Looking for Sources of PFAS in Bay Area Wastewater

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February 4th, 2022
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
How we leverage RMP’s mature CECs program to best use resources

1. Inform region-wide understanding
   • (Nearly) all effluent goes to the Bay, not to drinking water sources

2. Develop study design that is efficient and informs management actions
   • Reduce unnecessary costs, resources by sampling representative POTWs
   • Region-wide QA/QC, data management and comparability
   • Investigate sources of PFAS
   • Flexible analyte list

3. Leverage other RMP PFAS studies to gain insight on PFAS fate and transport
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 magnitude, sources, transport, and fate of PFAS to best target management actions and source control efforts

Image credit: CASA
Project Overview

Phase 1
Monitor representative subset of facilities in Q4 2020

• 15 representative facilities were chosen to participate based on size, geography, treatment processes and service area characteristics
• Sample influent, effluent, and biosolids using target and total oxidizable precursors (TOP) analysis

Phase 2
Additional monitoring and analysis based on Phase 1 Results (Beginning in Q1 2022)

• Subset of Phase 1 agencies
• Followup on Phase 1 data gaps
• Investigate PFAS sources
PFAS Analytical Methods

TOP (Total Oxidizable Precursors)

Target PFAS

Perfluorocarboxylates (e.g. PFOA)
Phase 1 Results
No clear trend observed from industrial flows

PFAS in municipal facilities generally comparable

Median: 27 ng/L
TOP results indicate significant presence of precursors

Decreasing industrial flows

Median of target = 27 ng/L
Concentrations of PFAS in WWTP Effluent

Influent = 27 ng/L

Median = 58 ng/L
Sum of PFAS measured in effluent increased compared to influent

Effluent Median = 58 ng/L
Influent Median = 27 ng/L
Bay Area PFAS detections generally lower than Preliminary Statewide Results

- BACWA influent median: 27 ng/L
- BACWA influent median with TOP: 231 ng/L
- Statewide influent median: 66 ng/L
- Statewide influent median of facilities with 100% residential flow: 95 ng/L

- BACWA effluent median: 58 ng/L
- BACWA effluent median with TOP: Not part of Phase 1 Study
- Statewide effluent median: 115 ng/L
- Statewide influent median of facilities with 100% residential flow: 146 ng/L
Municipal biosolid samples generally comparable

Median: 178 ng/g
Wet ash sample

Median = 594 ng/g
Main Takeaways from Phase 1

- Sum of PFAS concentrations in municipal influent, effluent, and biosolids generally comparable among POTWs for each matrix
- Quantified concentrations of PFAS are higher in effluent than influent, likely due to transformation of precursors
- Significant presence of unknown PFAS precursors in influent and biosolids
- BACWA Phase 1 results are about $\frac{1}{2}$ preliminary statewide results for influent and effluent
- BACWA and preliminary statewide results both show 100% residential service areas have higher quantified PFAS concentrations compared to mixed residential/commercial/industrial service areas, but no difference for TOP
Phase 2 Planning
On to Phase 2: Taking a closer look at 6 facilities

1) Data gaps from Phase 1
   ○ TOP in effluent
   ○ Groundwater
   ○ PAP analysis
   ○ TOF

2) Source Investigation
   ○ Commercial/industrial/residential service areas
   ○ Food waste
   ○ Specific industries
Top Priority for Phase 2 Study Objective – understand sources of PFAS entering sewershed
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- Focus on where PFAS is coming from, in addition to where it’s going
- Sample upstream in sewershed to understand PFAS concentrations from different service populations in sewershed
- What is the relative importance of residential flows compared to commercial and industrial flows?
  - Which industries or commercial entities are important sources?
What industries or types of businesses are unique or are disproportionately high sources of PFAS (if any)?

- Car washes
- Laundries/carpet cleaners
- Manufacturing
- Hospitals
- Prisons
- Military facilities
- Food waste/organics
### Phase 2 Project Timeline

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Date</th>
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<tbody>
<tr>
<td>Sampling and analysis plan complete</td>
<td>February 2022</td>
</tr>
<tr>
<td>Sampling</td>
<td>March through May 2022</td>
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<tr>
<td>Lab analysis and data quality assurance</td>
<td>June through November 2022</td>
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<tr>
<td>Analysis and internal discussion of results</td>
<td>December 2022 through April 2023</td>
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<tr>
<td>Draft report</td>
<td>June 2023</td>
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<tr>
<td>Final report</td>
<td>September 2023</td>
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Is there information we can use from the statewide effort?

- Compare R2 data to statewide 13267 data – apples to apples
- Consulting firm volunteered to synthesize statewide
  - Characterization of residential signal
  - Investigation of outliers
  - Correlation with service area, treatment technologies, others
Acknowledgements

- Participating POTWs and their staff
  - CCCSD, CSM, DSRSD, EBMUD, FSSD, NSD, PA, SFO, SFPUC, SJSC, USD, VFWD

Target data available at: https://geotracker.waterboards.ca.gov/