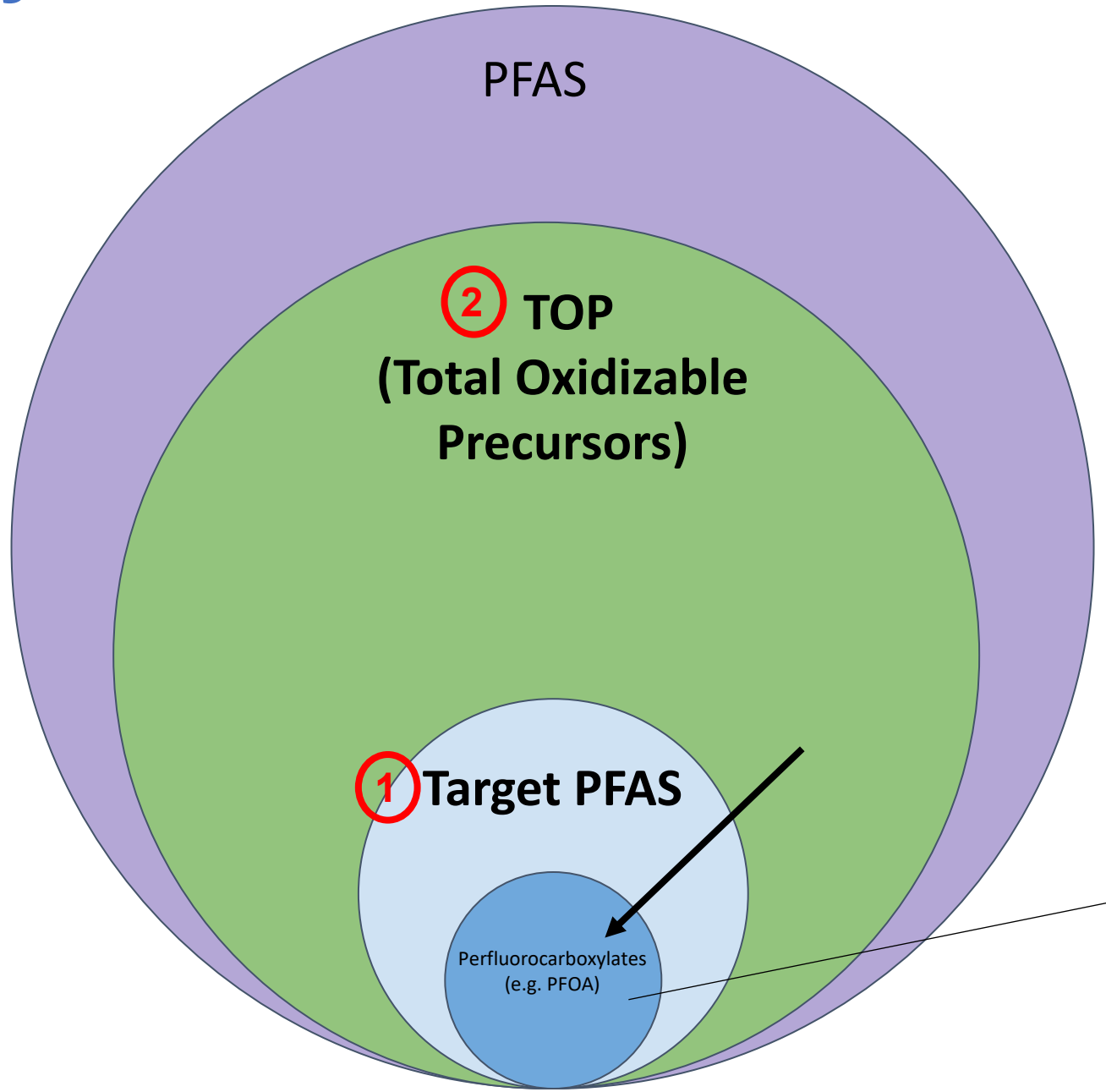
Dublin San Ramon Services District
Water, wastewater, recycled water

Novato Sanitary District

Union Sanitary District

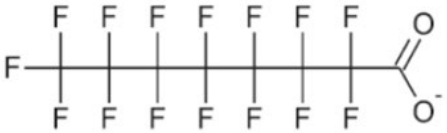
PFAS Analytical Methods



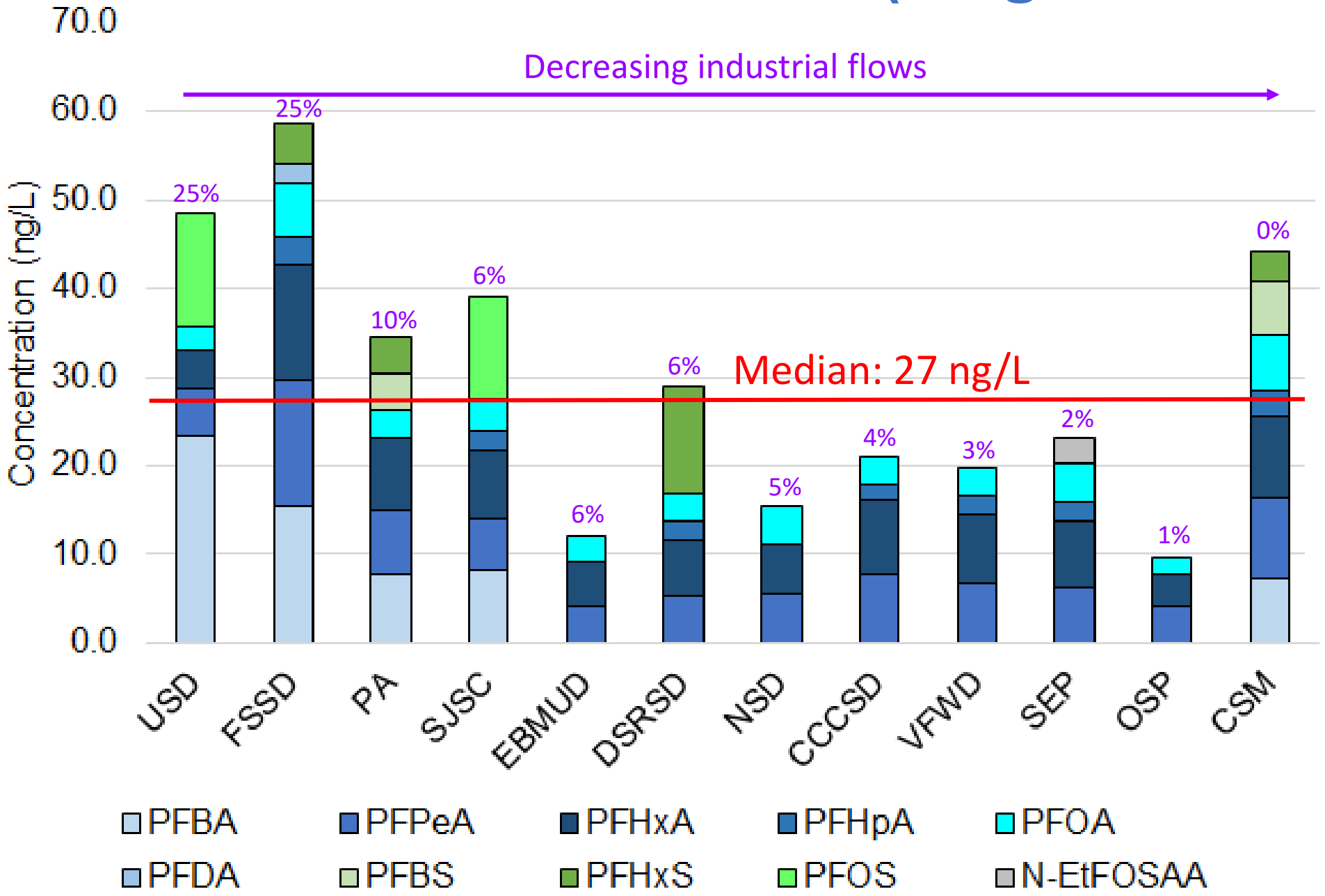


PFOA

Perfluorooctanoic acid

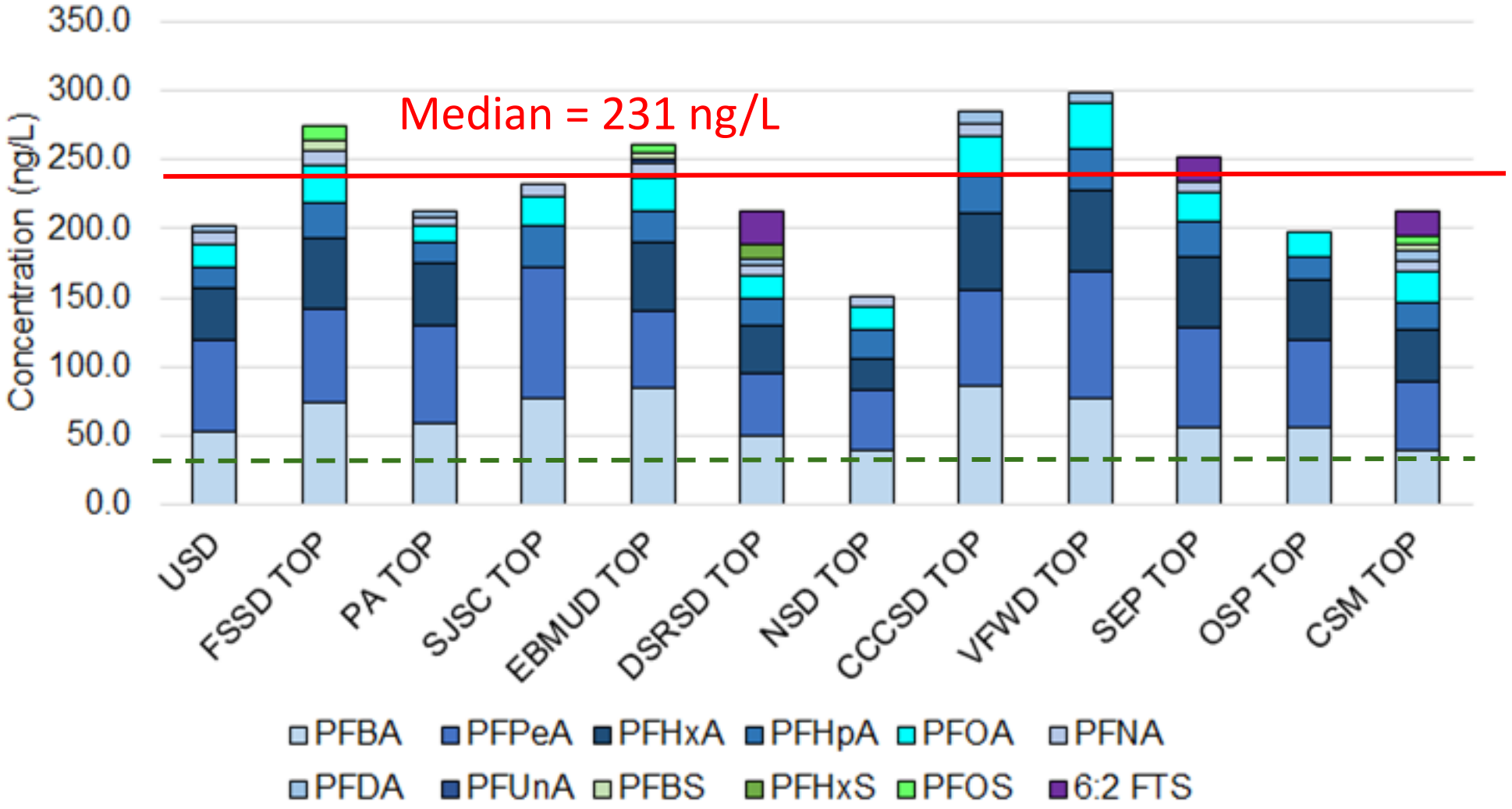


Influent Concentration (Target method)



- No clear trend observed from industrial flows
- PFAS in municipal facilities generally comparable

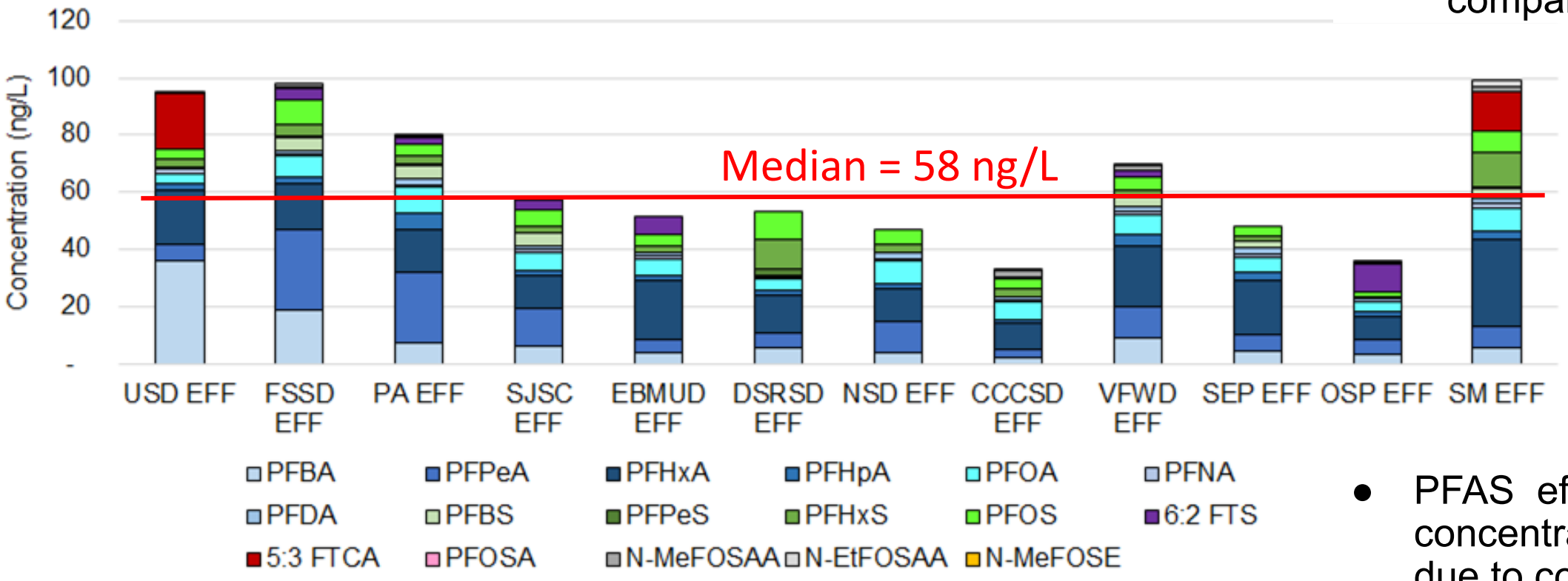
Influent Concentration (TOP method)



- PFAS in municipal facilities generally comparable
- TOP results indicate significant presence of precursors

Influent Target Analysis
Median = 27 ng/L

Effluent Concentration (Target method)

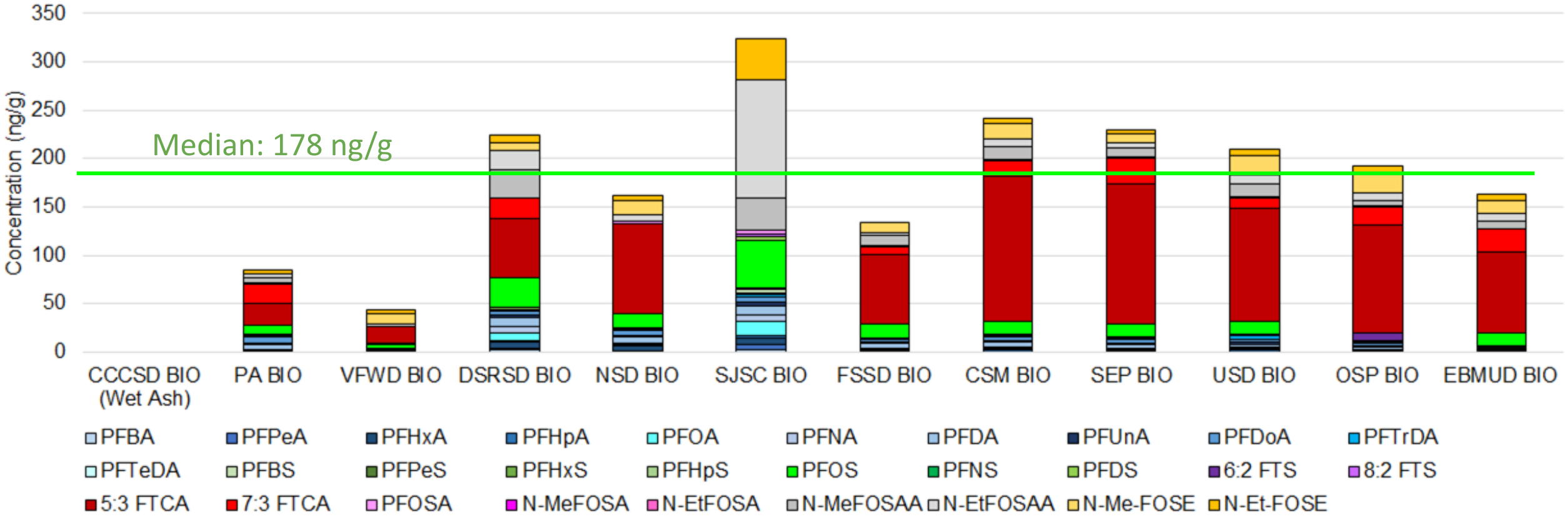


- PFAS in municipal facilities generally comparable

- PFAS effluent concentration increase due to conversion of PFAS precursors

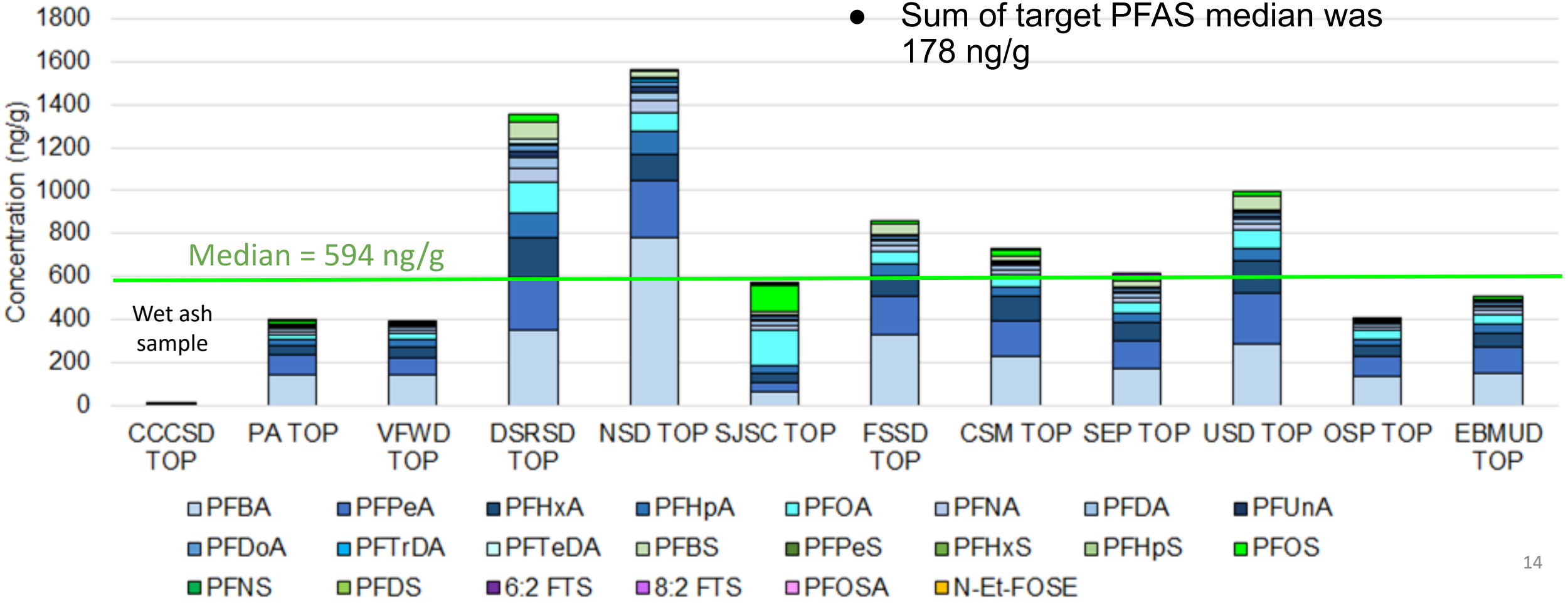
Biosolid Concentration (Target Method)

- PFAS in municipal facilities generally comparable



TOP results in Biosolids

- TOP results indicate significant presence of PFAS precursors
- Sum of target PFAS median was 178 ng/g

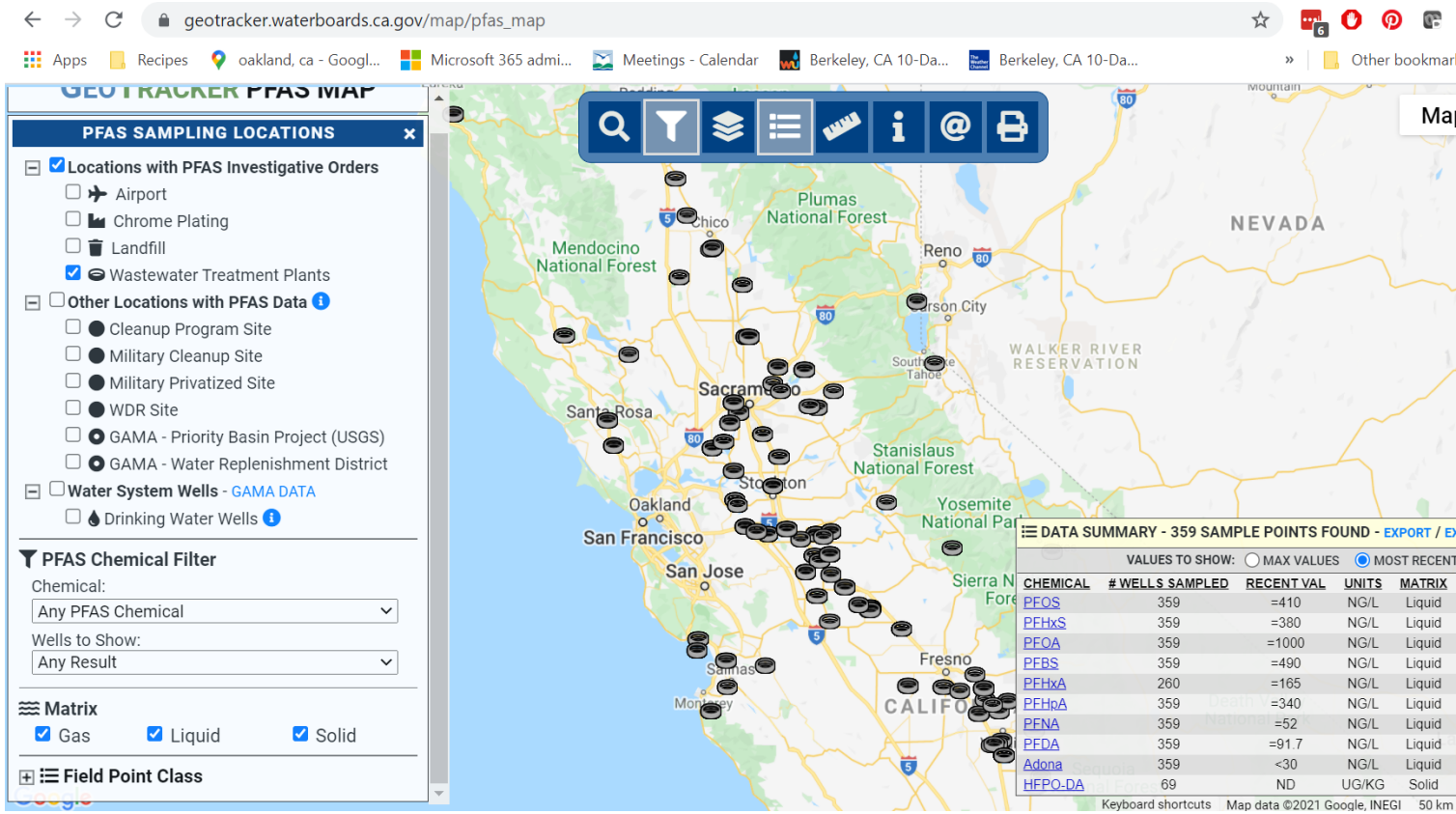


Main Takeaways from Phase 1

- Sum of PFAS concentrations in municipal influent, effluent, and biosolids generally comparable for each matrix
- Significant presence of unknown PFAS precursors in influent and biosolids
- Gained experience
  - PFAS sample collection methods
  - Study design
  - QA/QC
  - Reporting to Geotracker

Reporting

- SWB Geotracker database
  - Sampling and Analysis Plan
  - Monitoring Report, including QA/QC summary
  - Data
- Technical report
- Presentations:
  - >7 invited webinars/meetings



Model for collaborative, regional approach

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RMP

BACWA BAY AREA CLEAN WATER AGENCIES

Phase 2 Priority Study Questions to Inform Management of PFAS Entering Sewershed

- Are residential flows an important source of PFAS?
- Can specific industries (e.g., industrial laundry, food waste, semiconductor manufacturing) be identified as discharging higher than average concentrations of PFAS (including TOP) to POTWs?

Work with study participants to identify and prioritize upstream sewershed sampling locations.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

CENTRAL SAN
CENTRAL CONTRA COSTA SANITARY DISTRICT

CITY OF SAN MATEO
CALIFORNIA

EBMUD

Dublin San Ramon Services District
Water, wastewater, recycled water

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

Are residential flows an important source of PFAS to participating POTWs?

- Sample diverse residential neighborhoods to screen for range of PFAS levels in residential wastewater
  - Includes single-family homes and multi-unit dwelling
  - Neighborhoods in diverse geographic locations
  - Sample during different dates to capture variation
  - Field blanks and duplicates (QA/QC) included
  - Results will be compared to average influent and industrial sources

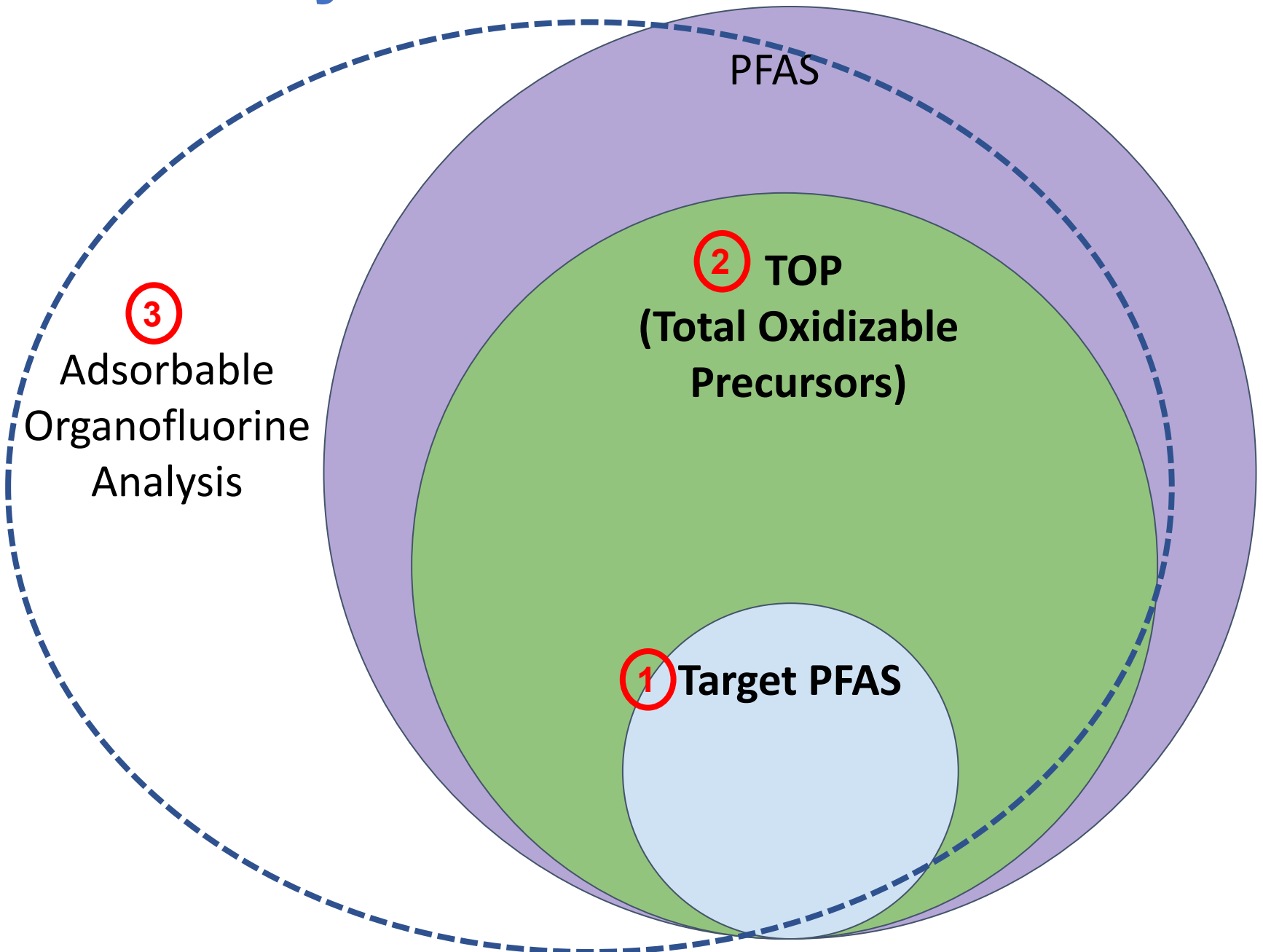
14 residential neighborhoods included

Can specific industries be identified as discharging higher than average concentrations of PFAS to POTWs?

- Industrial laundry (6 facilities)
- Manufacturing
  - Semiconductor/electronics (2 businesses)
  - Chemical (1 business)
- Chrome reduction/chrome plating operations (3 facilities)
- Hospital (4 sites)
- Car wash (3 sites)
- Military site/AFFF on-site (1 site)
- Pulp paperboard (1 site)
- Trucked food waste (combined from many businesses)

- ***22 business operations included***
- ***Leverage ongoing compliance monitoring efforts***

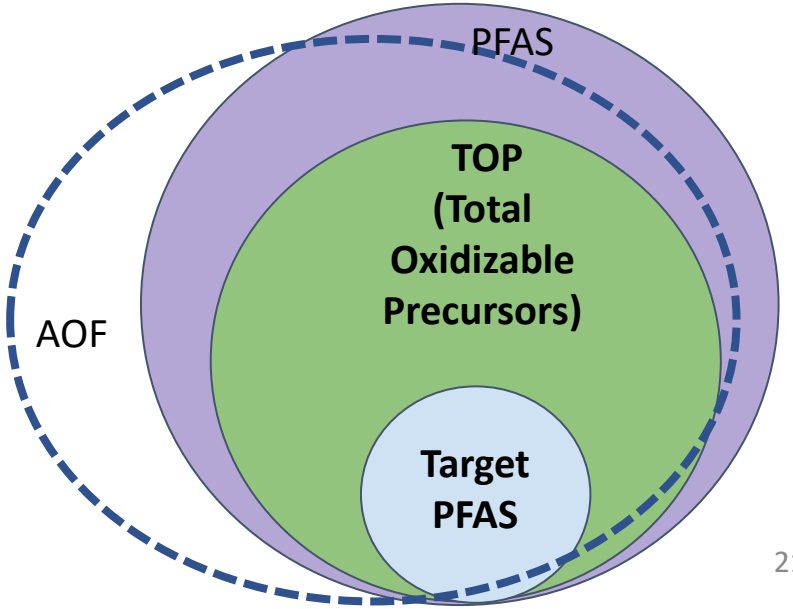
PFAS Analytical Methods



- Additional sample collection at influent, effluent, biosolids (undigested and digested), groundwater

Adsorbable Organofluorine (AOF)

- Sample adsorbed to activated carbon
- Inorganic fluoride removed with nitrate
- Analyzed via combustion ion chromatography (F-)
- Advantage: may capture larger portion of PFAS present
- Limitations
  - High detection limits
  - Low recovery of short-chain compounds
  - Includes F from non-PFAS including pesticides and pharmaceuticals
- Included in limited scope for Phase 2
  - Influent and effluent

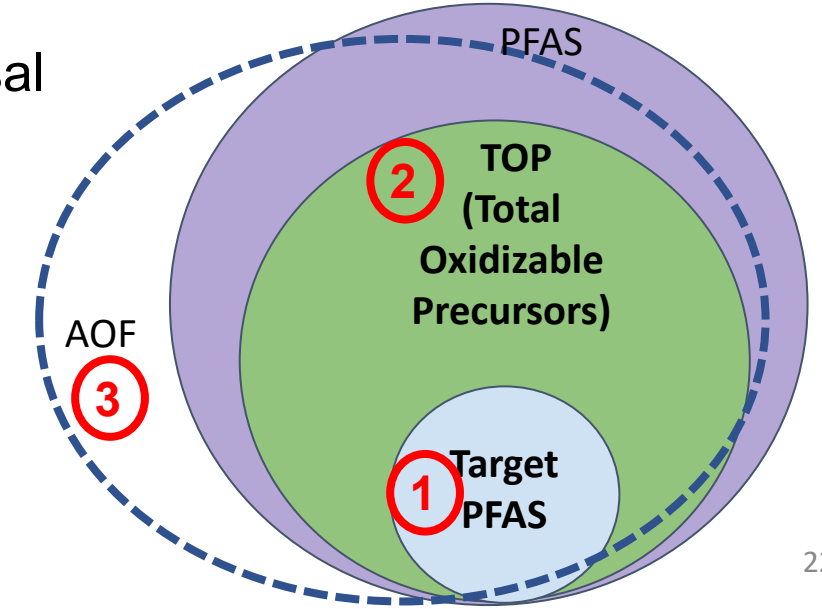


Secondary study questions

- How do TOP concentrations compare in influent, effluent, and biosolids from participating POTWs?
- Are there significant amounts of adsorbable organofluorine in wastewater samples not captured by TOP?
  - AOF analysis in influent and effluent
- How do biosolid digestion processes at POTWs affect the transformation and levels of measurable PFAS in biosolids
  - Compare target and TOP analysis in undigested to digested biosolids at 3 facilities
- Evaluate potential PFAS transport from on-site biosolid disposal
  - 3 sites at DSRSD

- ***~460 Sample bottles***
- ***~230 Analytical samples***

THANK YOU



Project Timeline

- 2022
  - March – May: Sample Collection
  - September: SGS AXYS completes laboratory analysis
  - November: SFEI QA/QC data
- 2023:
  - February: Data analysis and interpretation; results reported to Geotracker
  - Feb – April: Results discussion
  - June: Draft Report
  - September: Final Report

Relevant RMP CEC Project Updates

- Quarternary Ammonium Compounds in wastewater
  - Monitoring extended to 2024
  - Evaluate trends in wastewater due to expected increased use
- Ethoxylated Surfactants
  - Additional wastewater sample collection proposed for 2023

- Draft reports coming soon
  - Bisphenols in effluent and sediment
  - PFAS in Bay water
  - Sunscreen in effluent

Thank you

www.sfei.org/CECs

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