QUALITY ENABLES.

Case study on removing PFAS
in a municipal drinking water plant, New Jersey, USA

QUALITY WORKS.

LANXESS
Energizing Chemistry

Application of Lewatit® TP 108 DW in a full-scale municipal water treatment facility

Application

This case study presents the results of an analysis of the use of Lewatit® TP 108 DW for removal of per- and polyfluorinated alkyl substances (PFAS) at a full-scale municipal drinking water plant in New Jersey, USA. The gel type styrene/divinylbenzene-based high selective ion exchange resin was chosen as the media after pilot testing of various options.

Table 1: Key PFAS species in raw water

Sample date	PFOA	PFNA	PFBA	PFPeA	PFHxA	PFHpA
Jan. 2022	10.1	67.4	0.6	0.8	1.3	11.4
Nov. 2022	16.7	114.0	0.6	0.9	1.9	12.6
Feb. 2023	21.3	162.0	0.9	1.3	3.1	17.5
Average	16.0	114.5	0.7	1.0	2.1	13.8

Table 2: PFAS maximum contamination limits (MCLs)

Species	PFOA	PFOS	PFNA
New Jersey MCL, ppt	14	13	13
EPA drinking water MCL, ppt	4	4	10

All units are in ppt
Perfluorooctanoic Acid (PFOA), Perfluoropentanoic Acid (PFPeA), Perfluorononanoic Acid (PFNA), Perfluorohexanoic Acid (PFHxA), Perfluorobutanoic Acid (PFBA), Perfluoroheptanoic Acid (PFHpA)

System Design

The full-scale system included two parallel trains, with lead/lag configuration in each train. Each vessel was 8′ x 12′ in size and with 200 cu ft Lewatit® TP 108 DW resin. 5 µm cartridge filters were installed before the lead vessel to remove any suspended solids. The flow rate to each train fluctuated between 100 and 300 gpm depending on the season. Samples from the lead vessel were taken periodically from both the mid-vessel and end-vessel ports. The configuration of the vessel arrangement is shown in Figure 1, and the PFAS removal performance data is plotted in Figure 2.

Table 3: Key interfering species in raw water

Species concentrations					
Alkalinity ppm as $CaCO_3$	Chloride ppm	Nitrite ppm	Nitrate ppm	Sulfate ppm	TOC ppm
109	34.8	0	0	44.9	0.136

Lewatit®

Figure 1: Configuration of PFAS removal system in a New Jersey township

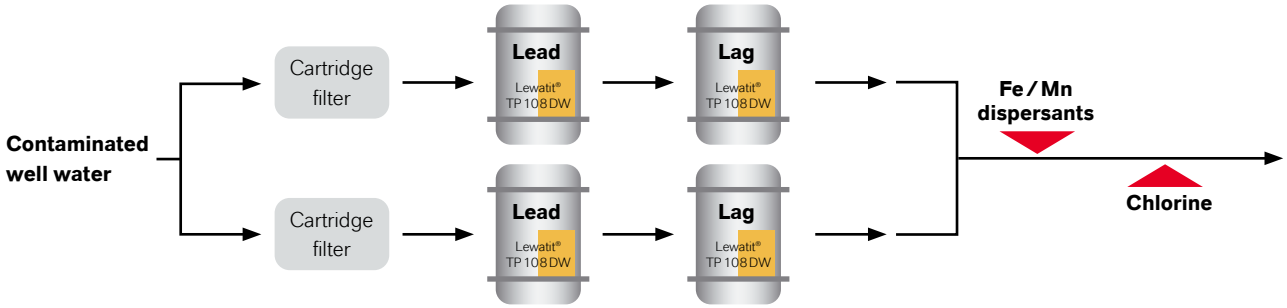
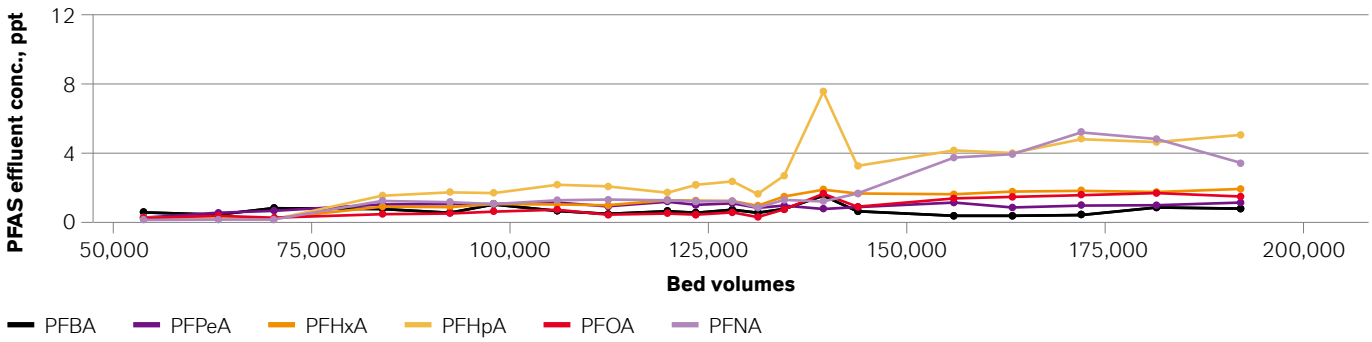


Figure 2: PFAS concentrations of samples taken at the effluent of the lead vessel



Conclusion

After nearly 200,000 bed volumes (BVs) and three years of successful operation, the lead vessel effluent was still meeting all MCLs for New Jersey, which is one of the most stringent in the USA, and the more stringent federal EPA drinking water MCLs. The mid-port data indicated the lead vessel could run for much longer beyond the 200,000 BVs. However, at that time it was decided that the lead vessel would be removed for re-bedding and the lag vessel would be switched into the lead position. One benefit of the lead/lag configuration is that it allows maximum utilization of the resin bed capacity at the lowest overall operating cost.

We will be happy to support your business. Please contact us for additional information: visit www.lewatit.com

LANXESS
Energizing Chemistry

LANXESS Deutschland GmbH
Liquid Purification Technologies
Kennedyplatz 1
50569 Cologne, Germany
Phone: +49 221 8885 0
lewatit@lanxess.com

11331-EN