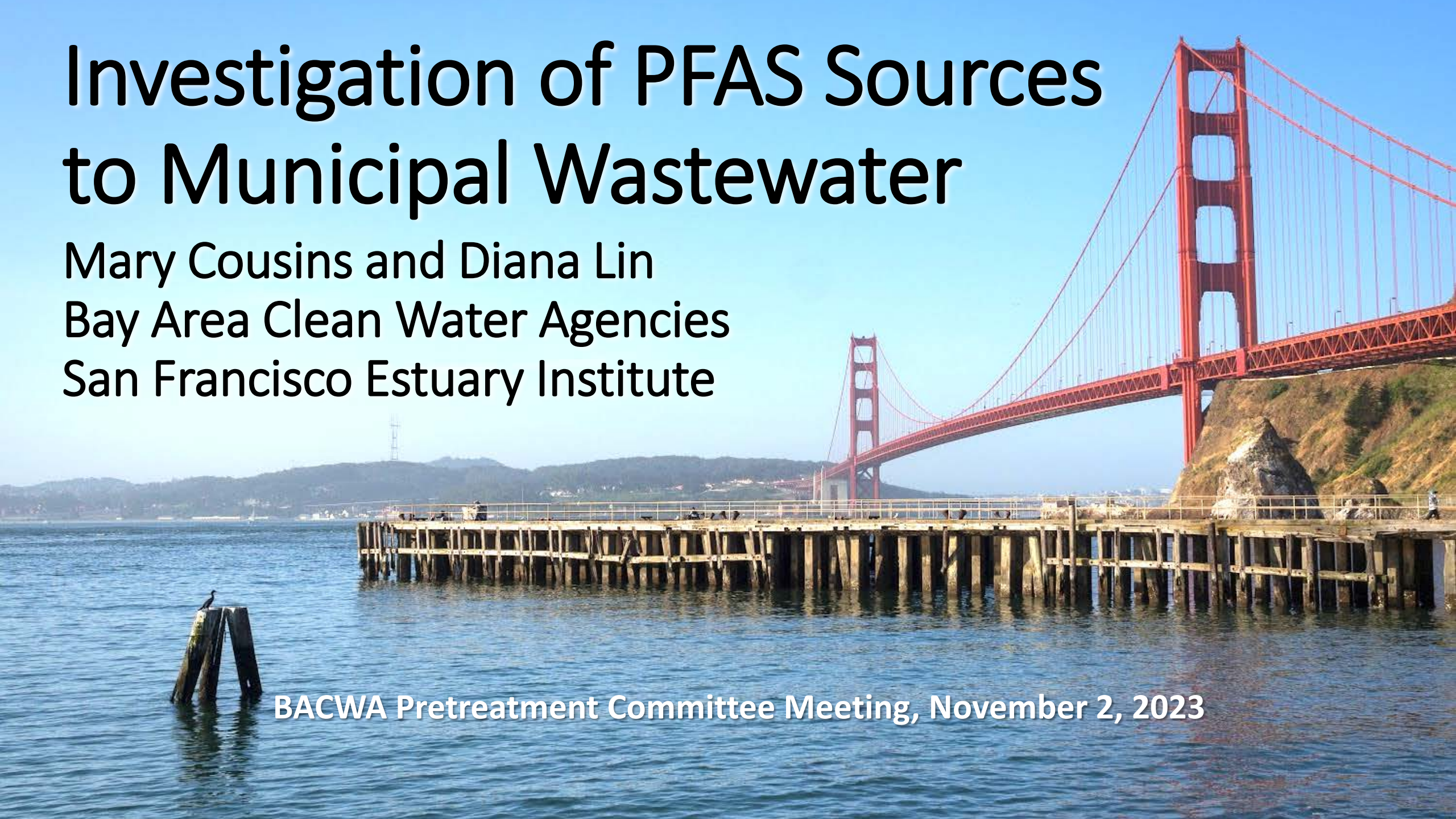


Investigation of PFAS Sources to Municipal Wastewater

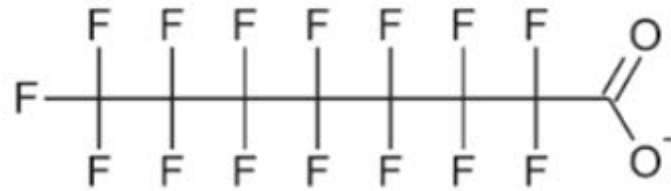
Mary Cousins and Diana Lin
Bay Area Clean Water Agencies
San Francisco Estuary Institute

BACWA Pretreatment Committee Meeting, November 2, 2023

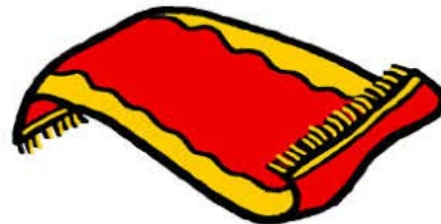
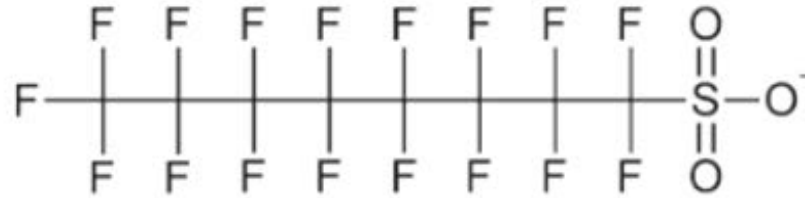


Poly- and Perfluoroalkyl Substances (PFAS)

PFOA



PFOS



To control PFAS, we must first turn off the tap



SF Bay Regional Study



BACWA
BAY AREA
CLEAN WATER
AGENCIES

SFEI | AQUATIC
SCIENCE
CENTER
SAN FRANCISCO ESTUARY INSTITUTE & THE AQUATIC SCIENCE CENTER



Project Overview

Phase 1

Consistent approach to
Statewide Investigation Order

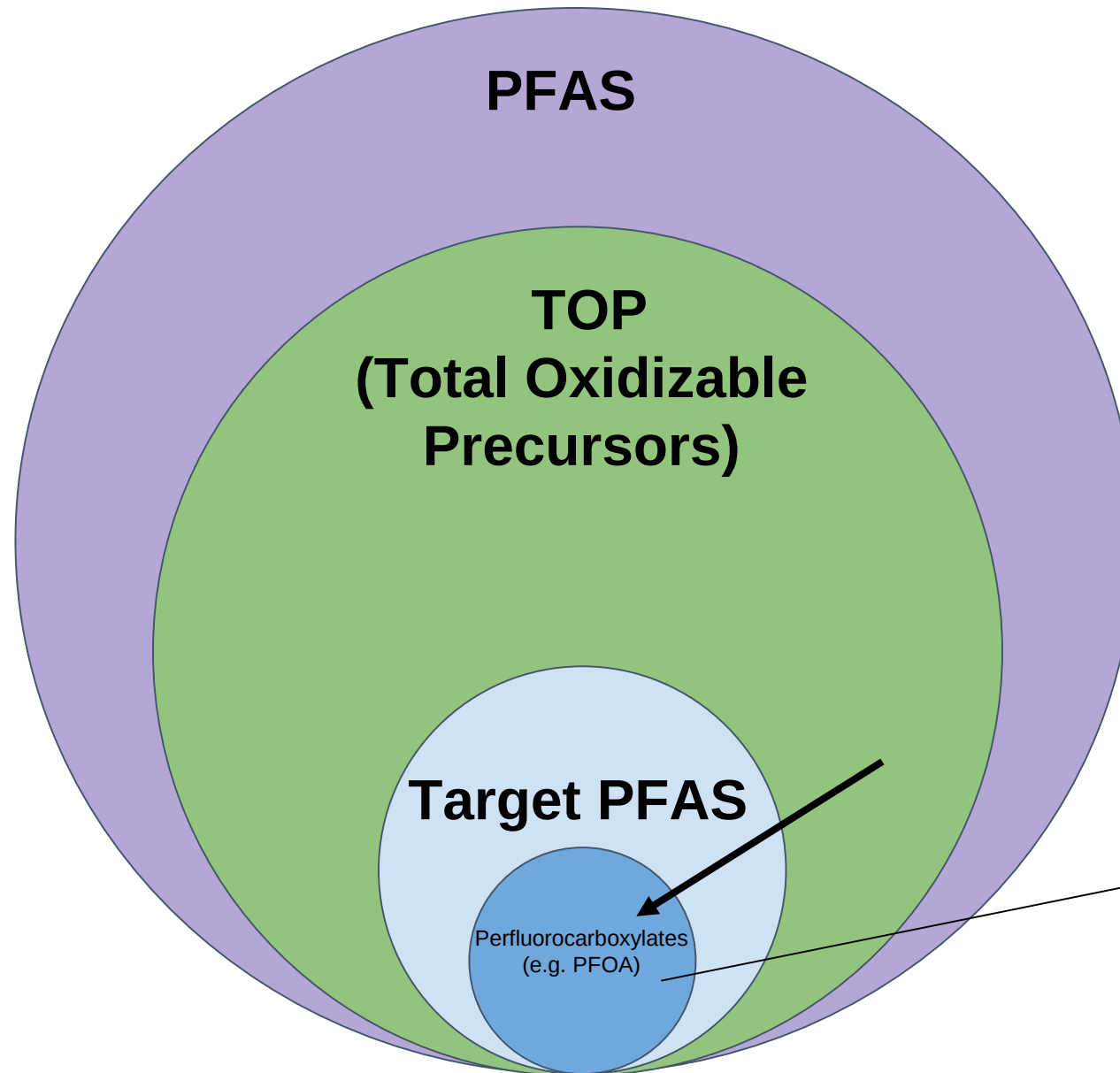
- Monitor representative subset (n=15) of facilities
- Q4 2020

Phase 2

Investigate PFAS sources in
sewershed

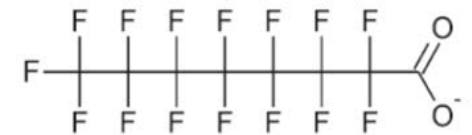
- Conduct more in-depth investigations (n=7)
- Summer of 2022

PFAS Analytical Methods

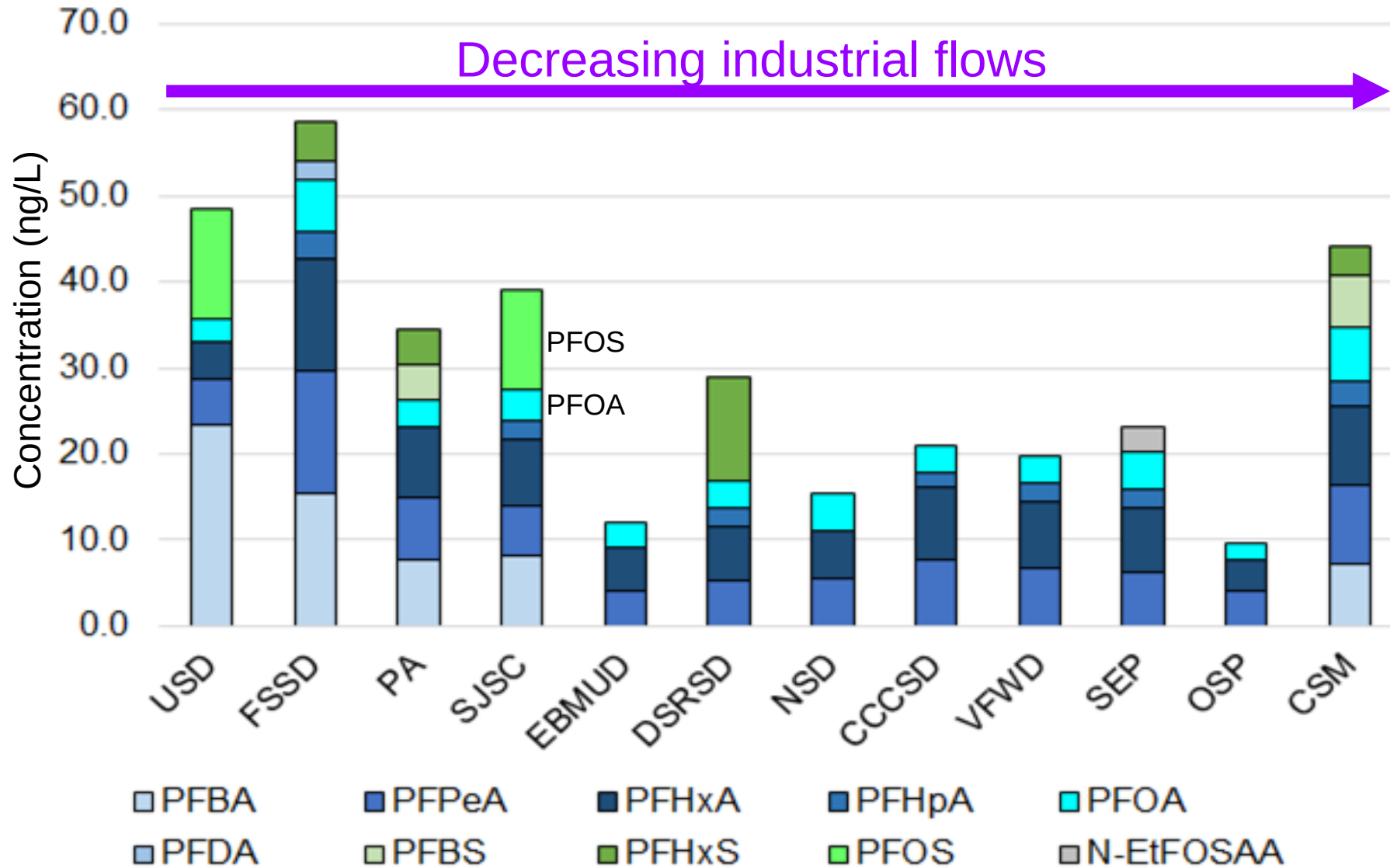


PFOA

Perfluorooctanoic acid

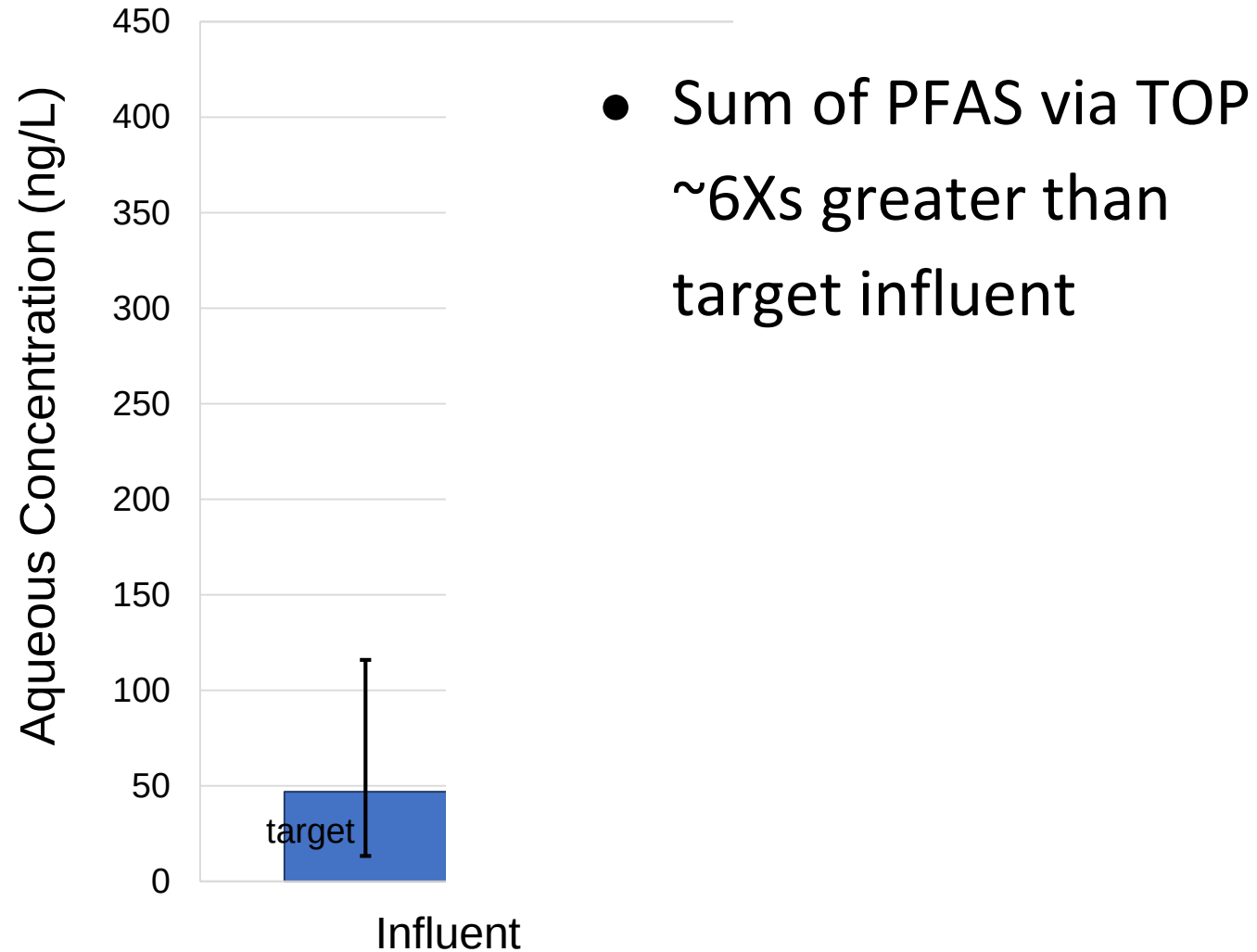


Influent Concentration (Target)

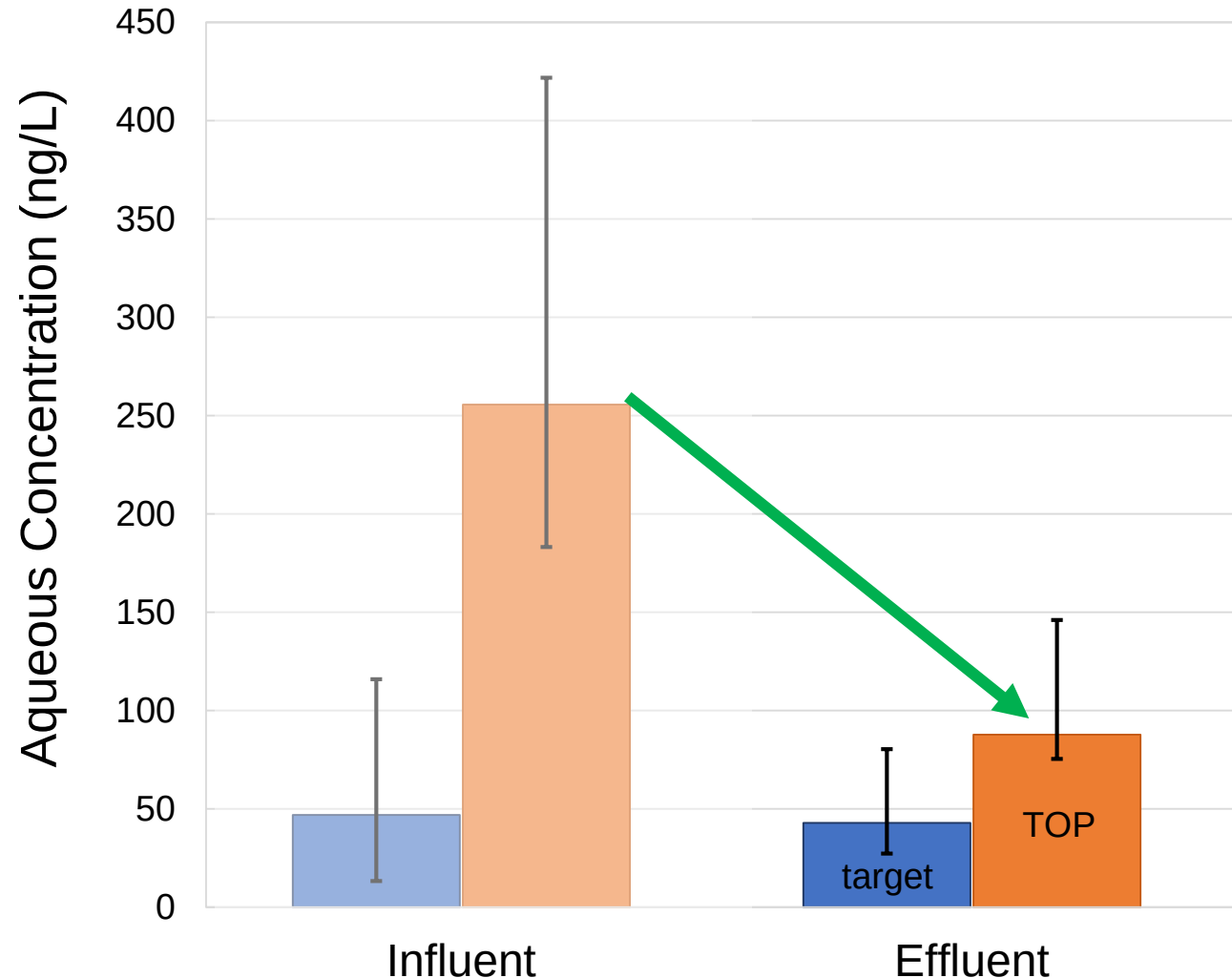


- PFAS levels comparable among sites
- PFOS and PFOA
- Comparable to other municipal wastewater
- No clear trend from industrial discharges

PFAS Concentrations in Wastewater Matrices



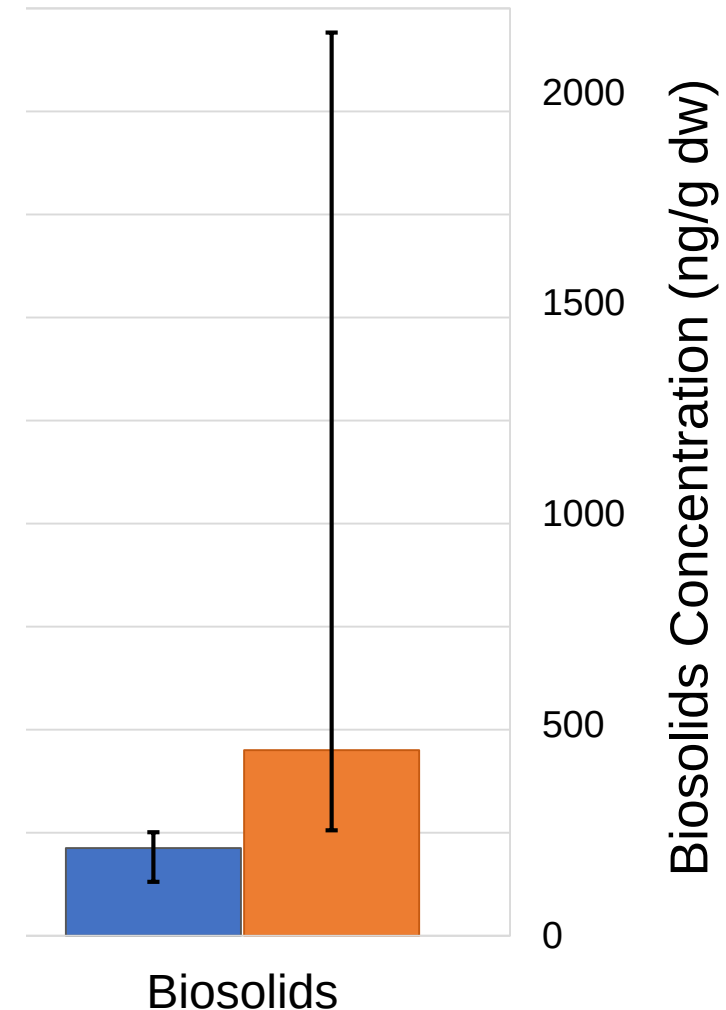
PFAS Concentrations in Wastewater Matrices



- Comparable with other studies
- 50% reduction in sum of PFAS quantified via TOP between 2014 and 2022
 - Reduction in PFOA and PFOS

PFAS Concentrations in Wastewater Matrices

- Biosolids treated through anaerobic digestion comparable
- Levels comparable to PFAS content in consumer products, including cosmetics, food packaging, textiles



Project Overview

Phase 1

Consistent approach to
Statewide Investigation Order

- Monitor representative subset (n=15) of facilities
- Q4 2020

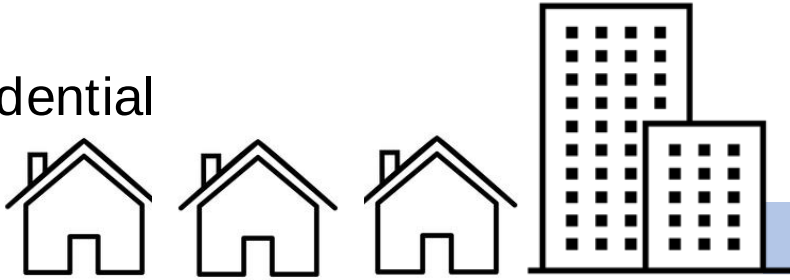
Phase 2

Investigate PFAS sources in
sewershed

- Conduct more in-depth investigations (n=7)
- Summer of 2022

Sewershed Monitoring

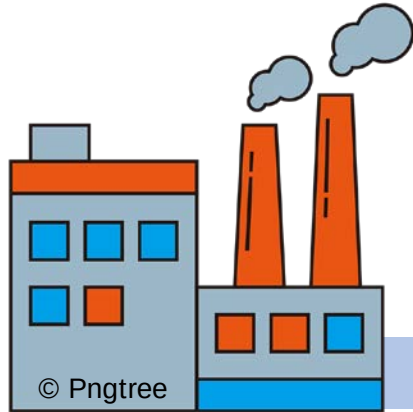
Residential



Sample



Industrial



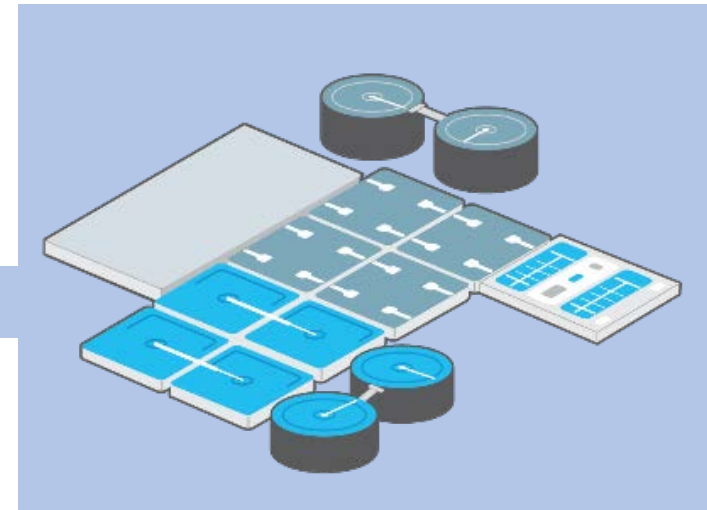
Sample



Commercial



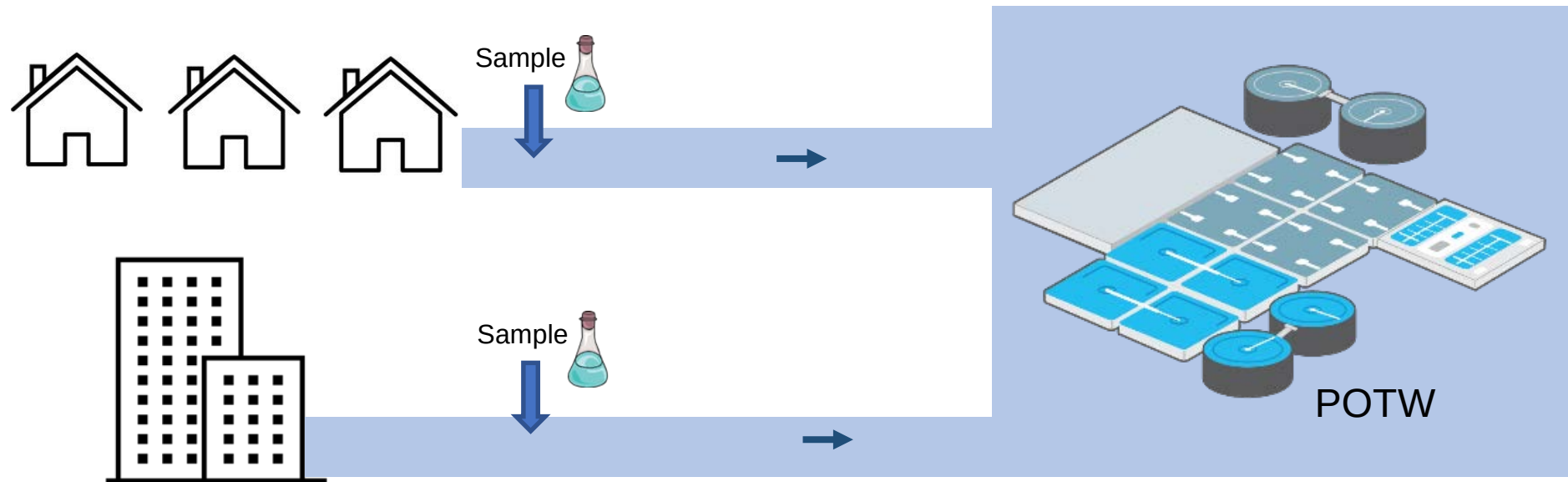
Sample



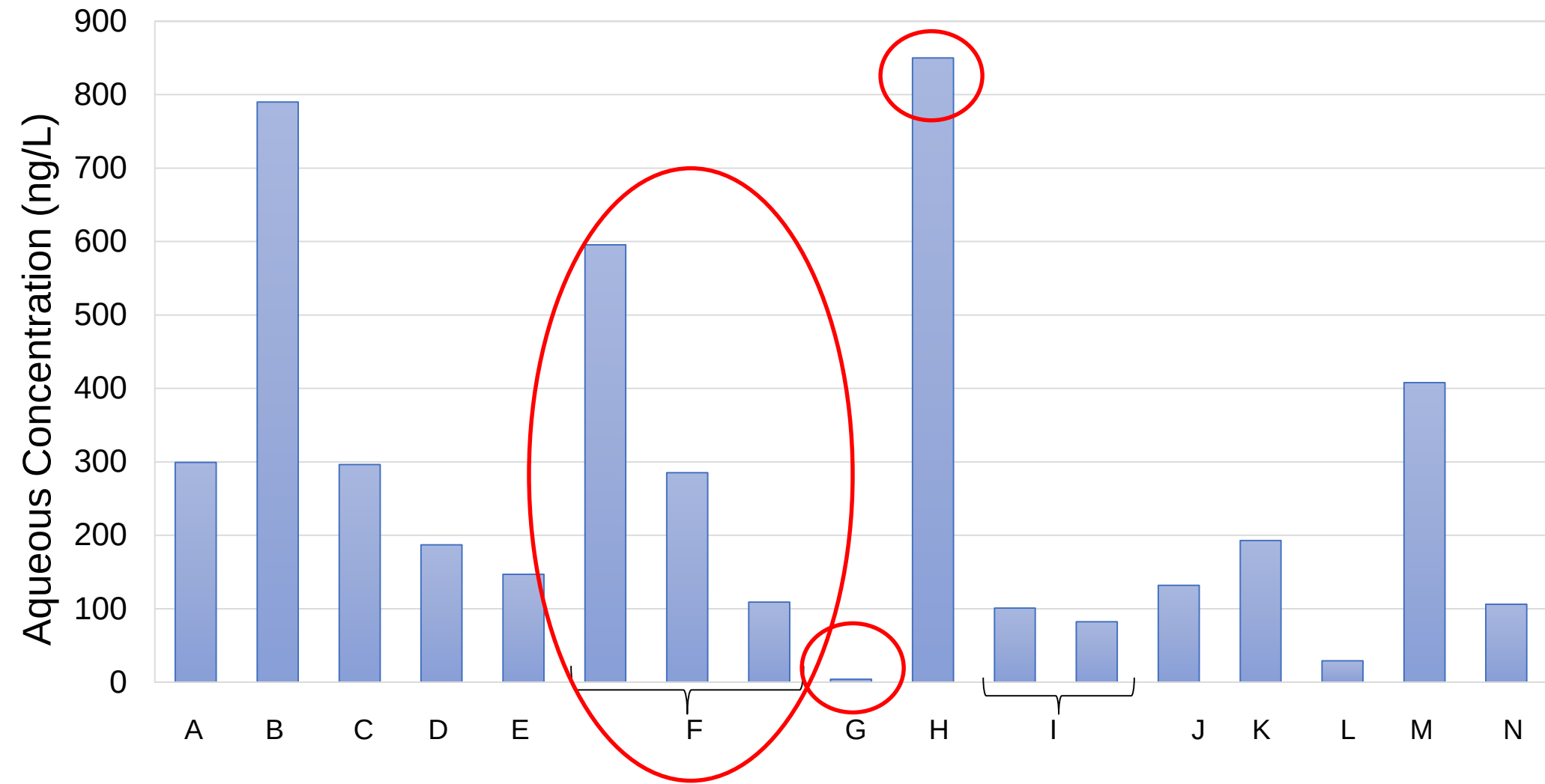
POTW

Residential Sewershed Discharge Sampling

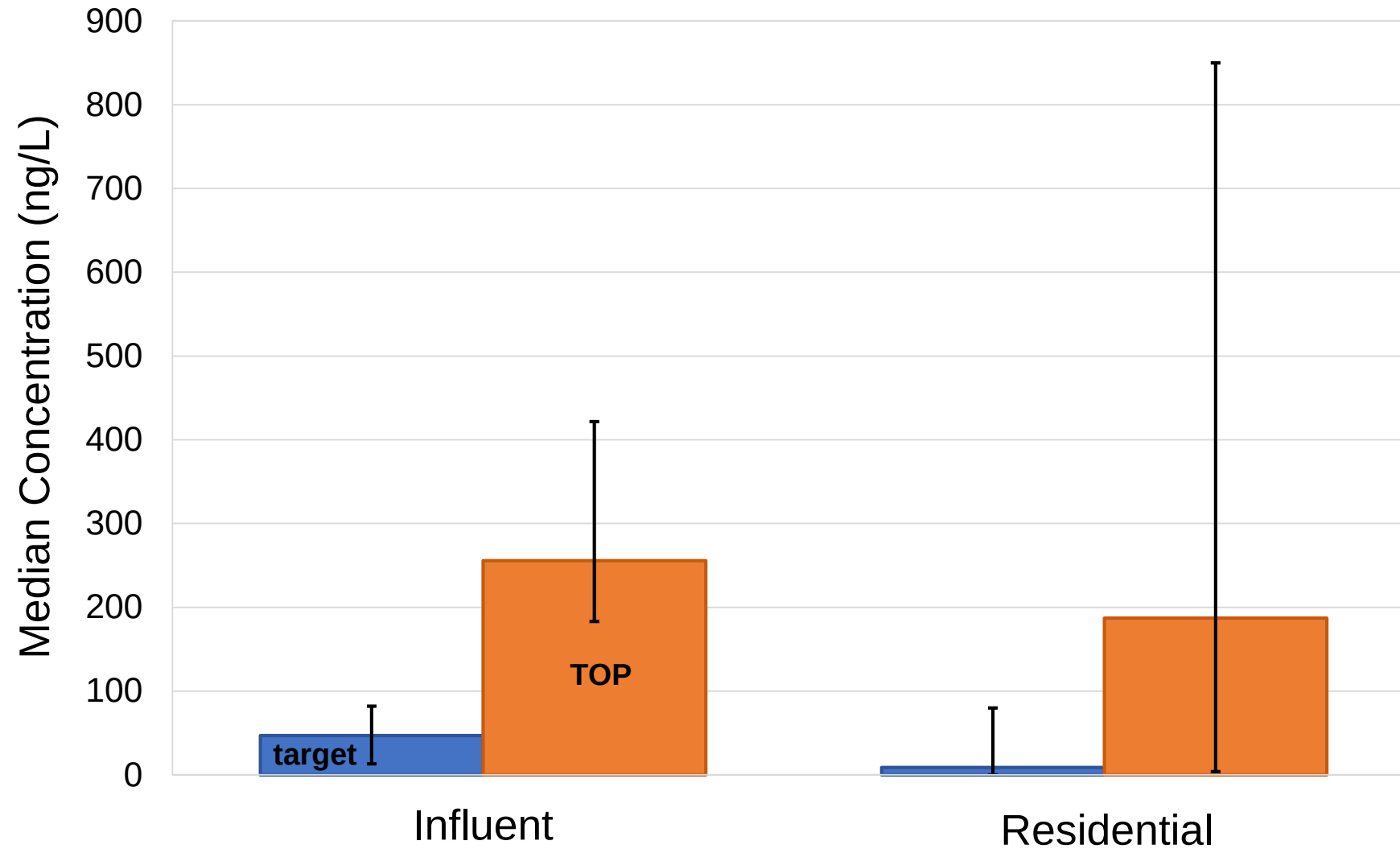
- Diversity in neighborhoods
- Screening approach



Residential Sewershed Discharge (TOP)

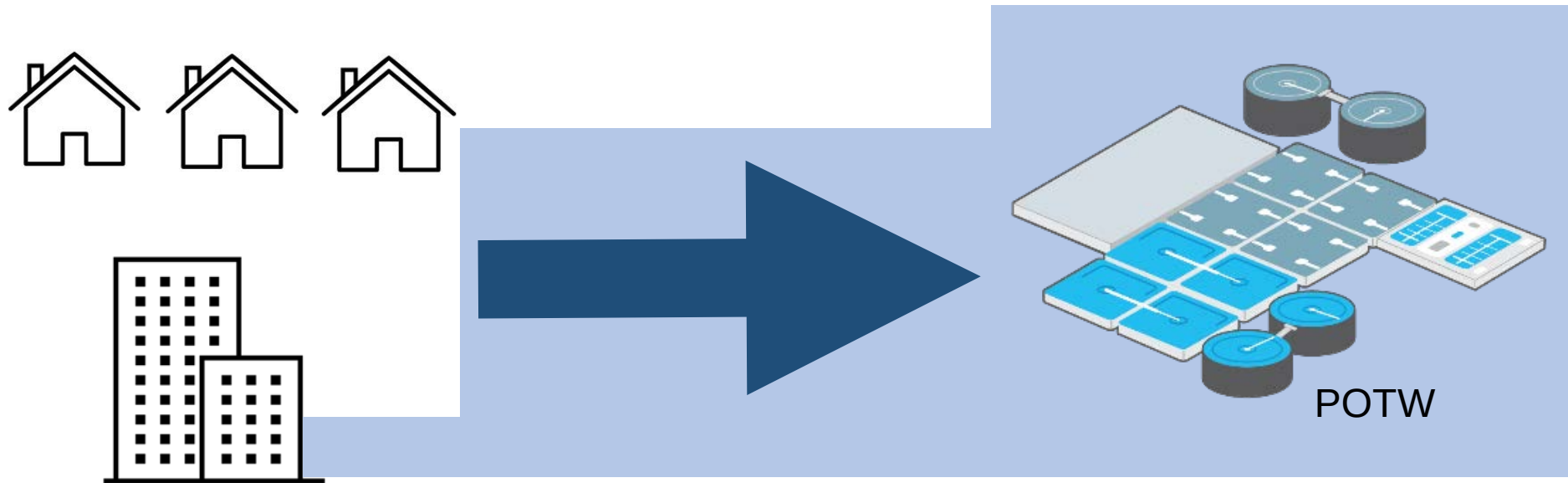


Residential Sewershed Discharge



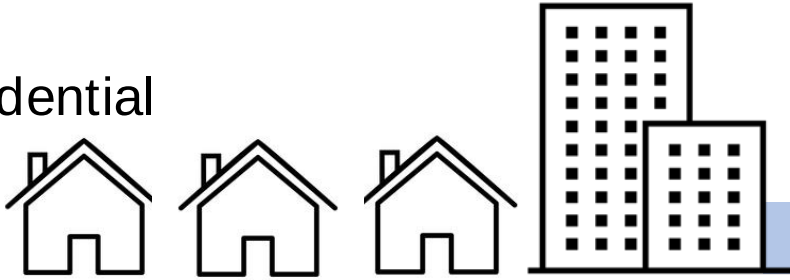
Residential Sewershed

- Residential discharges likely contribute the majority of PFAS loading received by municipal POTWs

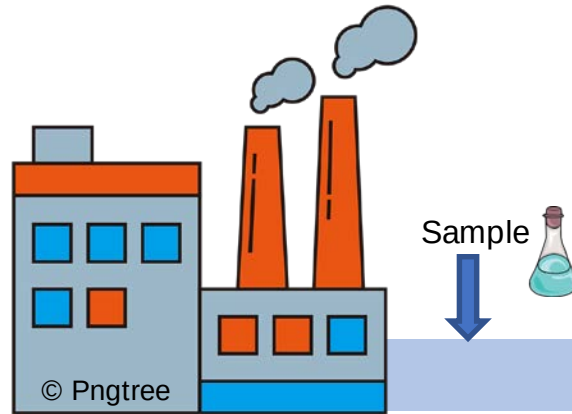


Sewershed Monitoring

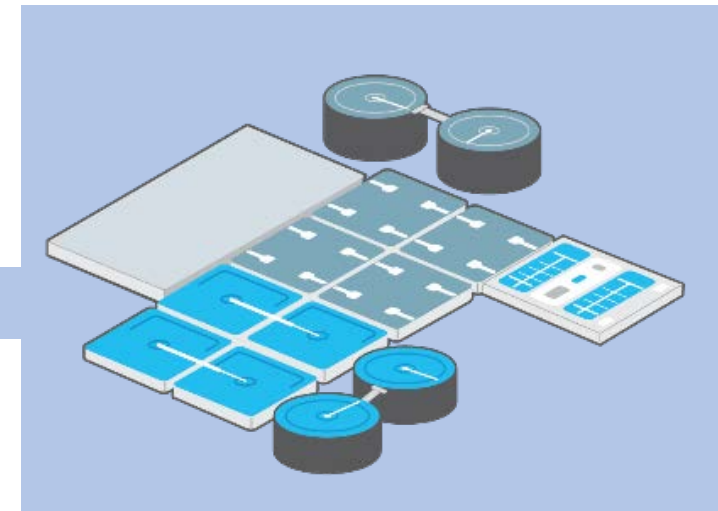
Residential



Industrial



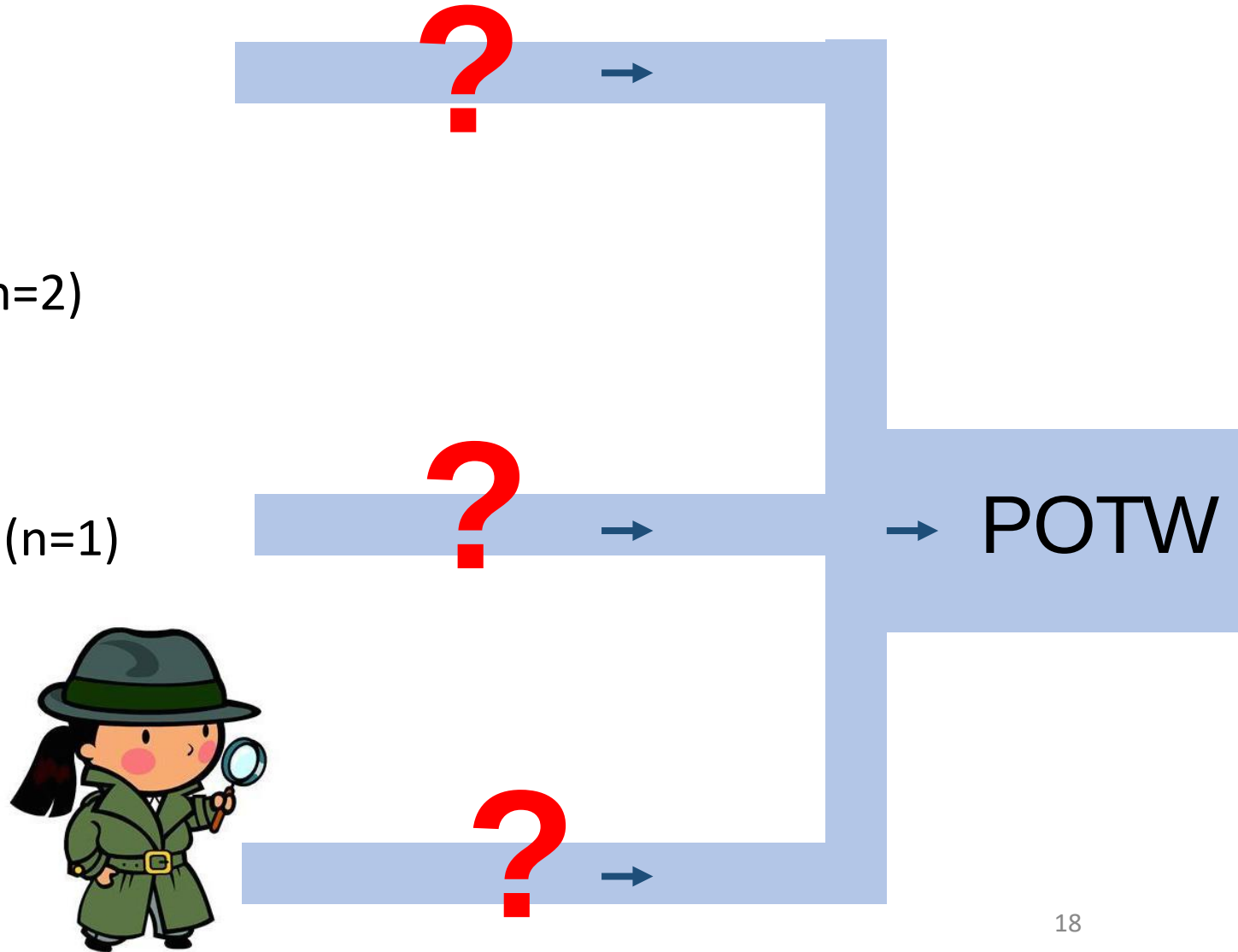
Commercial



POTW

Industrial Discharge Screening Study

- Industrial laundry (n=5)
- Hospitals (n=4)
- Chrome-plating on-site (n=3)
- Semiconductor manufacturing (n=2)
- Military site (n=1)
- Car wash (n=3)
- Pulp paperboard manufacturing (n=1)

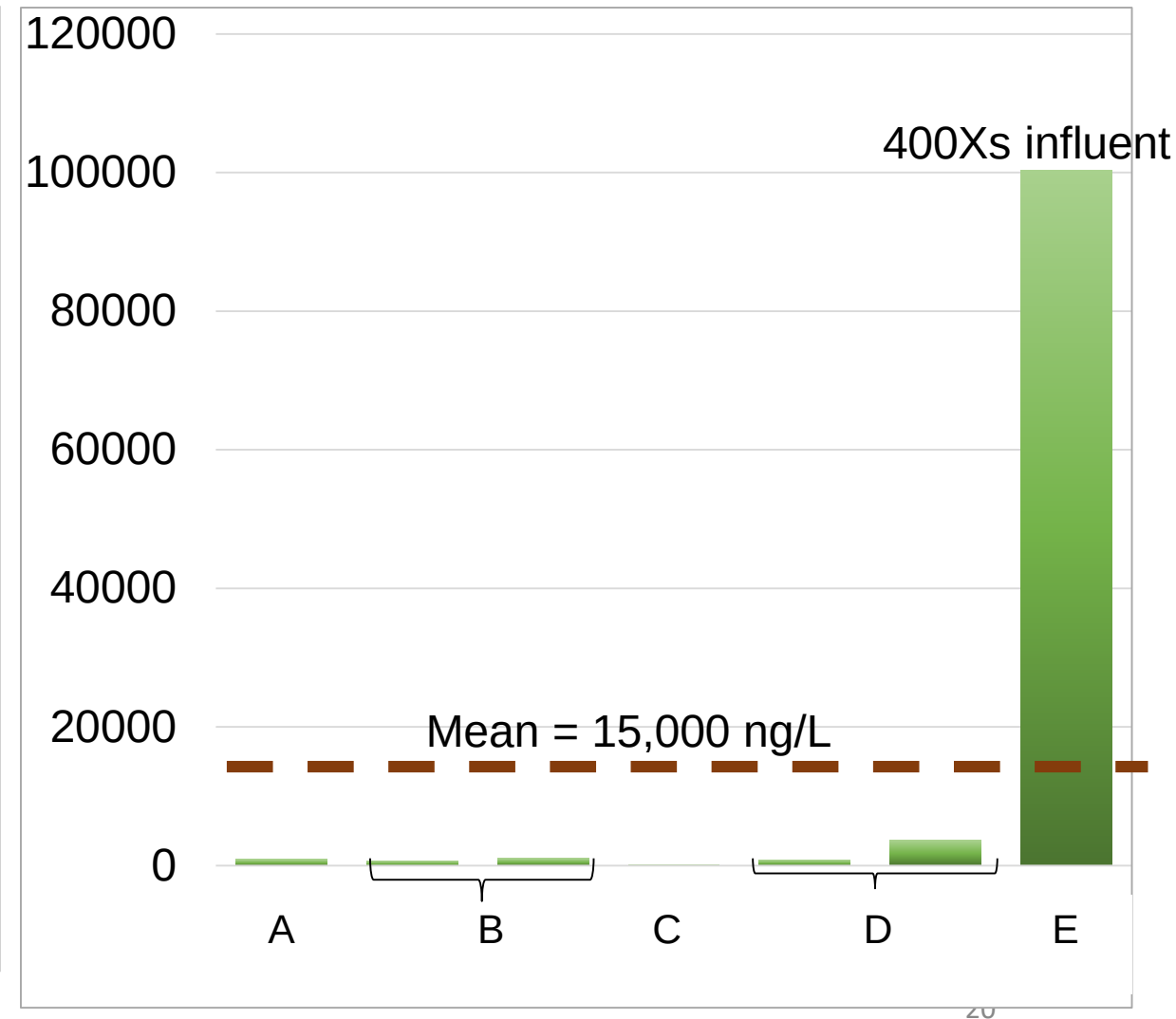
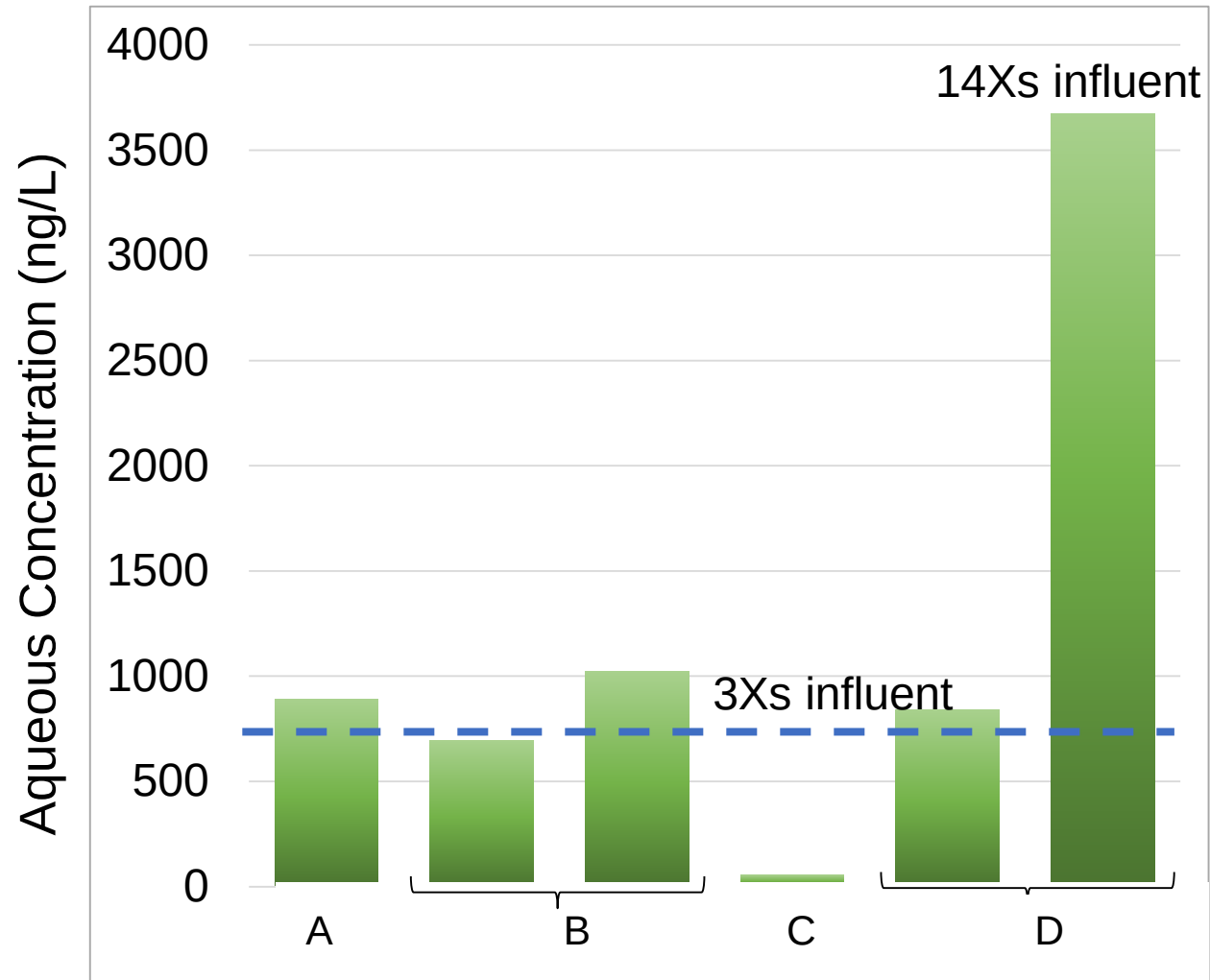


Industrial Laundry Dischargers

- Laundry service other businesses
- Top Laundered textiles
 - Restaurant linens
 - Floor mats
 - Refinery uniforms/rags
 - Medical uniforms and patient gowns, laboratory coats
- Discharge permit ~2.5 MGY
- Pre-treatment

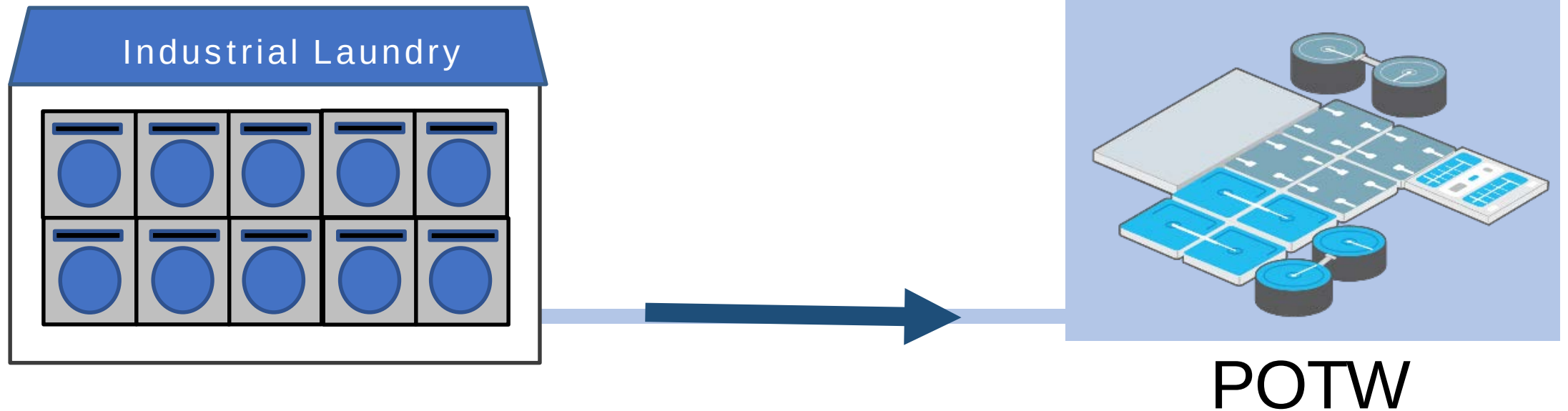


Industrial Laundry Sewershed (TOP)



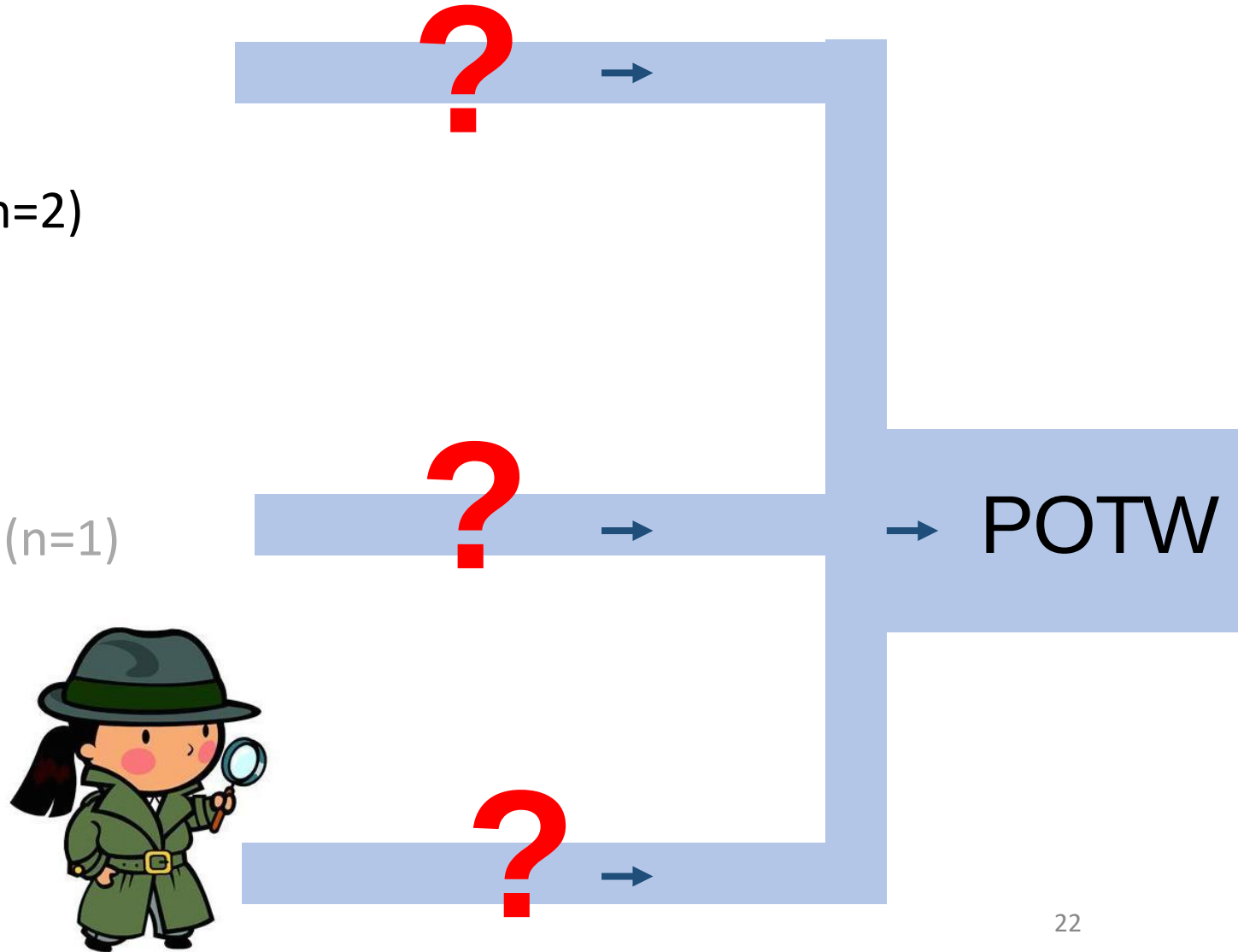
Industrial Laundry Contribution to PFAS Loading at POTW

- Discharge permit ~2.5 MGY
- Mean = 15,000 ng/L sum of PFAS (TOP)
- One facility discharging 0.01% of flows could contribute 1% of PFAS loadings

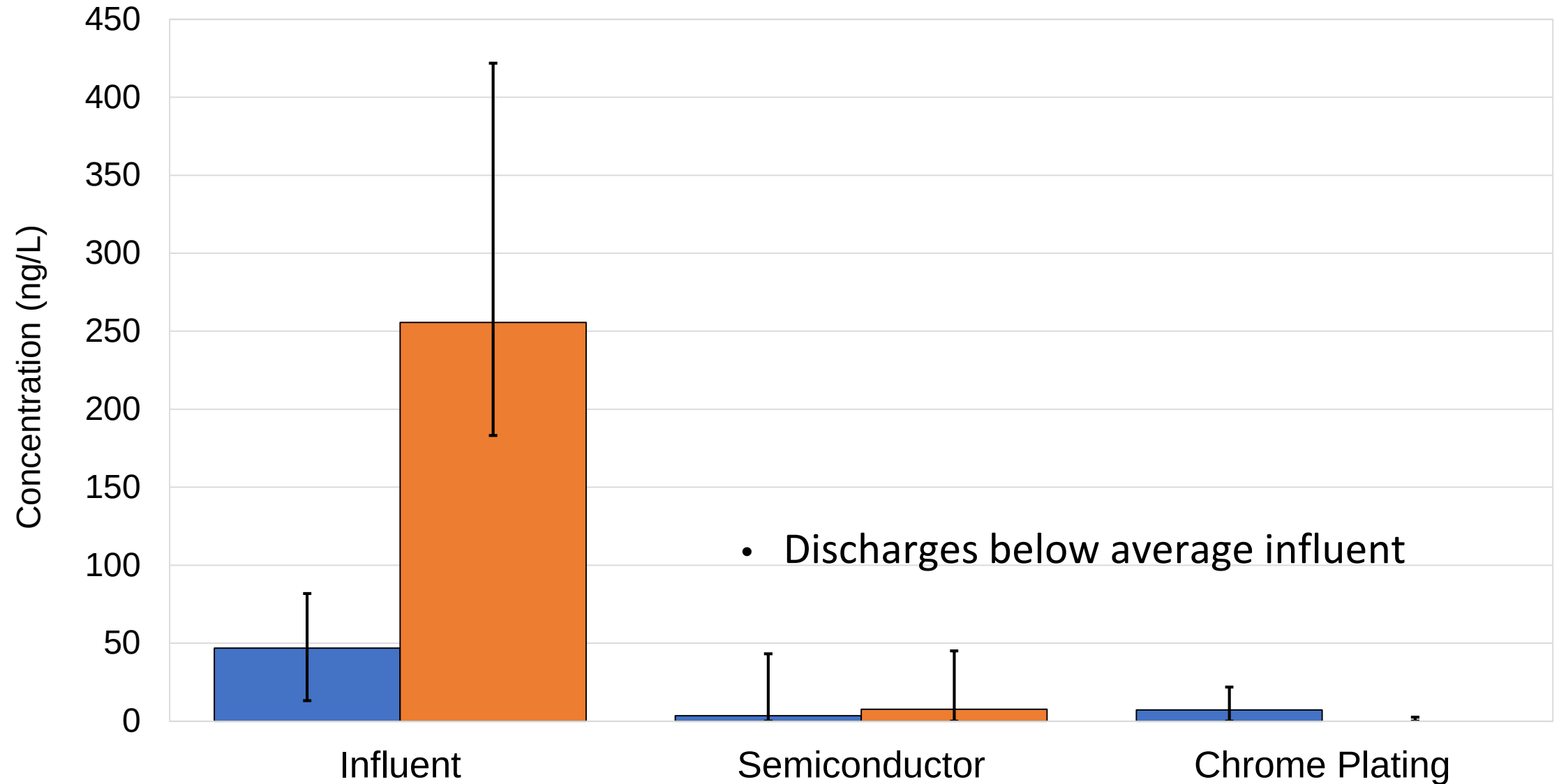


Industrial Discharge Screening Study

- Industrial laundry (n=5)
- Chrome-plating on-site (n=3)
- Semiconductor manufacturing (n=2)
- Hospitals (n=4)
- Military site (n=1)
- Car wash (n=3)
- Pulp paperboard manufacturing (n=1)

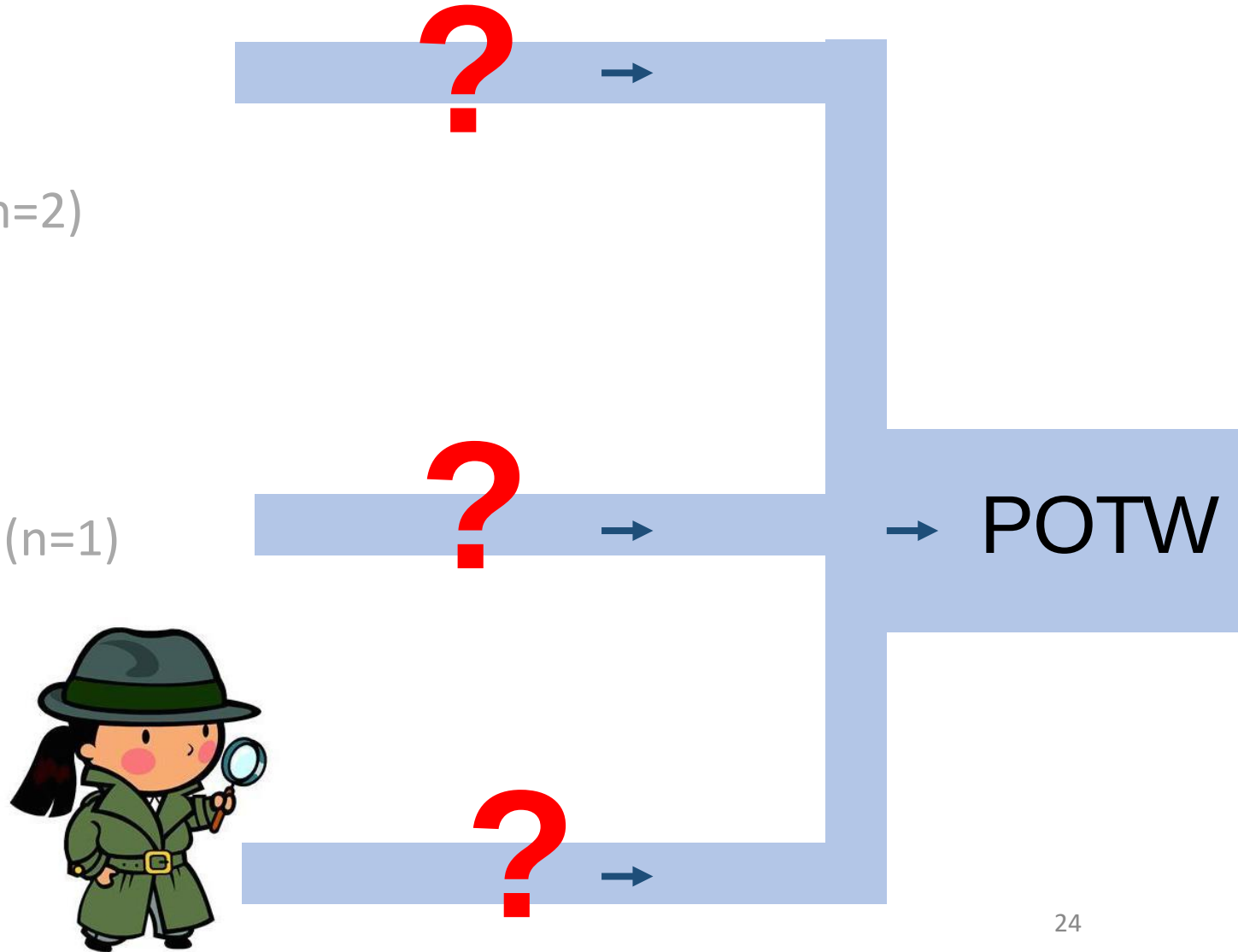


Semiconductor Manufacturing and Chrome-Plating

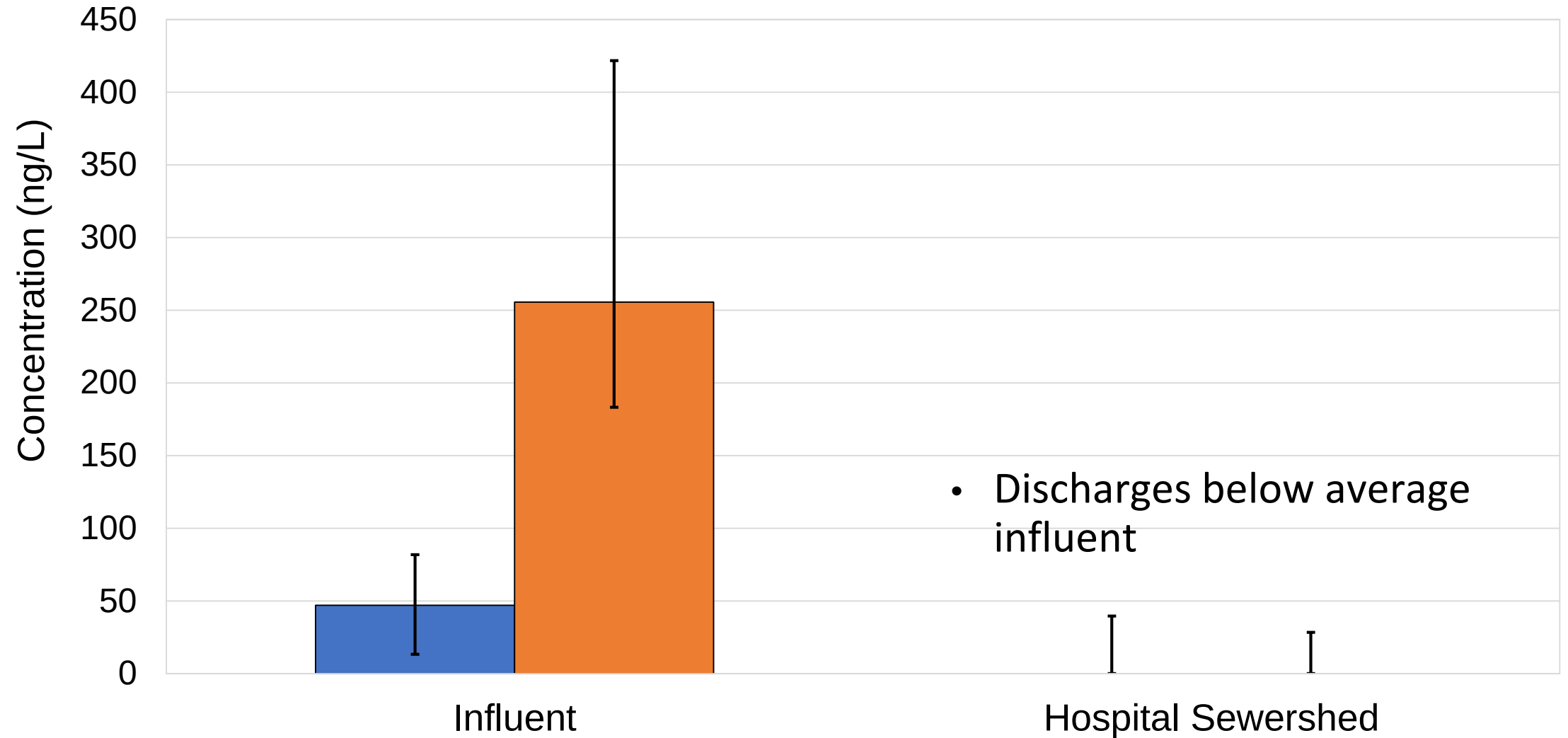


Industrial Discharge Screening Study

- Industrial laundry (n=5)
- Chrome-plating on-site (n=3)
- Semiconductor manufacturing (n=2)
- Hospitals (n=4)
- Military site (n=1)
- Car wash (n=3)
- Pulp paperboard manufacturing (n=1)

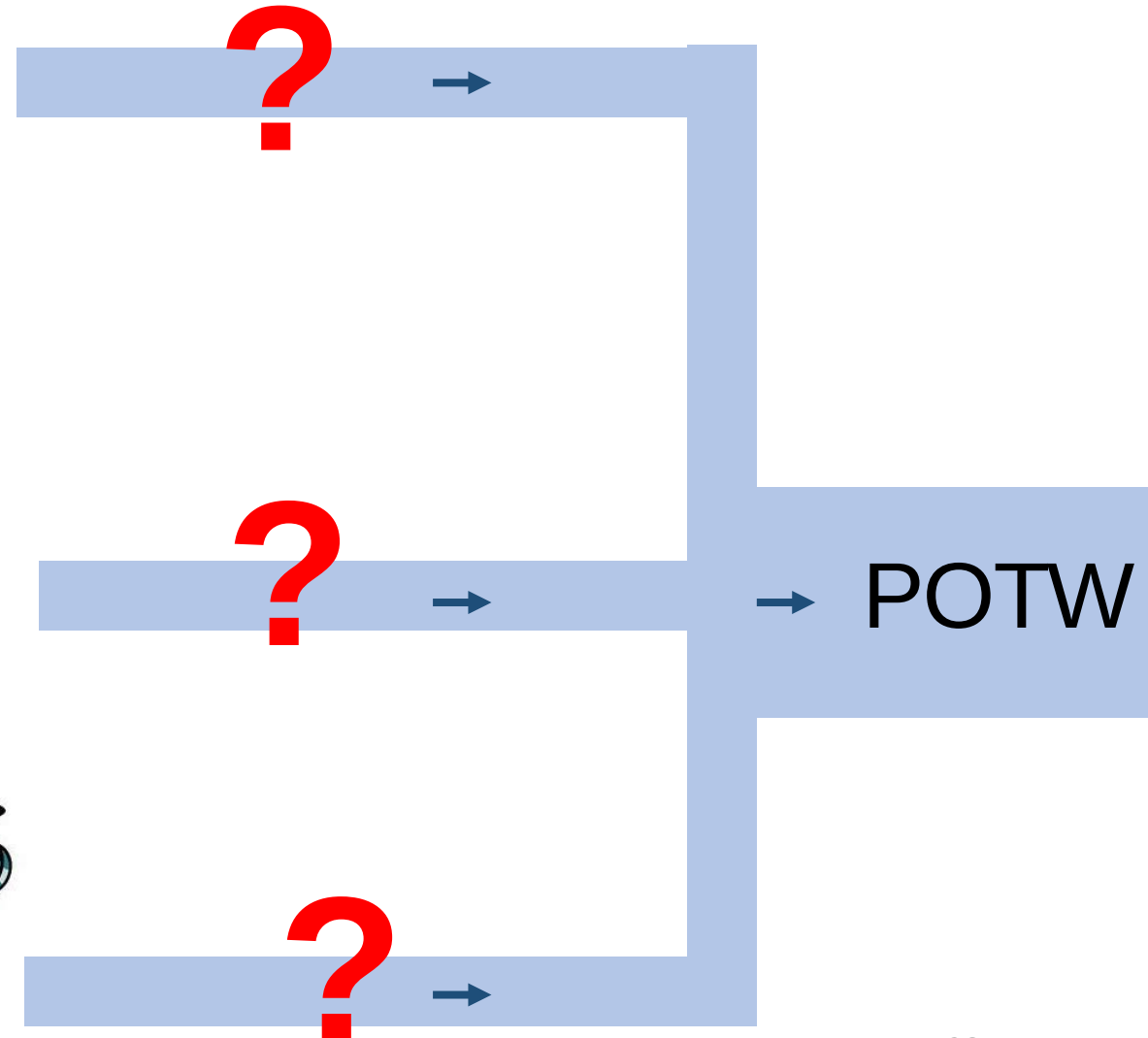


Hospital Sewershed Discharge

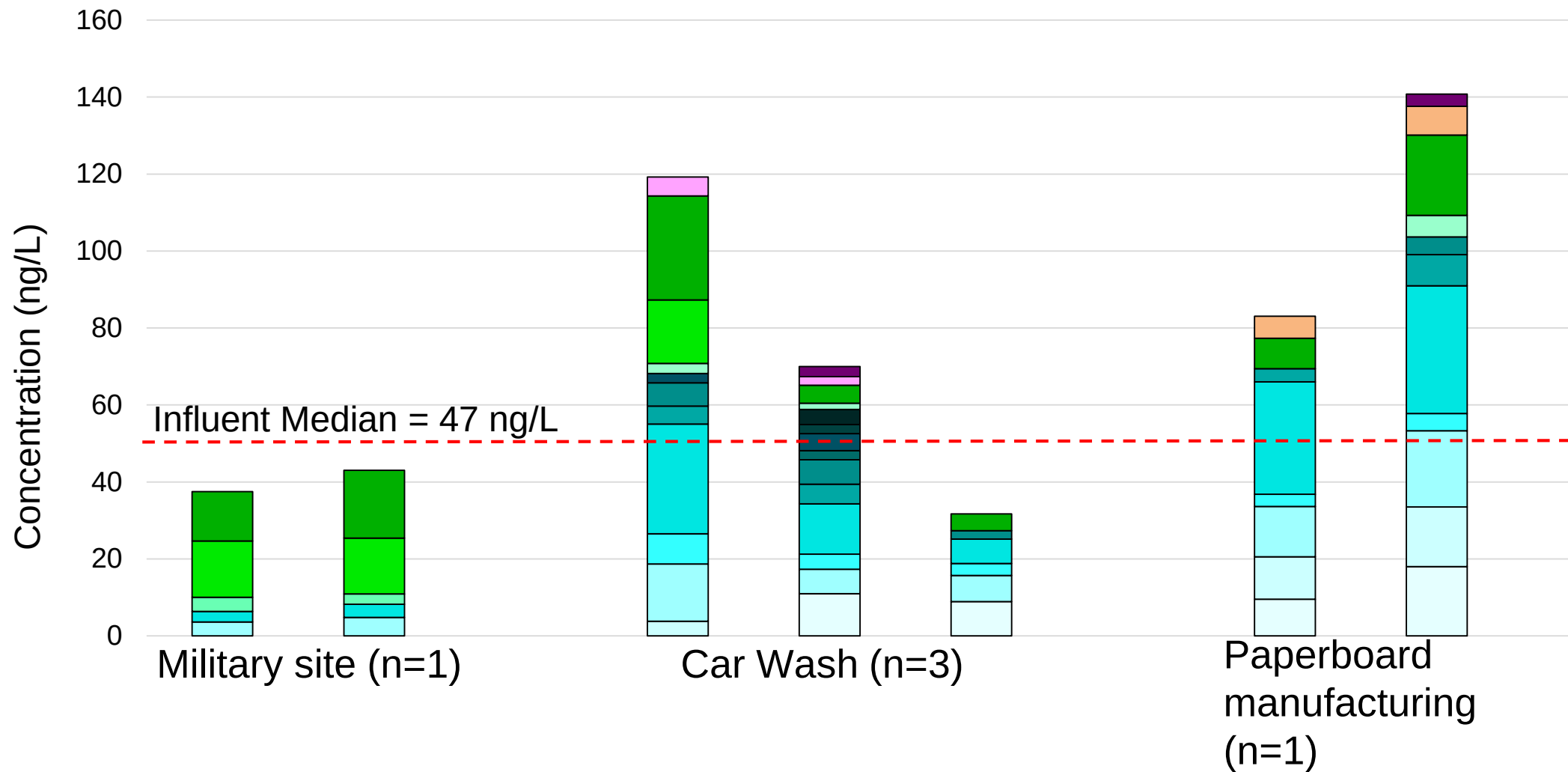


Industrial Discharge Screening Study

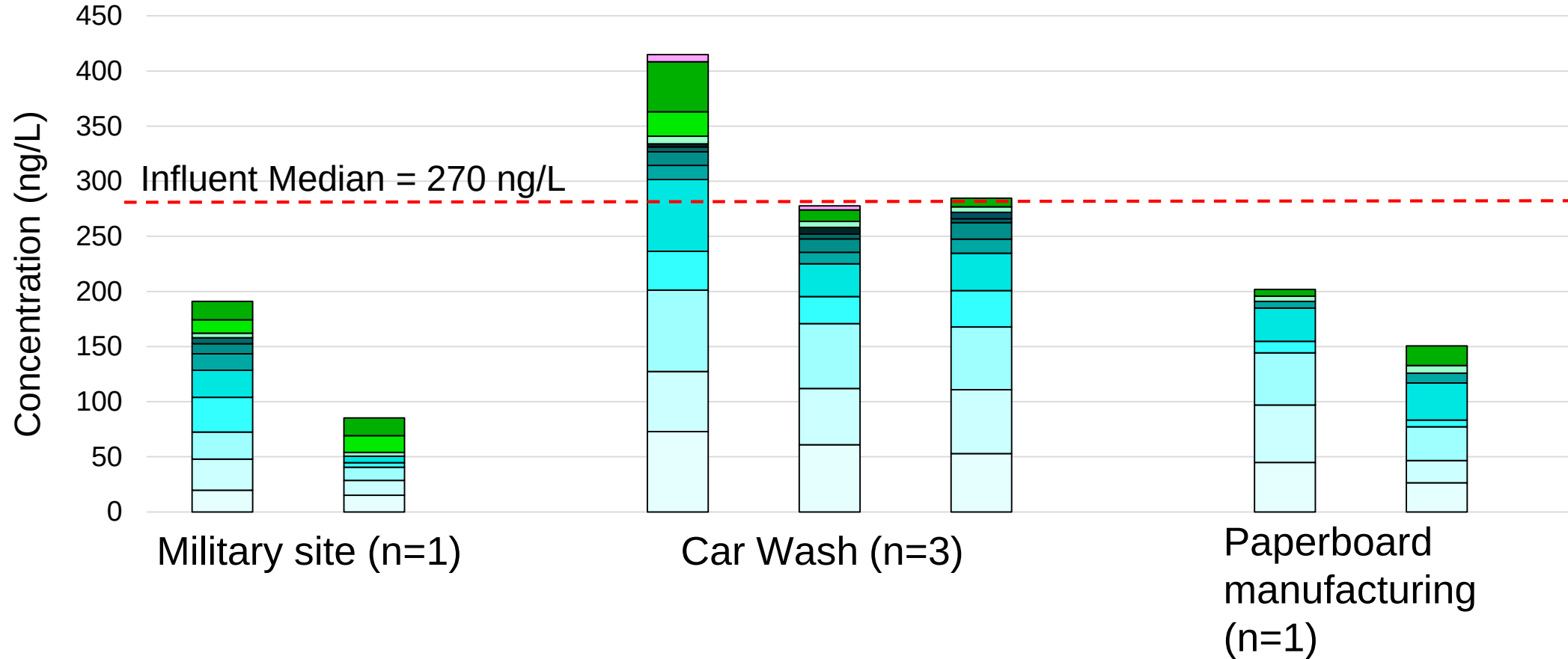
- Industrial laundry (n=5)
- Chrome-plating on-site (n=3)
- Semiconductor manufacturing (n=2)
- Hospitals (n=4)
- Military site (n=1)
- Car wash (n=3)
- Pulp paperboard manufacturing (n=1)
- Jail (n=1)



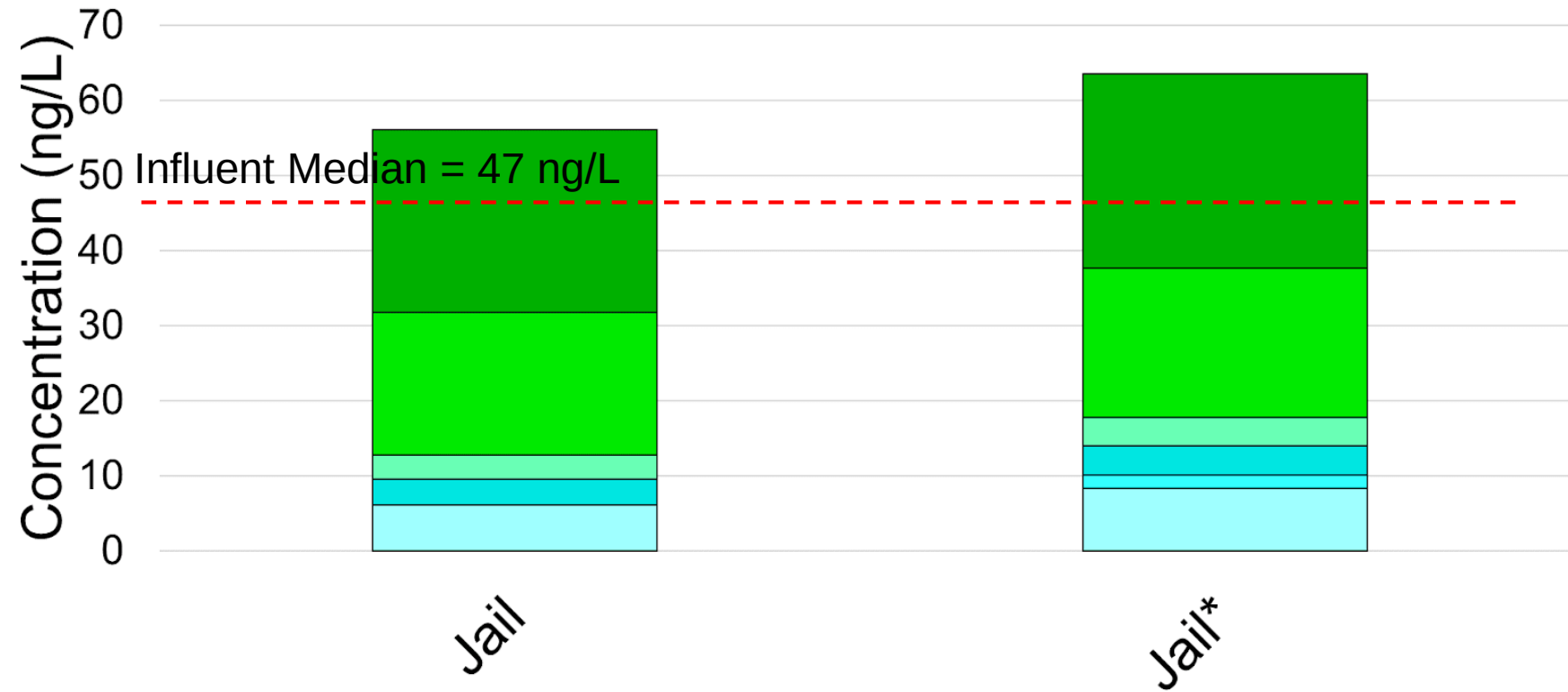
Industrial Discharges (Target)



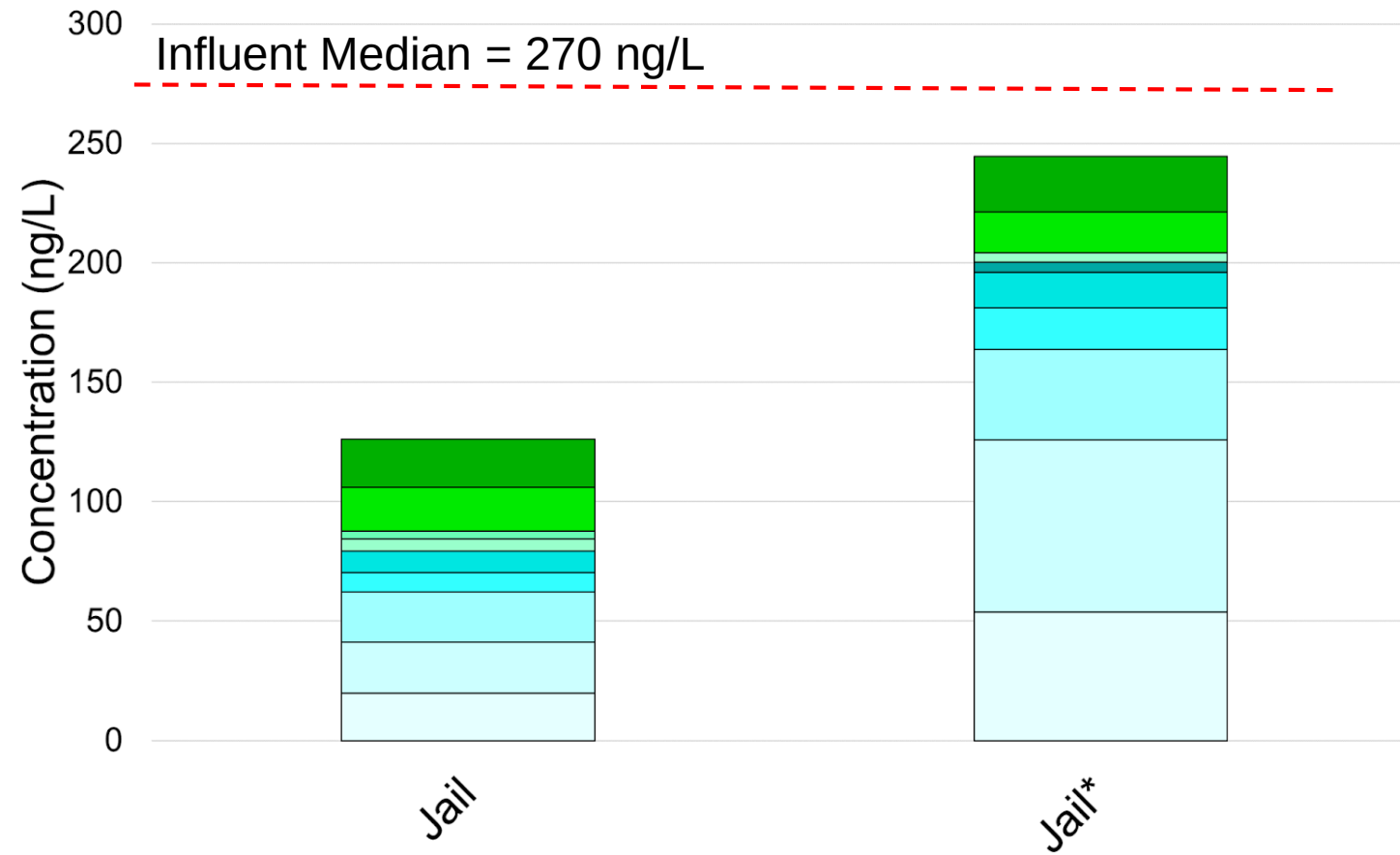
Industrial Discharges (TOP)



Jail (Target)

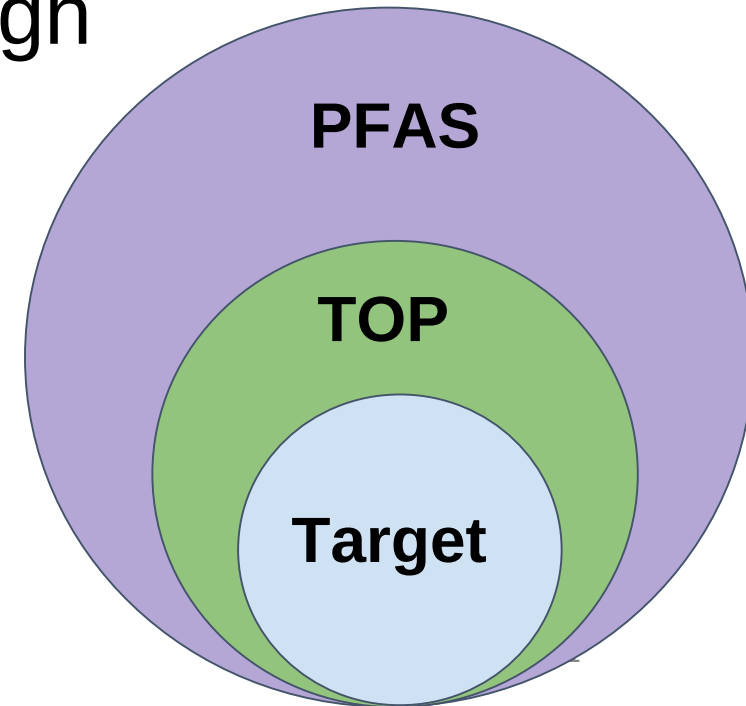


Jail (TOP)



Findings and Lessons Learned

- Applying different analytical methods is important
- Sewershed monitoring is effective
 - Residential discharges are important
 - Industrial laundry discharges have high PFAS concentrations
- Temporal trends suggest declines
- Remaining analytical challenges
- Next steps



More Information

- Final report
- Website: <https://www.sfei.org/projects/pfas>



Questions?

diana@sfei.org

