Management & Communications Strategies for PFAS Occurrence in Local Groundwater and Recycled Water

SINCE 1933

Orange County Water District presentation to
WateReuse California Communications Collaborative Group

August 24, 2023

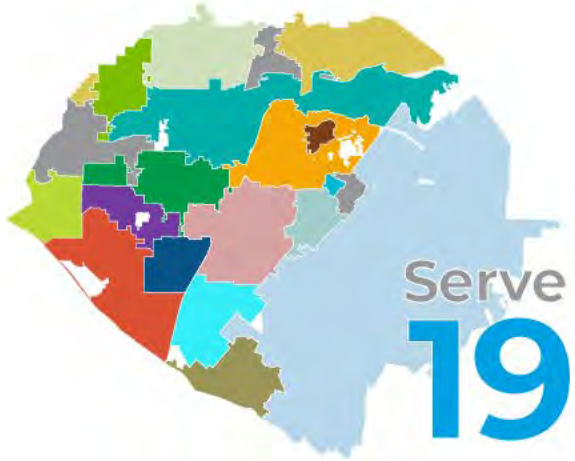
Outline

- Background
- OCWD's Response to PFAS in Local Groundwater Supply
- Managing PFAS in Potable and Non-Potable Reuse
- PFAS Communications Strategies

OCWD AT-A-GLANCE

Formed in
1933

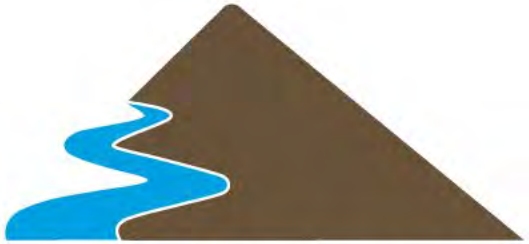
Groundwater Basin provides
85%
drinking water supply



Serve
19
cities and retail water districts in north & central OC

2.5
million people served

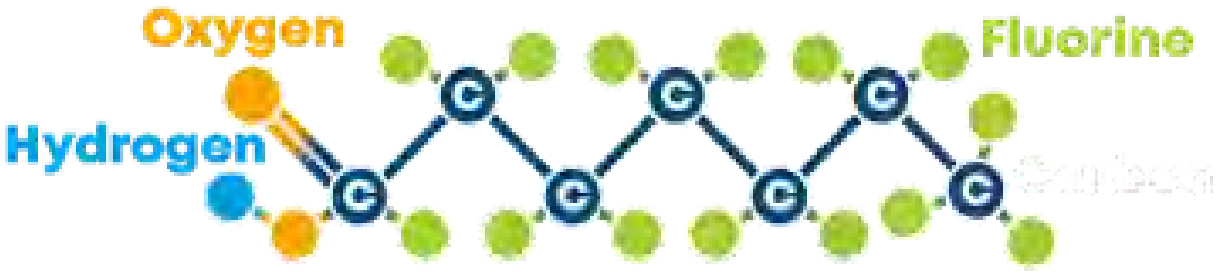
10 board members



Protect rights to Santa Ana River water

What Are PFAS?

PFAS = Per- and Polyfluoroalkyl Substances
(family of thousands of chemicals)



California PFAS Drinking Water Advisories

PFAS Compound	Health Effect	Notification Level (ppt)	Response Level (ppt)
PFOA	Cancer (Pancreatic + Liver)	5.1	10
PFOS	Cancer (Liver)	6.5	40
PFBS	Thyroid Effects	500	5000
PFHxS	Thyroid Effects	3	20

*Additional NLs/RLs anticipated for PFHxA, PFHpA, PFNA, PFDA, ADONA

PFAS Impacts at OCWD

$1B COST

for treatment system capital, O&M, interim replacement water
(over 30 years, and all costs likely to increase)

61 WELLS

need treatment
(possibly more in future)

11 RETAILERS

currently impacted
(cities and water districts)

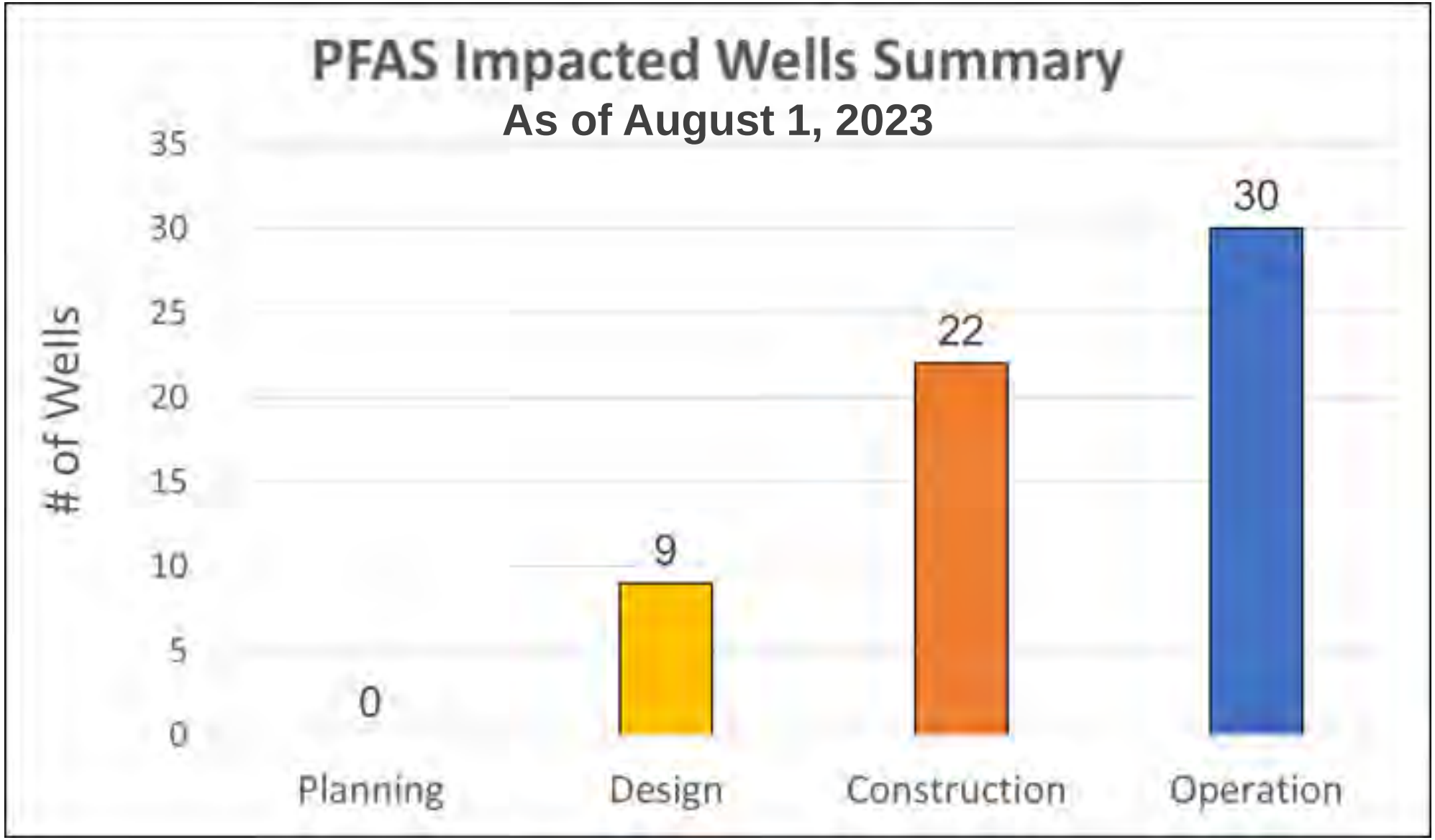
39 SYSTEMS

need to be built to remove PFAS from local well water
(possibly more in future)

Up to 1/3 groundwater basin production unavailable

Policy Response to PFAS Impacts

- Board Policy established in late 2019
  - OCWD to fund 100% of PFAS treatment system capital expense
  - Retail agencies to own & operate treatment system
  - O&M costs split 50/50 between OCWD and retailer
- Supported by non-affected retail agencies
- Two options for capital projects
  - Turnkey OCWD-led project management and contracting
  - Retailer-led with OCWD oversight
- Cost-recovery litigation filed in Dec. 2020

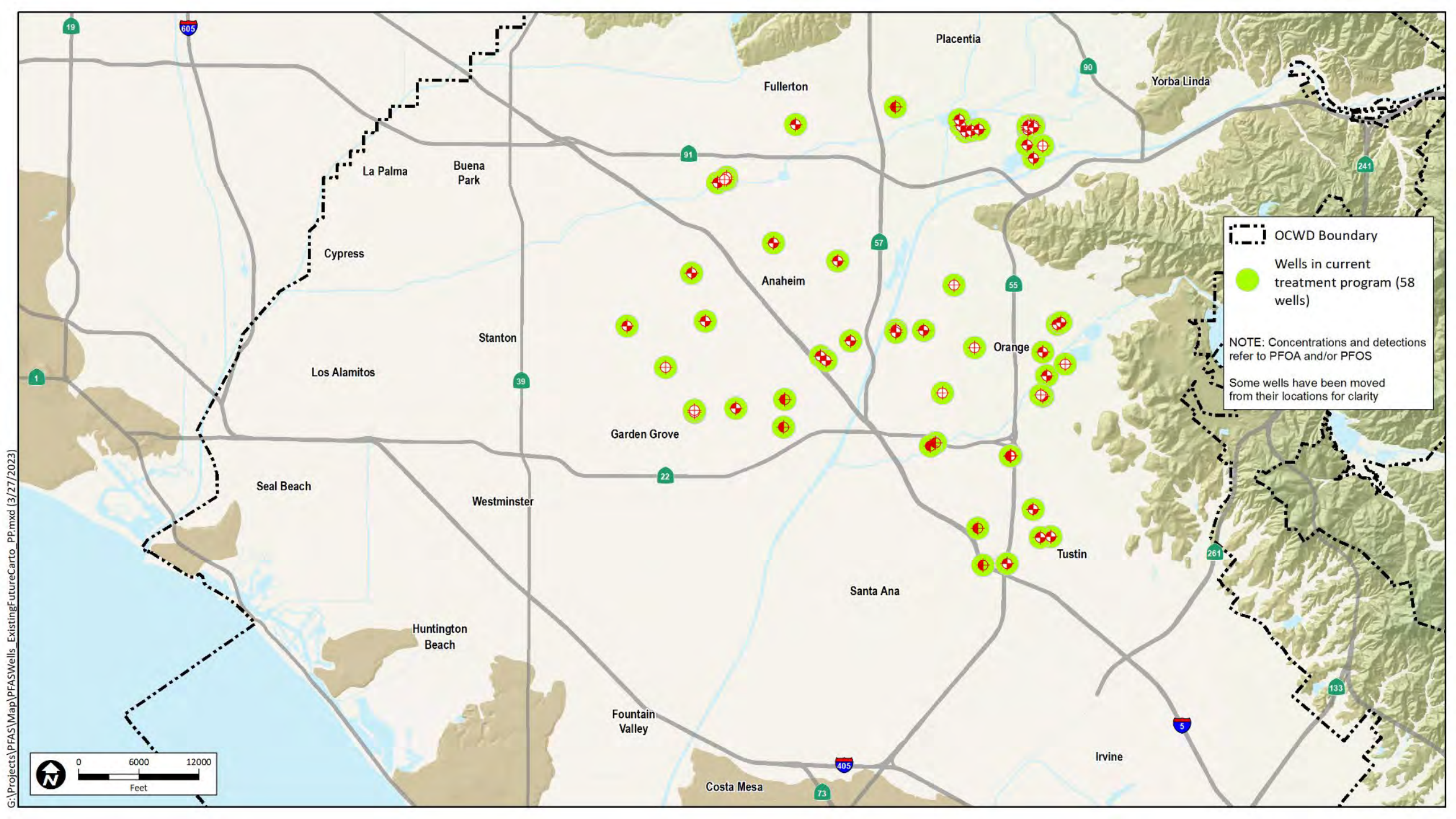


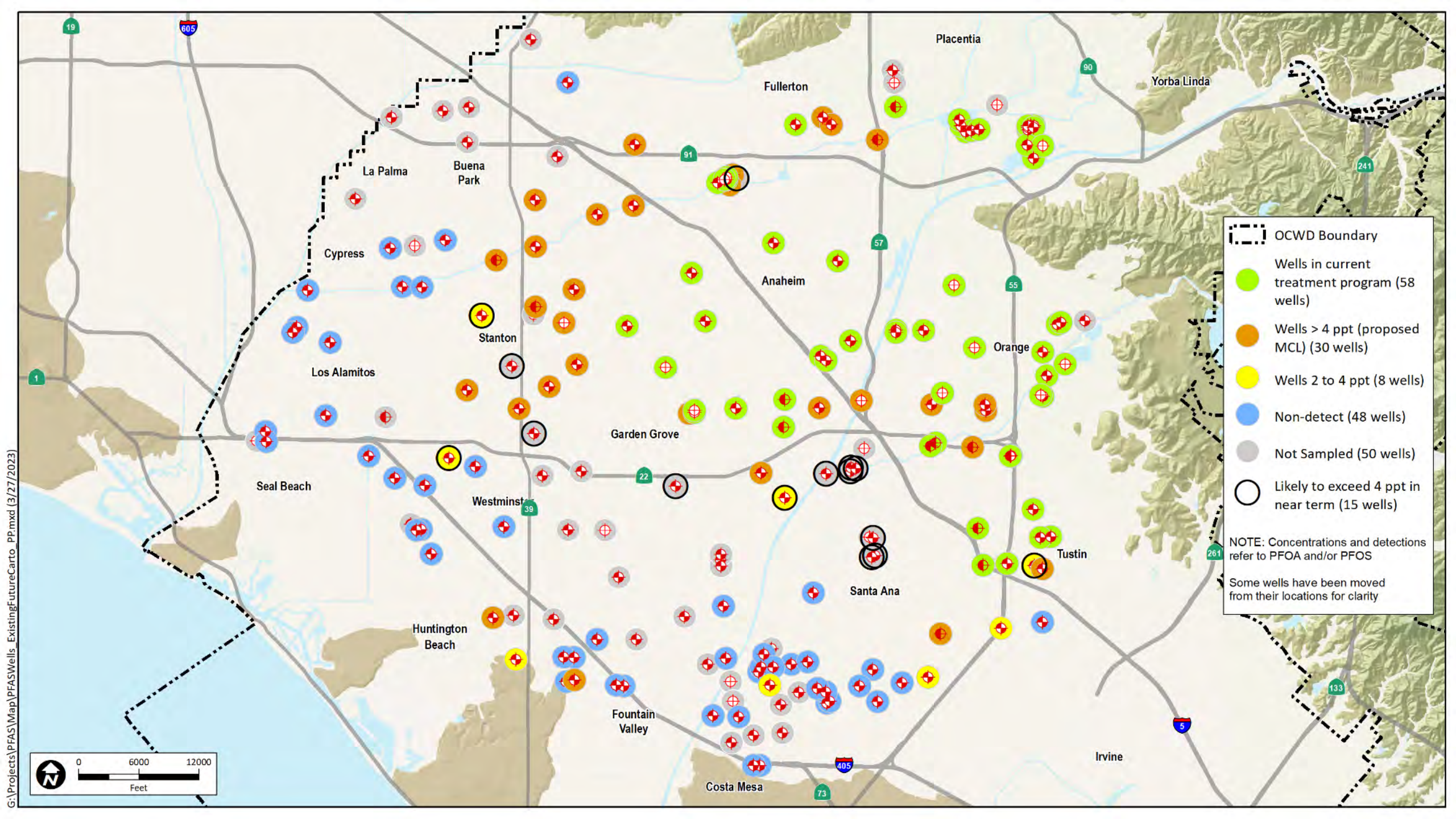
Projected treatment capital cost ~$300 million

U.S. EPA's Proposed PFAS National Primary Drinking Water Regulation

Compound	Health Effect	MCLG	MCL
PFOA	Cancer	0 ppt	4.0 ppt
PFOS	Cancer	0 ppt	4.0 ppt
PFHxS	Thyroid Effects	Hazard Index 1.0	
PFNA	Developmental Effects		
GenX	Liver Effects		
PFBS	Thyroid Effects		

- Officially published in Federal Register on March 29, 2023
- **MCL** = Maximum Contaminant Level *(enforceable)*
- **MCLG** = Maximum Contaminant Level Goal *(non-enforceable)*


OCWD Boundary
Wells in current treatment program (58 wells)
NOTE: Concentrations and detections refer to PFOA and/or PFOS
Some wells have been moved from their locations for clarity
Placentia
Fullerton
Yorba Linda
La Palma
Buena Park
Cypress
Anaheim
Stanton
Los Alamitos
Orange
Garden Grove
Seal Beach
Westminster
Tustin
Santa Ana
Huntington Beach
Fountain Valley
Costa Mesa
Irvine
0
6000
12000
Feet
G:\Projects\PFAS\Map\PFASWells_ExistingFutureCarto_PP.mxd (3/27/2023)

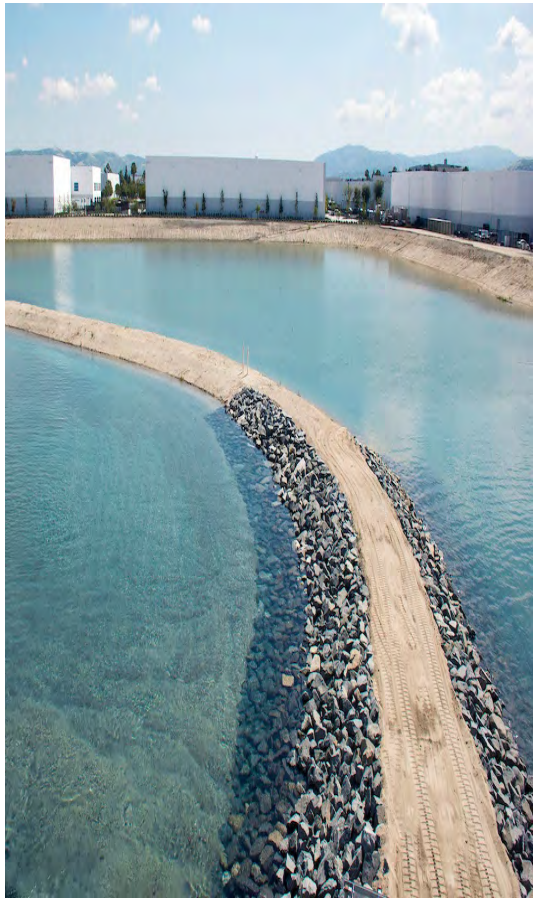

OCWD Boundary
Wells in current treatment program (58 wells)
Wells > 4 ppt (proposed MCL) (30 wells)
Wells 2 to 4 ppt (8 wells)
Non-detect (48 wells)
Not Sampled (50 wells)
Likely to exceed 4 ppt in near term (15 wells)
NOTE: Concentrations and detections refer to PFOA and/or PFOS
Some wells have been moved from their locations for clarity
Placentia
Fullerton
Yorba Linda
La Palma
Buena Park
Cypress
Anaheim
Stanton
Los Alamitos
Orange
Garden Grove
Seal Beach
Westminster
Tustin
Santa Ana
Huntington Beach
Fountain Valley
Costa Mesa
Irvine
0
6000
12000
Feet
G:\Projects\PFAS\Map\PFASWells_ExistingFutureCarto_PP.mxd (3/27/2023)

Groundwater Replenishment System (GWRS)

- Purifies sewer water that would otherwise be discharged to the ocean
- Water sent to seawater intrusion barrier and recharge basins in Anaheim
- Online since January 2008 **(70 MGD)**; expanded May 2015 **(100 MGD)**; Final expansion completed March 2023 **(130 MGD)**
- Recycles 100% of OC San's reclaimable wastewater flows
- Supplies enough water to meet the needs of ~1 million residents

World's largest potable reuse project

Purified product water available to taste



La Palma Recharge Basin in Anaheim

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GWRS

GROUNDWATER REPLENISHMENT SYSTEM

OC SAN
ORANGE COUNTY SANITATION DISTRICT

OC San Secondary Effluent

Low Pressure Membrane Filtration

Backwash Sent to OC San

Reverse Osmosis

Concentrate Discharged to OC San Outfall

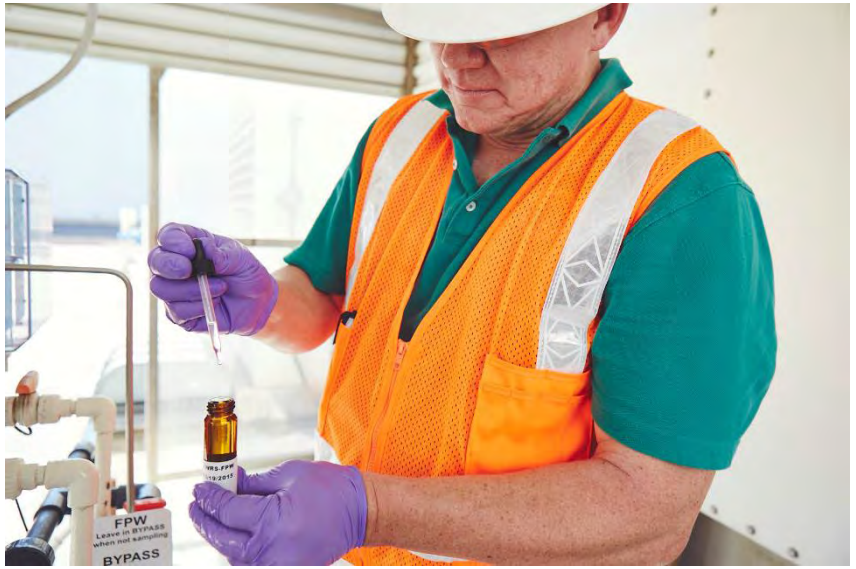
Ultraviolet Light + H_2O_2

Recharge Basins

Seawater Barrier & Mid-Basin Injection Wells

GWRS PFAS Monitoring

- 2017: Began quarterly monitoring with EPA Method 537/537.1 *(18 targets)*
- 2021: Added EPA 533 *(25 targets)*
- 537.1 + 533 → 29 unique PFAS



<u>Reverse Osmosis Product (ROP) & Final Product Water (FPW)</u>

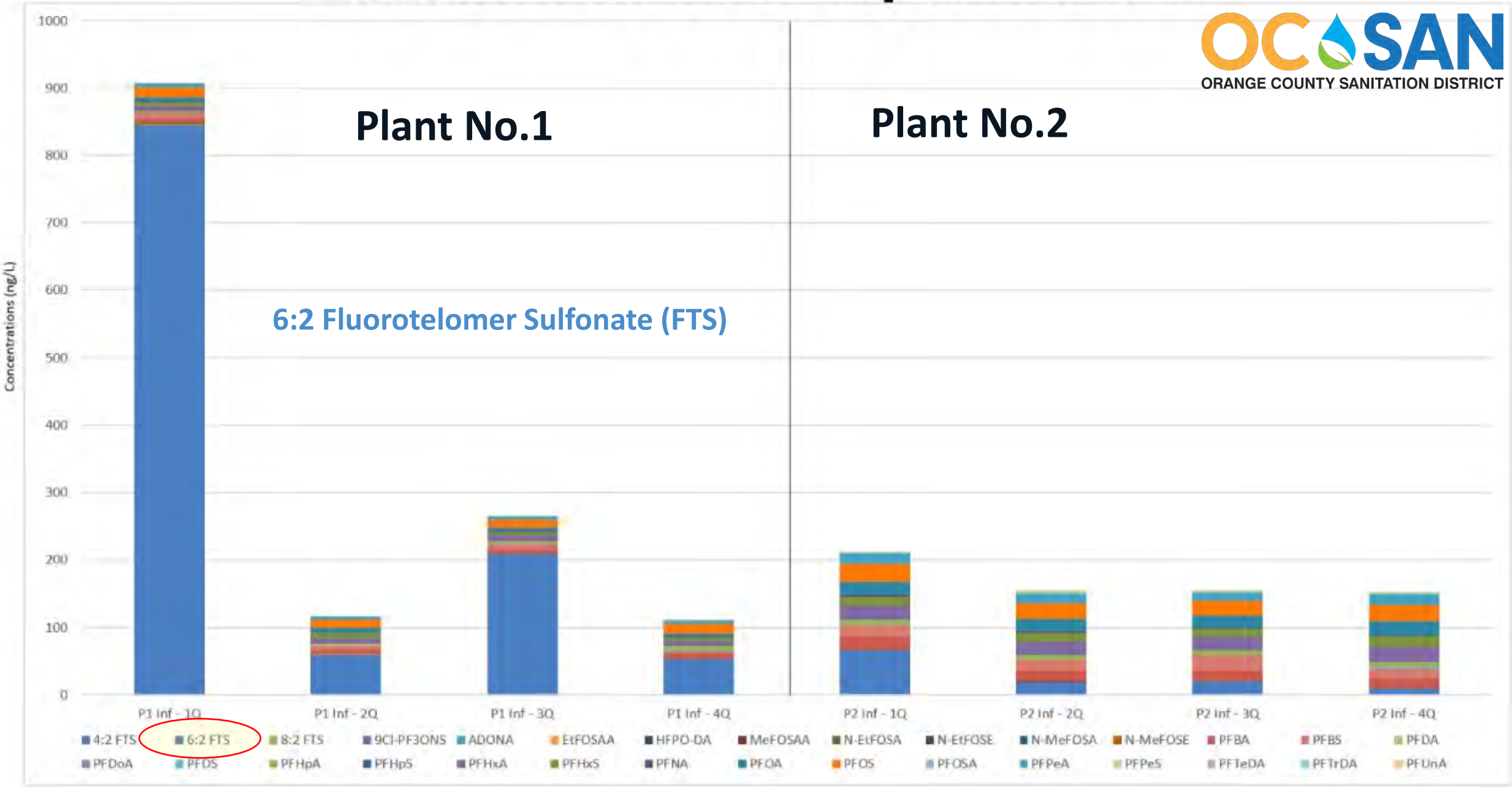
All results **Non-Detect (ND)** for all 29 PFAS compounds tested

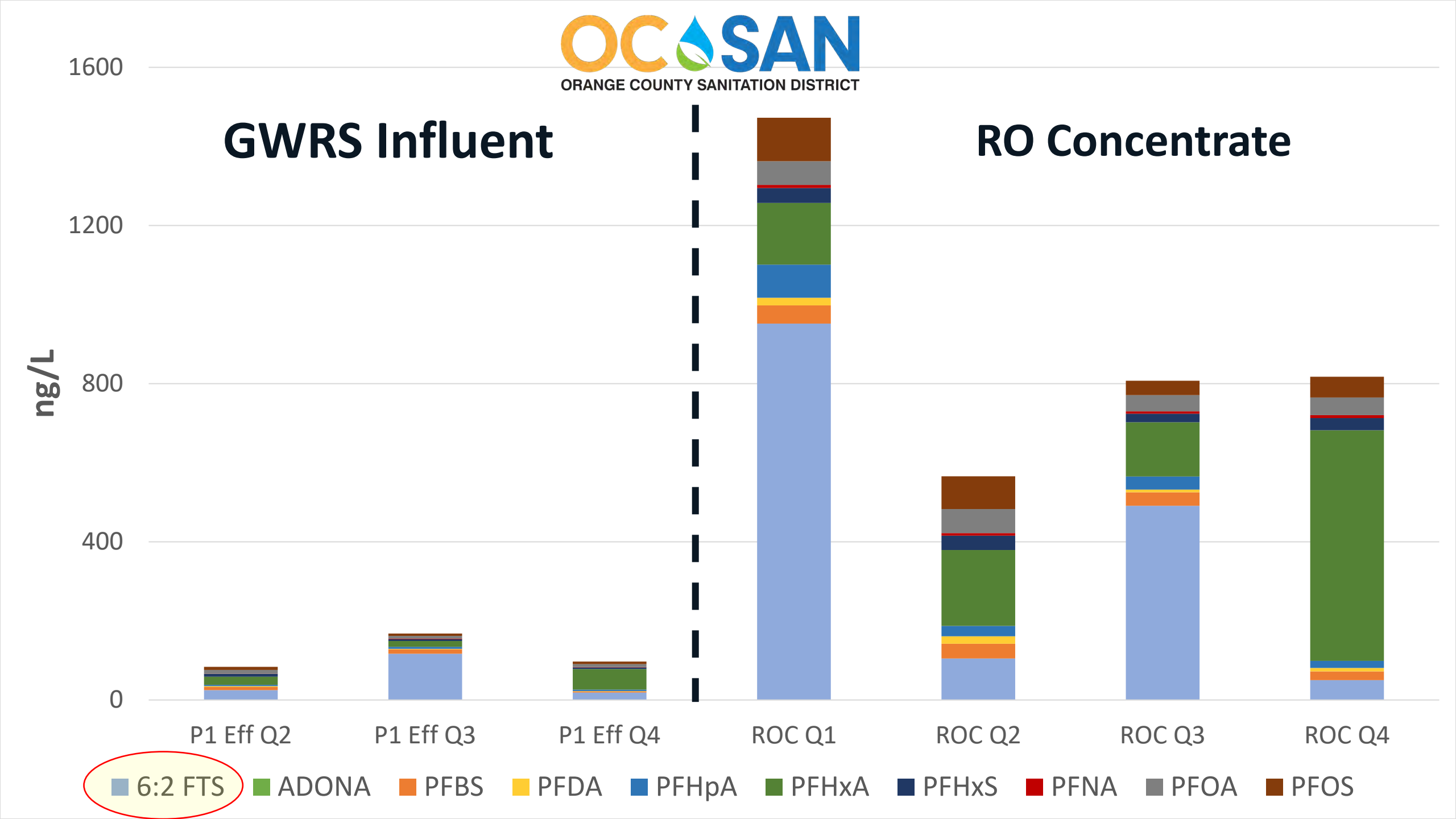
Reverse Osmosis is an effective treatment barrier for PFAS

- Issued statewide to all POTWS > 1 MGD
- One year of quarterly PFAS testing
  - Raw wastewater influent
  - Treated effluent
  - Biosolids
- 31+ PFAS targets via DOD QSM version 5.1 analytical method

OC SAN
ORANGE COUNTY SANITATION DISTRICT

Total Influent Sample Results




OC SAN
ORANGE COUNTY SANITATION DISTRICT
GWRS Influent
RO Concentrate
ng/L
1600
1200
800
400
0
P1 Eff Q2
P1 Eff Q3
P1 Eff Q4
ROC Q1
ROC Q2
ROC Q3
ROC Q4
6:2 FTS
ADONA
PFBS
PFDA
PFHpA
PFHxA
PFHxS
PFNA
PFOA
PFOS

Occurrence of PFAS Compounds in Conventionally Treated Wastewater is Well-Established in Literature

Detection of Poly- and Perfluoroalkyl Substances (PFASs) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants

Xindi C. Hu[*†‡], David Q. Andrews[§], Andrew B. Lindstrom[∥], Thomas A. Bruton[⊥], Laurel A. Schaider[#], Philippe Grandjean[†], Rainer Lohmann[@], Courtney C. Carignan[†], Arlene Blum[⊥▽], Simona A. Balan[•], Christopher P. Higgins[○], and Elsie M. Sunderland[†‡]

Chemosphere 72 (2008) 1541–1547

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

Perfluorochemicals in water reuse

Megan H. Plumlee [a], Jeannine Larabee [b], Martin Reinhard [a,*]

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[b] Santa Clara Valley Water District, 5750 Almaden Expressway, San Jose, CA 95118, USA

Journal of Environmental Sciences
Volume 61, November 2017, Pages 80-90

1,596 Views
147 CrossRef citations to date
9 Altmetric

ARTICLES

Perfluoroalkyl sulfonic and carboxylic acids: A critical review of physicochemical properties, levels and patterns in waters and wastewaters, and treatment methods

Sierra Rayne & Kaya Forest

Pages 1145-1199 | Received 05 May 2009, Published online: 04 Sep 2009
Download citation https://doi.org/10.1080/10934520903139811

Contribution of precursor compounds to the release of per- and polyfluoroalkyl substances (PFASs) from waste water treatment plants (WWTPs)

Ulrika Eriksson [1], Peter Haglund [2], Anna Kärrman [1]

Quantitative Determination of Fluorinated Alkyl Substances by Large-Volume-Injection Liquid Chromatography Tandem Mass Spectrometry – Characterization of Municipal Wastewaters

Melissa M. Schultz[†], Douglas F. Barofsky[†], and Jennifer A. Field[*†‡]

PFAS and Non-Potable Reuse

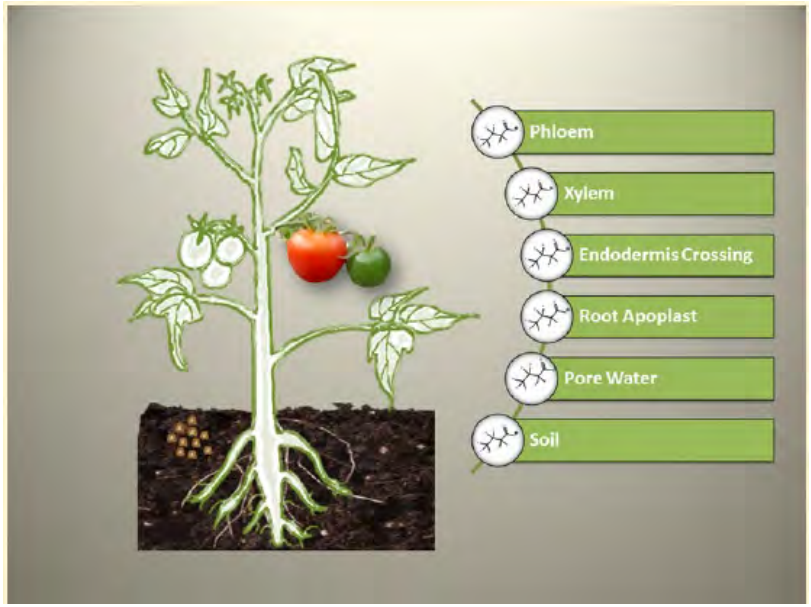
- No CA regulations or effluents limits (yet)
- POTW State Board PFAS Monitoring Orders for 2020-2021
- PFAS Monitoring Requirements being added to NDPES permits
- Potential drivers for regulation
  - Impacts to underlying groundwater
  - Effects on aquatic life & habitat
  - Effects on specific end users/customers/beneficial uses

OCWD 2020 Literature Review on PFAS Update by Food Crops

- Reviewed five (5) peer-reviewed scientific publications
- Studies published in 2013 – 2019
  - Three (3) studies on PFAS transfer from water/soil to crop/plant tissue
  - One (1) study tested ~20 vegetables in 4 European countries
  - One (1) publication was a review paper of several studies

Literature Review Summary

- Crop uptake depends on multiple factors
  - Concentration of PFAS in water and soil
  - Crop type
  - Part of crop (e.g., roots vs. stems vs. leaves)
  - Type of PFAS (e.g., short chain vs. long chain)
- Higher concentrations of soil or water PFAS → greater uptake
  - Minimal uptake observed with “background” PFAS levels in recycled water or biosolids
  - Greater uptake industrial discharge has affected effluent or biosolids
- Short-chain uptake > Long-chain uptake

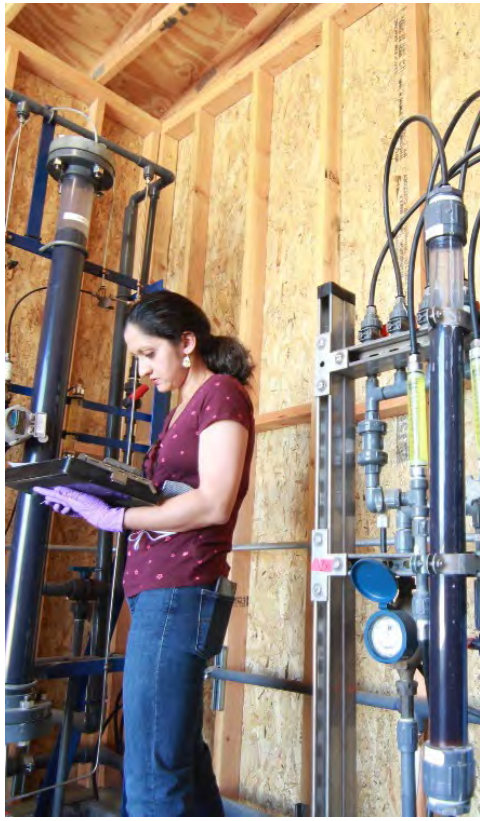


OCWD Responds

- [x] Formed PFAS taskforce with OCWD retailers
- [x] Adopted PFAS policy reflecting an all-for-one and one-for-all management approach
- [x] PFAS policy funds 100% design and construction of treatment plants & 50% of ongoing operations and maintenance)
- [x] Implemented nation’s largest pilot testing program to test treatment techniques to remove PFAS
- [x] Engaged in litigation

Communications & Outreach Goals

- Be early and proactive
- Develop clear, consistent messaging
- Communicate frequently
- Maintain public trust in local water supplies



Tactics

- Approached media early to tell our story
- Developed robust coalition of impacted agencies
- Created broad contact database to send communications
- Held regular meeting of the PFAS taskforce

NEWS › ENVIRONMENT

PFAS toxins found in drinking water throughout Southern California

'Forever chemicals' rapidly emerging as a potential health threat.

Yorba Linda Water District General Manager Marc Mercantonio talks about the sandy nature around the basins that capture water from the Santa Ana River and recharge the groundwater basin, while visiting one of those basins at the Santa Ana River Lakes in Anaheim, CA on Monday, August 26, 2019. Recently testing for PFAS chemicals in the district's wells showed results within acceptable levels but an expected lowering of regulatory levels could force the district to shut wells down and possibly import all its water. (Photo by Paul Bersebach, Orange County Register/SCNG)

By MARTIN WISCKOL | Orange County Register

PUBLISHED: August 30, 2019 at 6:41 a.m. | UPDATED: January 17, 2020 at 11:32 a.m.

Communication Assets

- PFAS education center
- Press releases
- FAQ
- Construction outreach toolkit
- Videos
- E-newsletter and stakeholder updates
- Webinars
- Presentations, meetings, events, public updates

Legislative Outreach

- Frequent meetings with state and federal officials
- Hold polluters accountable
- Exempt water/wastewater agencies from cleanup liability
- Need funding

Takeaways for Success

- [x] Be proactive and tell your own story; pivot when necessary
- [x] Highlight history of innovation and water quality
- [x] Engage legal
- [x] Collaborate with others, share best practices, serve as a resource
- [x] Keep communicating and don’t take your foot off the pedal

Thank You!

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