

SANTA CLARITA VALLEY WATER AGENCY PILOT

Treatment options for PFAS-contaminated groundwater were evaluated over a 12-month pilot comparing several ion exchange (IX) resins and FLUORO-SORB® 200 Adsorbent. PFAS concentrations ranged from 8 to 36 ng/L of the eight detected with the EPA 533 method over several months of pre-pilot evaluations. Several parameters were evaluated, including removal efficiency, duration of bed life, co-contaminants in backwash and rinse water, high hydraulic loading rate (HLR) impact (>17 gpm/ft²), and impacts of startup after a brief shutdown period. As a result of these evaluations, Water Quality and Treatment Solutions, Inc. (WQTS) recommended the Santa Clarita Valley Water Agency to request approval for use of FLUORO-SORB® Adsorbent from California's Division of Drinking Water (DDW).



PROJECT DETAILS

Groundwater

LOCATION

North America

Santa Clarita Valley, CA

PRODUCT USED

FLUORO-SORB® 200
Adsorbent

CHALLENGE:

For this pilot, the objective was to address several factors: (1) PFAS removal efficiency of FLUORO-SORB® Adsorbent in contaminated groundwater wells, (2) identify any co-contaminants produced in the backwash and (3) rinse water, (4) determine if there were negative impacts on startup after a brief shutdown period, and assure an HLR of 17.6 gpm/ft² would not impact the media's performance.

SOLUTION:

FLUORO-SORB® 200 Adsorbent was evaluated for treatment of PFAS contaminated groundwater from a well owned by the Santa Clarita Valley Water Agency to reduce their concentrations below the United States Environmental Protection Agency's (USEPA) drinking water Maximum Contaminant Levels (MCLs). Further analyses were performed to ensure no unintended contamination occurred as a result of the treatment media.

INFLUENT WATER QUALITY PARAMETERS		
PARAMETER	UNIT	AVERAGE
TOC	mg/L	0.80
Na ⁺	mg/L	91
Mg ²⁺	mg/L	28
K ⁺	mg/L	4.4
Ca ²⁺	mg/L	109
ClO ₄	mg/L	0.52
SO ₄	mg/L	139
NO ₃ -N	mg/L as N	5.6
Cl ⁻	mg/L	96

INFLUENT WATER PFAS CONCENTRATIONS		
PFAS	AVERAGE (ng/L)	RANGE
PFBA	11	8 - 17
PFPeA	13	6.4 - 27
PFHxA	16	6.5 - 33
PFHpA	8.1	3.2 - 16
PFOA	19	11 - 33
PFBS	19	15 - 25
PFHxS	13	10 - 18
PFOS	28	23 - 36

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MARCH 2025

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PROJECT CASE STUDY

RESULT:

1. FLUORO-SORB® 200 Adsorbent was determined to have high PFAS removal efficiency in reducing the 8 detected PFAS. Influent water was primarily characterized by short chain PFAS contamination, but concentrations of all 8 PFAS were reduced over the pilot study. PFOA reached the 4 ng/L MCL at 150,000 bed volumes (230 days of operation).

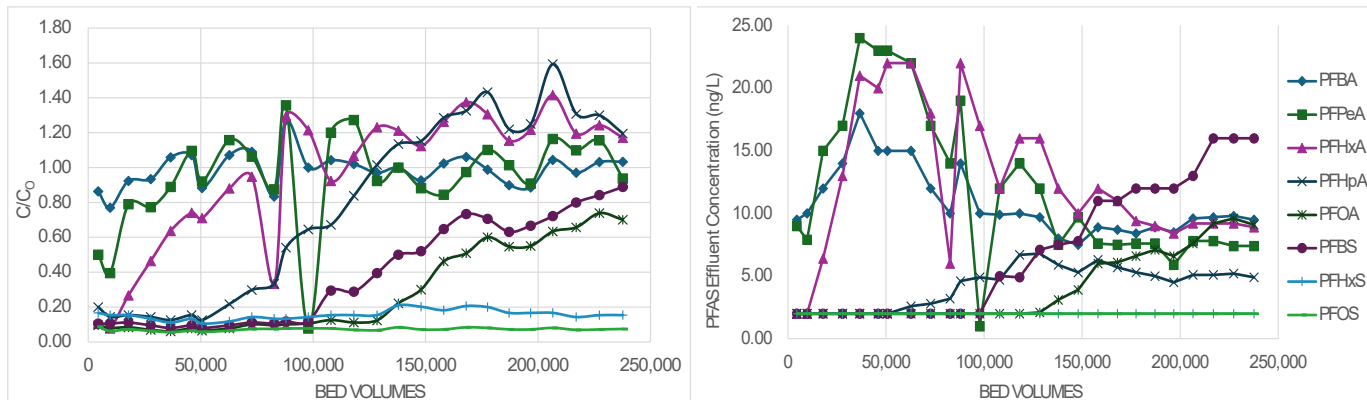


Figure 1: (Left): Effluent PFAS concentrations over influent concentrations (C/C0) of the 8 PFAS contaminants in SCV groundwater. (Right): Effluent PFAS concentrations from bi-weekly evaluations until roughly 240,000 bed volumes.

2. (A) No VOCs (n=66) were detected in backwash water from FLUORO-SORB® Adsorbent media.
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- (B) Metals (n=24) in backwash water were evaluated. After 3 bed volumes of backwash all metals concentrations fell below their respective drinking water MCLs.
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(C) Nitrosamines (n=8) were measured in backwash water. The first bed volume of backwash contained four nitrosamines at low concentrations (<65 ng/L). By 5.6 bed volumes of backwash, only N-Nitrosodimethylamine (NDMA) and N-Nitrosopiperidine were detected and had decreased in concentration significantly to 6 ng/L and 2.1 ng/L respectively, well below the California NDMA drinking water Notification Level (NL) of 10 ng/L.

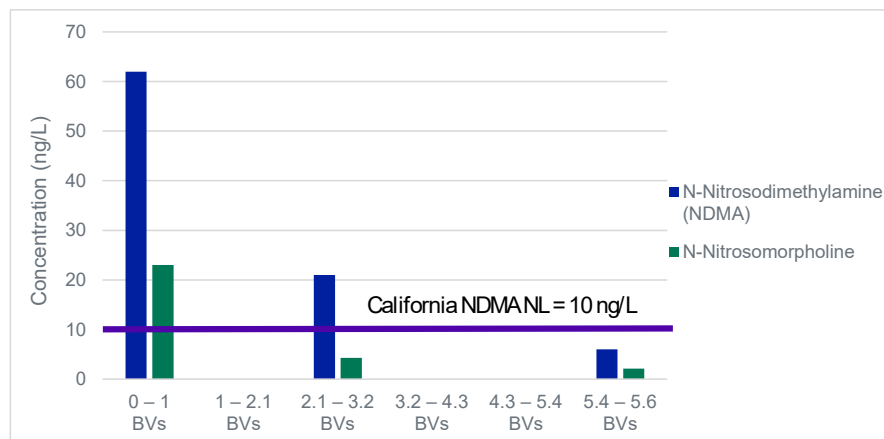


Figure 2: Nitrosamines detected in backwash water up to 5.6 bed volumes (BV) compared to the California drinking water NL for NDMA.

3. No VOCs or nitrosamines were detected in the rinse water, with the exception of one low level detection of chloroform (0.6 µg/L). It is notable that all resins tested in this study had chloroform present in rinse water at concentrations <3 µg/L.
4. With the strong PFAS removal efficiency results as well as the lack of hydraulic challenges as excessive pressure drop or loss of flow, the HLR of 17.6 gpm/ft² was determined to have no detrimental impacts on FLUORO-SORB® Adsorbent performance and would be suitable for full-scale applications.

CONCLUSION:

Results of this pilot led to Santa Clarita Valley Water Agency requesting approval from DDW for use of FLUORO-SORB® Adsorbent and the other media tested at current and future water treatment plants.