UPDATE ON PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) REGULATIONS AND WATER TREATMENT APPROACHES

Riverside Public Utilities

Board of Public Utilities

July 28, 2025

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BACKGROUND

Per- and Polyfluoroalkyl Substances (PFAS) are human-made chemical compounds, a group of more than 12,000 substances of emerging contaminants of concern.

1. Designed to repel oil and water
2. Known as "forever chemicals"
3. Bioaccumulate in living organisms
4. Potential to cause adverse human and ecological health effects

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ABBREVIATIONS & ACRONYMS

- $/kgal Dollar per 1,000 gallons
- ACWA Association of California Water Agencies
- AWWA American Water Works Association
- CA California
- DBCP Dibromochloropropane
- DDW Division of Drinking Water a division of the SWRCB
- EPA Environmental Protection Agency - Federal regulatory agency
- GAC Granular activated carbon
- Gen X Trade name for a processing aid technology used to make high-performance fluoropolymers
- GPM Gallons per minute
- HFPO-DA Hexafluoropropylene oxide dimer acid
- HI Hazard index
- IX Ion exchange
- JWN John W. North
- MCL Maximum contaminant level
- NL Notification level
- NPDWR National primary drinking water regulation

ABBREVIATIONS & ACRONYMS

- NPV Net present value (estimated in 2022)
- O&M Operation & Maintenance
- PFAS Per and polyfluoroalkyl substances
- PFBS Perfluorobutane sulfonic acid
- PFHxS Perfluorohexane sulfonic acid
- PFNA Perfluorononanoic acid
- PFOA Perfluorooctanoic acid
- PFOS Perfluorooctane sulfonic acid
- PPB Parts per billion
- PPT Parts per trillion
- PV Present value (estimated in 2022)
- RFP Request for proposals
- RL Response level
- RPU Riverside Public Utilities
- SWRCB State Water Resources Control Board - State regulatory agency
- TCE Trichloroethene
- TM Transmission main
- WTP Water treatment plant

LEGISLATIVE HISTORY

1. In May 2016, US EPA issued a lifetime health advisory for (PFOS) and (PFOA) for drinking water, to notify customers of the presence of levels over 70 parts-per-trillion (ppt).
2. In July 2018, State Water Resources Control Board, Division of Drinking Water (DDW) established an interim notification level (NL) of 14 ppt for PFOA and 13 ppt for PFOS and a single response level (RL) of 70 ppt for the combined concentrations of PFOA and PFOS.
3. In August 2019, DDW revised the NL to 6.5 ppt for PFOS and 5.1 ppt for PFOA. RL remains at 70 ppt.
4. On February 6, 2020, DDW issued updated drinking water RL of 10 ppt for PFOA and 40 ppt for PFOS based on a running four-quarter average.

LEGISLATIVE HISTORY CONT.

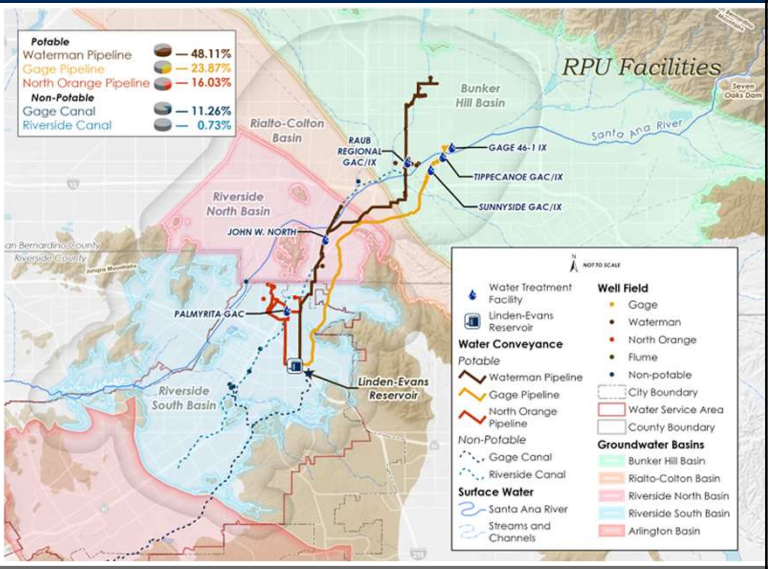
5. On March 5, 2021, DDW issued a drinking water NL of 500 ppt and RL of 5,000 ppt for PFBS.
6. On October 31, 2022, DDW issued a drinking water NL of 3 ppt and RL of 20 ppt for PFHxS.
7. On March 14, 2023, US EPA proposed MCL's for six (6) compounds: PFOA: 4 ppt, PFOS: 4 ppt, PFHxS 10 ppt, Gen X 10 ppt, PFNA 10 ppt and a Hazard Index (HI) not to exceed 1 for: PFNA, PFHxS, PFBS, and GenX (HI is made up of a sum of fractions).
8. On August 6, 2025, DDW will be discussing reducing NLs for PFOA and PFOS to 4 ppt, RL for PFHxS to 10 ppt and creating a PFHxA NL at 1 ppb and RL of 10 ppb at the State Water Board meeting.

ACTIONS

1. On October 28, 2019, the Board of Public Utilities approved a PFAS study.
2. On May 23, 2022, the Board of Public Utilities received and filed an update on the Per and Polyfluoroalkyl Substances Updates.
3. In November 2022, staff received the final report from the consultant, HDR, outlining a cost-effective and optimized long-term treatment strategy for reducing PFOA and PFAS.
4. On November 14, 2022, staff presented the results of the PFAS removal demonstration study at the Palmyrita Treatment Plant to the Board of Public Utilities.
5. On June 12, 2025, staff presented a PFAS update to the Mobility & Infrastructure Committee.

DISCUSSION

1. Forty-Five groundwater wells extract water from the Riverside, Rialto Colton and Bunker Hill groundwater basins.
2. Several wells are treated with GAC and/or IX to remove anthropogenic compounds.
3. Three transmission mains convey the City's domestic groundwater to a 32 million-gallon central reservoir complex, where it receives final treatment via blending and disinfection before being delivered to customers.



DISCUSSION

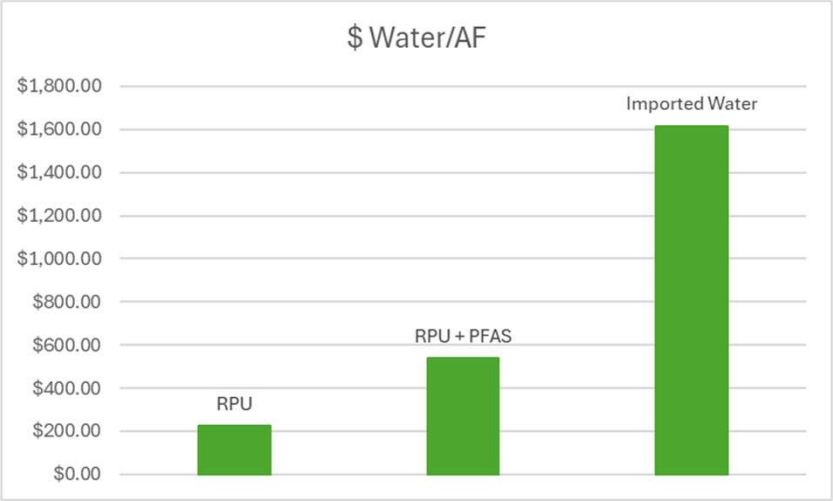
1. Water samples from more than 30 wells exceed the existing State notification levels for PFAS.
2. Treatment capacity is still capable of combining water sources to reduce PFAS concentrations during low demand season, but in high water demand periods, it will exceed the PFAS Federal limits without additional treatment or turning off wells with high PFAS concentrations.
3. Three (3) alternatives with two (2) commercially and readily available PFAS treatment technologies, GAC and IX, were identified to reduce the concentrations as part of the HDR Study.

GAC 20-Year Life Cycle Cost Estimate is Higher than that of IX

Parameter	Granular Activated Carbon			Ion Exchange		
	Alt 1 – Regional	Alt 2 – North Orange & Palm Meadows	Alt 3 – North Orange & JWN	Alt 1 – Regional	Alt 2 – North Orange & Palm Meadows	Alt 3 – North Orange & JWN
Design Capacity (gpm)	23,458	10,850	12,454	23,458	10,850	12,454
Capital Cost	$84 M	$35 M	$38 M	$63 M	$24 M	$27 M
NPV Total O&M	$238 M	$107 M	$117 M	$248 M	$108 M	$124 M
Total PV	$322 M	$142 M	$156 M	$311 M	$132 M	$151 M
Annual $/kgal Treated	$1.30	$1.24	$1.19	$1.26	$1.16	$1.15

WATER SOURCE COMPARISION

Riverside also considered utilizing imported water in lieu of local groundwater, but this was not a cost-effective solution.



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DISCUSSION

The data below compares PFAS concentrations at RPU's drinking water compliance point to the Federal and State standards.

Units in parts per trillion (ppt)	PFOA	PFOS	GenX	PFBS	PFNA	PFHxS	HI (<100%)
CA Notification Level	**5.1**	**6.5**		500		**3**	
Compliance Point (7th & Chicago) *	**ND - 4.7**	**ND - 6.4**	ND	ND - 4	ND	**ND -5.5**	
Health-Based Value and EPA MCL	**4**	**4**	10	2000	10	**10**	
Hazard Index (HI) in %			0%	0-0.002%	0%	**0-61%**	0-61%

*Data ranges 2019-current. SWRCB-DDW proposed MCLs are anticipated this year.

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DISCUSSION

1. The analysis revealed that an additional local treatment plant on the Waterman transmission main would be needed in addition to the optimum alternative proposed by the consultant HDR.
2. Staff also modified the Alternate 2 proposal to expand the current Palmyrita WTP, which will provide treatment on the North Orange transmission main.

The table below shows the amount of reduction needed to meet the regulations.

Units in parts per trillion (ppt)	PFOS	PFOA	PFHxS
CA Notification Level (NL)	6.5	5.1	3
Percent Reduction to NL	38%	25%	70%
EPA MCL	4	4	10*
Percent Reduction to MCL	62%	31%	21%

*PFHxS MCL is part of the Hazard Index (HI)

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DISCUSSION

1. On January 24, 2022, the Board of Public Utilities approved the Drinking Water Quality Policy Principles.
2. On February 22, 2022, the City Council adopted the Drinking Water Quality Policy Principles.
3. The nine water quality policy principles guide RPU in its compliance with drinking water standards, as well as its coordination with Federal and State policies and agreements with responsible parties.
4. RPU is actively collaborating with regulatory agencies, water association workgroups and has been evaluating and developing treatment options to reduce PFAS levels and meet regulatory requirements.

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DISCUSSION

1. RPU's low water rates are a result of the City's success in mitigating higher treatment costs by successfully holding polluters responsible for groundwater contamination. Over the last 30 years, this effort has provided funding for five of the six water treatment plants to reduce contamination.

2. Compliance with the Federal PFAS MCLs is estimated to cost Riverside the following:
   - Capital costs of three treatment plants $110,000,000.
   - Annual operating and maintenance costs of $15,600,000.
   - Financing costs of $105,000,000 over 30 years.

DISCUSSION

1. The estimated annual rate impacts for the City's drinking water customers in the first five years beginning July 1, 2026, are as follows:

Estimated Annual Rate Increase Effective Date	7/1/2026	7/1/2027	7/1/2028	7/1/2029	7/1/2030
PFAS Treatment (100% bond funded)	4.5%	4.5%	4.5%	4.5%	4.5%

2. A cost of service and rate design study to address funding requirements will be completed.
3. Augmentation of the current five-year rate plan will be necessary.
4. Public outreach will be incorporated with these efforts.

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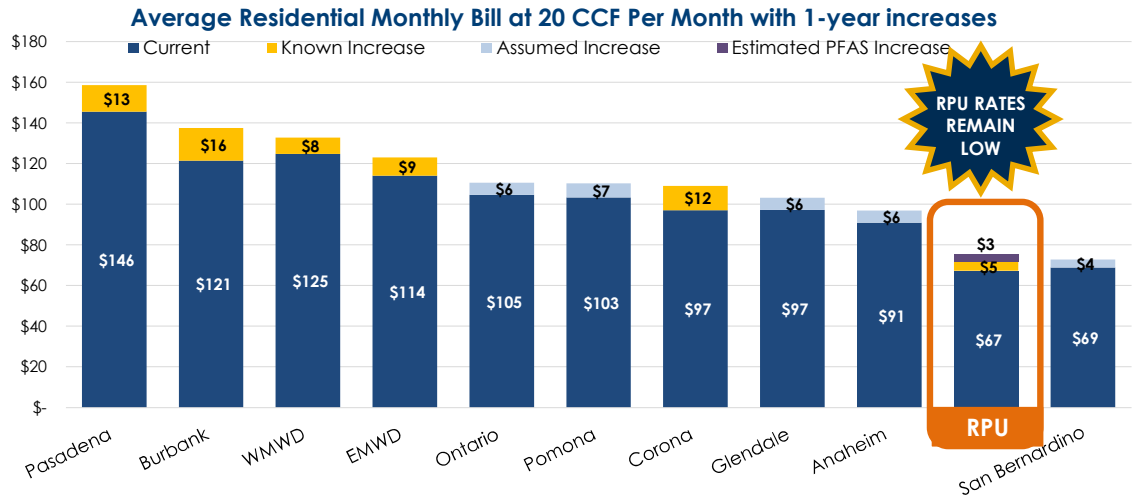

Rates Effective July 1, 2025 | RPU = 66K Service Connections

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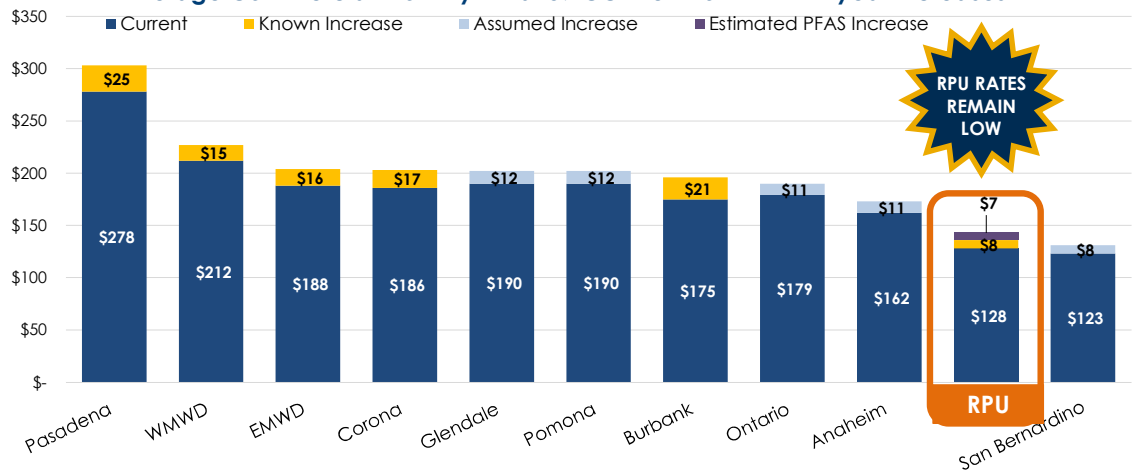
COMMERCIAL



Rates Effective July 1, 2025
RPU = 66K Service Connections

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WHAT'S NEXT

Board of Public Utilities
August 25, 2025

Mobility & Infrastructure Committee
September 11, 2025

Board of Public Utilities Public Hearing and Rate Consideration
September 22, 2025

City Council Public Hearing and Rate Consideration
October 28, 2025

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WATER QUALITY INFORMATION

- Riverside's water meets or exceeds all Federal and State Regulations
- The Annual Water Quality report is available online at RiversidePublicUtilities.com/WQR

- The Groundwater Atlas is also available at RiversidePublicUtilities.com/Reports

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RECOMMENDATION

That the Board of Public Utilities:

1. Receive a report on Per- and Polyfluoroalkyl Substances (PFAS) regulations and water treatment approaches; and
2. Recommend a report on Per- and Polyfluoroalkyl Substances (PFAS) regulations and water treatment approaches be presented to the City Council; and
3. Recommend staff present to the Public Utilities Board a cost of service and rate design study to address the funding requirements to comply with the Per- and Polyfluoroalkyl Substances (PFAS) regulations.