



Drinking Water & Groundwater Program

**Wisconsin Department of Natural Resources 101
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PFAS Treatment Submittal and Pilot Study Guidance

July 2024

This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

PFAS Treatment Submittal and Pilot Study Guidance

Section NR 811.44, Wis. Adm. Code

Purpose: This guidance is intended to outline the required documents for the submittal of plans and specifications for PFAS treatment systems at community water systems. Additionally, this guidance seeks to provide a list of options available to water systems to satisfy the department's expectations for the pilot testing results requirement for a new PFAS treatment system outlined in the required submittal documents.

Background: In anticipation of the adoption of the new federal MCLs for PFAS compounds, the department has prepared a guidance document to assist community water system owners and agents in the preparation of plan and specification submittals for new PFAS treatment systems. A complete PFAS treatment submittal must include the results of pilot testing before the department can consider a submittal to be complete.

Section NR 811.44, Wis. Adm. Code outlines pilot testing treatment and operation requirements. This section of code further indicates required information in a pilot test plan and specification submittal and operation and outlines the requirements for, pilot testing must include plans and specifications and include the pilot study to operate for a minimum of 2 treatment cycles. Where appropriate, the department may approve alternative pilot testing where there is sufficient justification to support the proposed treatment or where the department determines a different number of treatment cycles are appropriate.

Due to the urgent nature of addressing PFAS in public water systems, the department has considered on a case-by-case basis, the use of RSSCT as a basis for treatment design in limited applications for new PFAS treatment systems pursuing GAC or ion exchange treatment. The benefit of RSSCTs is that they can be completed in several weeks, while traditional pilot testing on GAC or ion exchange treatment for PFAS treatment may take multiple months to years to complete a single cycle.

However, the use of RSSCTs is only appropriate in limited situations. Given that RSSCTs are small bench scale offline tests, there is an increased potential for error, which may lead to inaccurate conclusions and improper design of final treatment systems. Additionally, RSSCT may demonstrate that the selected treatment is effective, but may not provide a clear understanding of long-term system operations.

Further, some public water systems may need to install interim measures to treat the water supply and maintain adequate system capacity. On a case-by-case basis, the department has considered the installation of emergency or interim treatment as a full-scale pilot testing system for the specific media used in the treatment.

Document Organization: This guidance outlines the requirements for a complete submittal of plans and specifications for the review and approval of a new PFAS treatment system at community water systems. The guidance further provides acceptable approaches and additional department expectations with each approach to satisfy the pilot testing results requirements for the preparation of a complete plan and specification submittal.

Periodic Review Required: This guidance will be periodically reviewed by the department's Public Water Engineering Section.

DATE: July 10, 2024

TO: Wisconsin Public Water Systems Owners, Operators and Agents

FROM: Wisconsin Department of Natural Resources Drinking Water and Groundwater Program

SUBJECT: PFAS Treatment Submittal and Pilot Study Guidance

The Wisconsin Department of Natural Resources (department) is providing this guidance to assist community public water systems in preparing plans and specifications submittals for the treatment of PFAS along with the department's requirements surrounding pilot testing to comply with the requirements of ch. NR 811, Wis. Adm. Code. The pilot testing requirements outlined in this document are primarily intended for municipal community water systems. Other than municipal community water systems looking to install PFAS treatment should contact the department to discuss the department's pilot testing requirements. The department expects more systems to submit PFAS treatment proposals in response to existing PFAS maximum contaminant levels in ch. NR 809, Wis. Adm. Code and in anticipation of implementing the final U.S. Environmental Protection Agency standards for certain PFAS.

PFAS Treatment Submittal Requirements:

Plans and specifications for new PFAS treatment systems must be submitted to the department for review and approval prior to beginning construction of the projects. The contents of the plans and specifications submittal will vary based on the proposed treatment system. In general, a complete submittal should include:

- Water System Approval Request [Form 3300-260 \[PDF\]](#)
- Cover letter
- Engineering Report - see [Engineering Report Requirements \[PDF\]](#)
- Pilot Test Results
- Water Treatment Plant Building Station Submittal Checklist [Form 3300-304 \[PDF\]](#)
- Chemical analyses of the water to be treated (IOC, SOC, VOC, PFAS, and Radionuclides)
- Chemical Feeder Submittal Checklist [Form 3300-227 \[PDF\]](#)
- Equipment and chemical cut sheets
- Plans
- Specifications

Pilot testing results are a key element of a complete submittal for the installation of a permanent PFAS treatment system. Public water systems proposing to treat for PFAS must submit for and receive department approval for the pilot system before the pilot may be operated. Then, the public water system must complete the approved pilot testing, collect data, and analyze the results prior to the final plan and specification submittal. Department guidance for the preparation of pilot testing submittal proposals for review and approval can be found on the department's website and at the link below.

<https://dnr.wisconsin.gov/sites/default/files/topic/DrinkingWater/PilotStudyGuidance.pdf>

The department recognizes and commends public water systems efforts to be proactive in the treatment of PFAS. The sections below are intended to provide additional guidance on department expectations specifically for PFAS pilot testing. This guidance is intended to aid community water systems in satisfying the Pilot Testing Results requirements noted above and ensuring a complete reviewable and approvable submittal is provided to the department with the final plans and specifications for the PFAS treatment system.

PFAS Pilot Study Background

In general, there are currently two approaches to establish a basis of design for full scale PFAS treatment systems: 1) standard pilot testing as described in s. NR 811.44(1), Wis. Adm. Code, and 2) rapid small scale column testing (RSSCT). These approaches have primarily been used to evaluate proven and established PFAS removal technologies such as granular activated carbon adsorption, selective ion exchange, and reverse osmosis. This guidance is primarily focused on the above established treatment technologies. Proposals for alternate PFAS removal medias, treatment, or destruction techniques at community water systems should contact the department before beginning system design to discuss any pilot testing requirements.

Section NR 811.44, Wis. Adm. Code outlines the requirements for pilot testing treatment and operation requirements. This section of code further indicates required information in a pilot test plan and specification submittal and operation and outlines the requirements for the pilot study to operate for a minimum of 2 treatment cycles. Where appropriate, the department may approve alternative pilot testing where there is sufficient justification to support the proposed treatment or where the department determines a different number of treatment cycles are appropriate.

Note: Due to the need to establish cleaning procedures, determine pre-treatment and post-treatment requirements, bypass ratios, fouling potential, system recovery, system efficiency and other treatment design characteristics, all reverse osmosis membranes must be pilot tested according to the requirements of s. NR 811.50(3), Wis. Adm. Code.

The pilot testing requirements referenced in s. NR 811.44, Wis. Adm. Code for media filtration systems were originally intended for pressure filtration type systems such as those used in the removal of iron and manganese. These types of systems traditionally have treatment cycles which operate for approximately 1 week before they are backwashed making the operation of 2 treatment cycles more practical than the medias used in PFAS removal which may operate for a year or more before a single treatment cycle is completed.

Due to the urgent nature of addressing PFAS in public water systems that have recently identified contamination, the department will consider on a case-by-case basis, the use of RSSCT as a basis for treatment design in limited applications for new PFAS treatment systems pursuing GAC or ion exchange treatment. The benefit of RSSCTs is that they can be completed in several weeks, while traditional pilot testing on GAC or ion exchange treatment for PFAS treatment may take multiple months to years to complete a single cycle. RSSCT utilizes crushed media in a small diameter column to rapidly simulate months to years of data in a few weeks. Additionally, when a contaminated well has been taken off-line, RSSCTs avoid having to pump the contaminated well at the normal pumping rate and duration to simulate full scale treatment conditions, thus avoiding the contaminated water being pumped to consumers or discharged to waste.

However, the use of RSSCTs is only appropriate in limited situations. Given that RSSCTs are small bench scale offline tests, there is an increased potential for error, which may lead to inaccurate conclusions and improper design of final treatment systems. Additionally, RSSCT may demonstrate that the selected treatment is effective, but may not provide clear understanding of long-term system operations. For example, a system may assume from RSSCT a system can achieve 2 years of run time prior to media changeout, but discover during full scale treatment that other factors not identified by the RSSCT limit the system to only 7 months run time prior to media change out. This results in unanticipated cost and maintenance issues for the water system. Generally, the information from a standard pilot test better mimics the real-world conditions, improves the design confidence, and helps

account for unforeseen circumstances in design.

Pilot/Demonstration Study Options

The following are general guidelines the department will consider when reviewing proposed pilot testing options. When reviewing plans and specifications for RSSCT and pilot testing proposals, the department will consider all the circumstances of a particular public water system and make a case-by-case determinations as necessary for the particular system.

1. Rapid Small Scale Column Testing (RSSCT)

The department recognizes that PFAS presents unique challenges that may make the standard pilot testing process difficult or impossible. RSSCT will be considered in cases where a contaminated well is currently off-line and a standard pilot test would require pumping the well to achieve normal operational conditions. This would require either sending contaminated water to customers or pumping the water to waste and treating the wastewater. The department is particularly concerned where a standard pilot test would require sending water to customers that exceeds standards for PFAS.

When approving RSSCT, the department will generally require monthly PFAS samples from the entry point for up to one year following startup of the final, full-scale treatment system to verify the conclusions and data produced by the RSSCT. The department recommends column tests be sampled every 5,000 bed volumes for the first 30,000 bed volumes with samples collected every 10,000 bed volumes thereafter.

2. Standard Pilot Testing

The department's preferred approach remains for public water systems to conduct standard pilot testing as described in s. NR 811.44(1), Wis. Adm. Code, for PFAS treatment system design. For public water systems that must continue to run impacted wells in order to meet peak demands, a pilot study is often a practical approach. A small side stream of water from the source can be used to mirror real world applications and account for unforeseen situations which can aid in the design of the treatment system. Standard pilot testing provides the utility with information which can assist in operation and maintenance of the system during the design phases, rather than after the treatment is installed and in operation. Where circumstances or timing considerations necessitate a shorter study, the department may approve a pilot test that operates for only a single treatment cycle, rather than the standard two treatment cycles.

Note: The department will require a minimum of 2 months of pilot testing for use of reverse osmosis treatment for PFAS removal to satisfy the requirements of s. NR 811.50(3), Wis. Adm. Code.

The department recommends pilot tests be sampled every other week for the first 3 months and monthly thereafter at a minimum. Novel filter medias and treatment technologies will likely be required to complete pilot testing prior to construction and operation of full scale treatment.

3. Emergency or Interim Treatment

Some public water systems may need the contaminated well's capacity to meet average and maximum day demands, but the system cannot pump to the distribution system without treatment for its concentration of PFAS. On a case-by-case basis, the department will consider the installation of

emergency or interim treatment as a full-scale pilot testing system for the specific media used in the treatment.

The department will generally require monthly PFAS samples from the entry point for up to one year following startup of the full-scale pilot treatment system. Modifications to operations of the system or use of alternate types of filter medias in a final design will require the system to complete separate pilot testing. RSSCT will not be permitted as the basis of design for a final treatment system where emergency or interim treatment is in place.

The public water system must submit results from the pilot testing or RSSCT along with or prior to the plans and specifications for a permanent full scale treatment system, per s. NR 811.44(2), Wis. Adm. Code. Final treatment plans and specifications submitted without pilot testing or RSSCT data will be deemed incomplete.

The department will review this guidance regularly to consider any additional emerging technologies for PFAS treatment, taking into consideration supporting literature, use in other states, and other relevant information.

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