

Appendix C

Second Addendum to Appendix C: Recommendation on Perfluorinated Compound Treatment Options for Drinking Water

New Jersey Drinking Water Quality Institute

Treatment Subcommittee

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Introduction

In June of 2015 the Drinking Water Quality Institute (DWQI) issued a recommendation for a Maximum Contaminant Level (MCL) for perfluorononanoic acid in response to a request from the Department of Environmental Protection to recommended MCLs for three long-chain perfluorinated compounds (PFC), also known as poly- and perfluoroalkyl substances (PFAS): perfluorononanoic acid (PFNA), perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). Due to their similar properties (e.g. persistence, water solubility, similar structure, strong carbon-fluorine bonds, and high polarity) the treatment options are not expected to differ for each of these three compounds. Accordingly, the DWQI Treatment Subcommittee reported on treatment options for all three compounds in one document found in Appendix C of the DWQI PFNA Recommendation and entitled "[Recommendation on Perfluorinated Compound Treatment Options for Drinking Water.](#)"

An addendum to this document entitled "[Addendum to Appendix C: Recommendation on Perfluorinated Compound Treatment Options for Drinking Water](#)" was issued by the DWQI Treatment Subcommittee in August 2016.

This document is intended to supplement both the June 2015 Treatment Subcommittee report and the August 2016 Addendum to Appendix C: Recommendation on Perfluorinated Compound Treatment Options for Drinking Water with additional and current data.

The Treatment Subcommittee of the DWQI is responsible for identifying available treatment technologies or methods for removal of hazardous contaminants from drinking water and for identifying whether a recommended MCL can be feasibly and reliably met using available technologies.

Addendum

1. Granular Activated Carbon

a. New Jersey American Water – Logan System Birch Creek

Samples collected at the Birch Creek system between 2014 – 2017 show average PFOS levels of 7 ng/L in the raw water. Samples collected post-treatment with granular activated carbon (GAC) show no detectable level of PFOS using a method with a minimum reporting level (MRL) of 5 ng/L. Any results below the MRL are reported as not detected (New Jersey American Water, 2017).

b. New Jersey American Water – Penns Grove

The Ranney Station treatment plant at Penns Grove blends water from shallow wells and deeper wells to balance the elevated levels of PFOS and sodium found in the source water. The raw water in the shallow wells showed levels of PFOS as high as 13 ng/L between October 2, 2014 and January 6, 2017. Post-GAC treatment concentrations of PFOS were non-detectable with an MRL of 5 ng/L. Any results below the MRL are reported as not detected (New Jersey American Water, 2017).

c. Oakdale, Minnesota

The City of Oakdale operates a GAC filtration plant to remove perfluorinated compounds, including PFOS from their groundwater source. The raw water samples from the two wells contaminated with PFOS show concentrations of 540 ng/L and 620 ng/L, respectively. Samples taken after GAC treatment have remained below the recommended limit of 13 ng/L (Bachmeier, 2017; Dahle, 2018).

In addition, a new method of sample analysis is in the process of being implemented. This method first prepares samples using solid phase extraction before they are large volume injected into a liquid chromatography tandem mass spectrometry (LC/MS/MS) system. This method has a Method Detection Limit (MDL) of 0.5 ng/L and a reporting limit of 5 ng/L (Rinker, 2017).

d. Horsham, Pennsylvania

Horsham Water & Sewer Authority utilizes a temporary treatment system consisting of two GAC vessels in series, followed by Purolite resin (see *Other Treatment Technologies* below) as a polisher that has been in operation at two sites since the Spring of 2017. The two sites include a vessel series that operates at a flow rate capacity of 700 gallons per minute. Each vessel can hold 20,000 lbs. of carbon media. The methods used to analyze PFOS concentration were EPA 537 and EPA 537-modified, with a MRL of 2.5 ng/L for potable water. Raw water samples collected between January and March 2017 show a range of PFOS concentrations from 230-1297 ng/L and an average of 629.3 ng/L. In finished water samples taken after the installation of treatment (March to September), PFOS was not detected in finished water sample results (O'Rourke, 2017).

2. NSF International (NSF) Certification for Point-of-Use Treatment Systems

NSF International developed a protocol for point-of-use water treatment systems designed to remove PFOS and PFOA from drinking water. The NFS Protocol P473 certification evaluates whether treatment units can reduce levels of PFOS and PFOA. Thus far, 65 products have been certified from four different manufacturers. More information about the certification can be found at <http://www.nsf.org/consumer-resources/health-and-safety->

[tips/water-quality-treatment-tips/perfluorooctanoic-acid-and-perfluorooctanesulfonic-acid-in-drinking-water](https://www.epa.gov/water-quality-treatment-tips/perfluorooctanoic-acid-and-perfluorooctanesulfonic-acid-in-drinking-water)

3. Other Treatment Technologies

a. Ion Exchange - Purolite

The Purolite Corporation markets a proprietary resin for removal of PFAS. According to Purolite the resin “acts as both an ion exchange resin and an adsorbent resin with exceptionally high kinetics and selectivity for removing PFASs.” Purolite also maintains that the resin can remove PFASs, without re-contaminating the system and can remove it to non-detectable levels of about 1-5 ppt (Purolite, 2017).

Conclusion

Given the effective removal of PFOS from raw water using GAC at water systems noted above, the Treatment Subcommittee concludes that it has been demonstrated that PFOS can be reliably and feasibly removed in public water systems by carefully designed GAC treatment to levels below the recommended health-based MCL of 13 ng/L.

The Treatment Subcommittee continues to advise that GAC and/or an equally efficient technology be considered for treatment of PFNA, PFOA and PFOS if they are detected above the DWQI recommended MCLs subject to the on-site pilot testing performance results.

Furthermore, the Treatment Subcommittee recommends that private well owners with PFOS contamination exceeding the recommended MCLs consider the installation of NSF-certified treatment to reduce exposure.

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