

INTERIM STRATEGY FOR LAND APPLICATION OF BIOSOLIDS CONTAINING PFAS

September 22, 2021

1.0 Executive Summary & Goal

The purpose of this document is to provide an overview and interim strategy for operators handling per- and polyfluoroalkyl substance (PFAS) impacted municipal biosolids generated at municipal wastewater treatment facilities (WWTF) in Wisconsin. The Wisconsin Department of Natural Resources (DNR or department) intends to prevent further land application of municipal biosolids that have been industrially impacted with PFAS compounds thereby mitigating risks to human health and the environment while commensurately reducing PFAS concentrations in biosolids. The department's overall goal is for WWTF operators to continue to reduce PFAS concentrations in biosolids using PFAS source identification and reduction strategies. DNR will continue to share findings from Wisconsin's efforts with WWTF operators, the Environmental Protection Agency (EPA) and other states to support risk assessment efforts and the efforts related to the development of potential PFAS biosolids limitations and/or strategies.

2.0 Brief Background

A brief overview of biosolids, PFAS, PFAS in municipal wastewater, and proposed PFAS criteria in Wisconsin is provided below. The intent of the overview is to provide basic information and a high-level summary of issues surrounding this interim strategy document.

2.1 Biosolids

Biosolids are nutrient-rich organic materials that remain following the treatment of domestic sewage at WWTFs. Most often, biosolids are land applied for nutrient reuse after undergoing treatment and testing. During biosolids treatment, biosolids are stabilized and undergo significant reduction in pathogens prior to use as a soil amendment, conditioner and/or fertilizer replacement product. Treatment processes vary at each WWTF resulting in various forms of biosolids such as liquids, cakes or dried pellet-like products. In Wisconsin, approximately 85 percent of biosolids generated are beneficially reused.

DNR operates its biosolids program under delegated federal authority from EPA. Wisconsin's Biosolids Program conforms to 40 CFR Part 503 and is authorized by chapters 283, Wis. Stats. and NR 204, Wis. Adm. Code. EPA is required to review biosolids regulations biennially to evaluate and identify additional toxic pollutants that occur in sewage sludge and set regulations for those pollutants if sufficient scientific evidence demonstrates that the pollutants may harm human health or the environment. EPA is currently reviewing and conducting a risk assessment for additional pollutants, including specific PFAS compounds that have been identified in biosolids nationwide. DNR will continue to follow EPA's PFAS biosolids risk assessment activities, assist where possible and follow-up in Wisconsin as necessary.

In general, DNR maintains that beneficial reuse of non-industrially impacted biosolids via land application is an appropriate disposal approach. Biosolids from WWTFs not beneficially used as a soil amendment or fertilizer substitute are typically landfilled or incinerated. Landfilling and incinerating biosolids are often costly for ratepayers and eliminates the ability to reuse the nutrients and soil conditioning benefits that biosolids provide.

2.2 PFAS

PFAS have been classified by EPA as emerging contaminant(s) at the national level. PFAS are a suite of over 4,000 chemicals historically used in thousands of applications throughout the industrial, food, and textile industries. Some historical uses include: firefighting foams, food packaging, mist suppressants associated with metal finishers and platers, and cleaning products. Materials containing PFAS were and continue to be used by many industries such as: plating, tanneries, or clothing manufacturers, where waterproofing may be required, or a protective film is needed in a manufacturing process.

In the United States, industry voluntarily phased out two of the most studied PFAS chemicals, perfluorooctanoic acid (PFOA) in 2015 and perfluorooctanoic sulfonate (PFOS) in 2002. However, due to the extremely stable nature of PFOA and PFOS, the compounds often continue to be found in materials and in environmental media at the industrial locations where they were once used. The carbon-fluorine bond that exists in PFAS is one of the strongest bonds in nature and is resistant to thermal, chemical and biological degradation.

2.3 PFAS in Municipal Wastewater and Biosolids

PFAS have been identified at municipal WWTFs since the early 2000s. Some of the most frequently detected PFAS compounds in municipal wastewater and biosolids include PFOA and PFOS.

Widespread use of PFAS in consumer products and manufacturing/industrial processes, in conjunction with extreme resistance of the compounds to degradation, have resulted in the presence of PFAS in municipal wastewater and biosolids. It is important to note that WWTFs are not the source of PFAS, but they are a central point of collection and serve as a key location to control and potentially mitigate their release into the environment. Effluents discharged from WWTFs to waters of the state and biosolids applied to the land for beneficial reuse have been identified as potential PFAS release pathways into the environment. This puts municipal WWTF operators in a key position to control the environmental spread of PFAS and a key participant in protecting both human and environmental health.

To date, PFOS has been identified to be the main regulatory driver for municipal WWTFs with elevated PFAS concentrations in the biosolids/sludge from WWTFs with known significant industrial sources. Based on Michigan data, short-chain PFAS are more frequently correlated with aqueous WWTF process flows, while long-chain PFAS were strongly associated with solids process flows. This indicates that long-chain PFAS, such as PFOS, are expected to accumulate in the biosolids/sludge and, if land applied at excessive concentrations, will likely accumulate in soils to some degree.

2.4 PFAS Criteria in Wisconsin

Currently, there are no established federal criteria for PFAS in biosolids under 40 CFR Part 503. EPA is in the process of conducting a risk-based assessment of PFAS in biosolids. While DNR is supportive of these efforts, it is unknown and potentially unlikely that actual numeric PFAS-biosolids criteria will be developed and promulgated by EPA in the next few years. Additionally, completion of the risk assessment does not guarantee that federal criteria will be subsequently promulgated.

At the time of writing this strategy, Wisconsin is currently developing PFAS criteria for select PFAS compounds (e.g., PFOS and PFOA) in surface water, public drinking water and groundwater. PFOS is considered a bioaccumulative chemical of concern (BCC), meaning it readily accumulates in living organisms such as people and fish. As a result, proposed PFOS criteria in surface water are much lower than that proposed for PFOA. This approach is mainly to protect people who may inadvertently ingest PFAS through fish consumption.

3.0 Proposed Interim Strategy for Land Application of Biosolids

Until a fully vetted, risk-based assessment is completed for PFAS in biosolids, similar to other states DNR is implementing the following strategy to assist WWTFs and landowners/farmers who make decisions relating to land application of biosolids with detectable concentrations of PFAS. Note, the department expects that this interim strategy be used in conjunction with the requirements of NR 204, Wis. Adm. Code.

The strategy primarily focuses on three-parts for success:

- PFAS Biosolids Sampling. Sample and analyze biosolids suspected to be impacted by PFAS prior to land application.
- PFAS Source Identification and Reduction. PFAS analytical results from biosolids sampling will dictate the level of source identification and reduction efforts. Note, while PFAS sources are often associated with industrial manufacturing, other sources, including a variety of commercial businesses, have the potential to substantially contribute PFAS loading to WWTFs.
- Farmer and Landowner Communication. It is important that PFAS concentrations in biosolids and source reduction efforts are communicated with the landowner and/or farmer receiving the biosolids. DNR will assist in providing analytical information and additional educational resources specific to PFAS in biosolids in Wisconsin.

3.1 PFAS Biosolids Sampling

Sampling of WWTF biosolids for PFAS at those facilities suspected of potentially having elevated PFAS concentrations in their biosolids prior to land application is a key part of this strategy to mitigate risk.

3.2 Source Identification and Reduction

Sampling of biosolids for PFAS prior to land application will determine if WWTFs should initiate a plan to identify sources of PFAS in their sludge. Reduction strategies can then be employed to reduce and potentially eliminate PFAS in the biosolids such that WWTF operators can continue to provide a reusable source of nutrients in the form of their biosolids to landowners and/or farmers.

3.3 Farmer and Landowner Communication

It is anticipated that landowners and/or farmers may have concerns about accepting biosolids due to PFAS impacts. See a template letter at the end of this document that should be used by the land applier prior to land application of biosolids as part of communicating PFOS plus PFOA concentrations to the owner of the land/farmer. An open dialogue with landowners and farmers is necessary as part of a WWTF's successful program. Quickly implementing PFAS reduction strategies will likely contribute to successful relationships with landowners and farmers into the future.

4.0 Proposed PFAS Sampling prior to Land Application

The department will request permittee sampling for PFAS in municipal biosolids at those facilities known or suspected to have elevated PFAS concentrations in their biosolids or effluent prior to authorizing land application of the waste. This approach will direct available resources to reducing the risk associated with any identified PFAS hotspots in the state.

Additional biosolids sampling and analyses beyond an initial sampling event may be necessary to accurately identify potential PFAS risk to biosolids as well as determine appropriate disposal options.

5.0 Analytical Results/Action Items/Source Investigation

The following target thresholds are provided to assist WWTF operators through the decision-making process. Collecting PFAS biosolids samples and determining associated concentrations sooner than later will assist with these types of decisions. Note, these target thresholds are approximate values to be used by the department in conjunction with site-specific knowledge of the characteristics of the biosolids, the proposed disposal option, the characteristics of any proposed land application site (e.g., soil type, depth to groundwater, proximity to sensitive receptors like drinking water wells or surface water, etc.), type of method and equipment used for land application, etc.

Two primary thresholds were selected in developing this interim strategy:

Industrial Impacted Biosolids: From a dataset of municipal biosolids from Michigan WWTFs, data demonstrated that biosolids greater than 150 ug/kg of PFOS were highly impacted by industrial contributions of PFAS.

Considering Nitrogen Application Calculations. When calculating nitrogen application rates and comparing potential PFOS concentrations to a variety of soils, it appears that a lower threshold of 50 ug/kg is appropriate at this time. This interim lower threshold will minimize disruptions to biosolids for beneficial reuse until PFAS source reduction measures are further implemented.

The following details the department's approach when PFOS and PFOA impacts are identified in biosolids at certain levels. Again, implementation of this approach shall also be in conformance with the requirements of NR 204, Wis. Adm. Code.

Sum of PFOA and PFOS concentrations values generally at or above 150 µg/kg

- Biosolids generally exceeding a 150 µg/kg PFOA/PFOS combined value are industrially-impacted. As a result, the department may not approve new or transfer land application sites when the biosolids concentrations are above 150 µg/kg PFOA/PFOS. Future permits may include language prohibiting the authorization of the land application of biosolids with PFAS concentrations above 150 µg/kg.
- Immediately notify DNR Staff.
- Sample effluent and investigate potential PFAS sources to develop a source reduction program, if the WWTF operators have not already done so.
- Arrange alternative treatment or disposal of biosolids besides land application.

Sum of PFOA and PFOS concentration values generally above 50 µg/kg but below 150 µg/kg

- Immediately notify DNR Staff.
- Sample effluent and investigate potential PFAS sources to develop a source reduction program, if the WWTF operators have not already done so.
- To reduce overall loading to a land application site, reduce land application rates to no more than 1.5 dry tons per acre (or submit to the department for an approval of an alternative risk mitigation strategy in an updated sludge management plan prior to land application).

- Prior to initial land application at a site, provide the PFAS analytical results to the landowner/ farmer (if different) along with DNR contact information and additional information related to PFAS work in Wisconsin. See template letter at the end of this document.
- If land applied, track the cumulative application rates on each land application site and report to the department.
- WWTF operators may decide it appropriate to arrange for alternative treatment or disposal of solids.

Sum of PFOA/PFOS concentration values generally below 50 µg/kg

- If over a median concentration of 20 µg/kg but below 50 µg/kg, implement PFAS source investigation and reduction efforts as well as effluent sampling. The 20 µg/kg median value is based on Michigan biosolids data collected from the sludge of approximately 40 municipal WWTF.
- Prior to initial land application at a site, provide the PFAS analytical results to the landowner/ farmer (if different) along with DNR contact information and additional information sources related to PFAS work in Wisconsin. See template letter at the end of this document.
- Track application rates on each land application site.
- If below 20 µg/kg, land apply per normal approach consistent with NR 204, Wis. Adm. Code.

Additional municipal biosolids actions and activities including addressing other PFAS analytes, sampling requirements, limits and notifications may be appropriate as new information becomes available.

6.0 Identifying Potential Sources of PFAS Impacting Biosolids

Because there are potentially many sources of PFAS within biosolids, source identification is necessary to ensure biosolids are protected from industrial and commercial contamination. Common industrial sources of PFAS include: metal finishers, landfills (leachate), paper manufacturing, mixed manufacturing, paint manufacturing, leather tannery facilities, commercial industrial laundries, chemical manufacturers, centralized waste treaters, and a variety of miscellaneous sources. Aqueous film forming foam (AFFF) used as fire-fighting foam can also have lingering impacts as a source of PFAS as residuals within sewers or from infiltration into the sewer collection system.

For small WWTFs, small commercial operations including operations that appear innocuous, such as floor mat cleaning, commercial laundries and truck washes, may be PFAS sources and identified as potentially impacting PFAS concentrations in biosolids.

The department is eager to partner with any WWTF operators wanting to establish a PFAS source identification and reduction program and stands ready to assist if requested.

7.0 Next Steps

In addition to implementing the measures discussed within this Interim Strategy for the land application of biosolids containing PFAS, DNR has identified the following next steps that will be implemented in the future as we expand implementation of the strategy.

- Continue supporting EPA's effort to conduct a robust risk-based evaluation of PFAS in biosolids.
- Collaborate with Michigan and other states on strategies dealing with PFAS in biosolids.

- Review available documentation to identify historical land application sites associated with previous use of PFOS and PFOA.
- Continue to implement PFAS pretreatment initiatives and control strategies at WWTFs.
- Continue the evaluation PFAS in biosolids including additional testing at WWTFs and land application sites as appropriate and as resources allow.
- Continue working with stakeholders to evaluate the fate and transport of PFAS in the environment.
- Update this document as new information becomes available.

Template Letter

Date:

Farmer Name / Landowner Name:

Address:

Subject: Biosolids Application Notification

(Please add generator name) is preparing to apply biosolids on land you own and/or farm. Recently there has been a great deal of information in the news about Per- and polyfluoroalkyl substances (PFAS) in our environment. The intent of this letter is to provide a brief update on what is being done to control these substances in biosolids, our recent biosolids sample results, and where additional information can be obtained.

PFAS are a large group of chemicals used for decades in some industrial, commercial, and domestic settings and are found worldwide. Typical materials or processes that use or contain PFAS include firefighting foam, chrome plating, cookware coatings, waterproofing on clothing and carpet, and even food wrappers. Some PFAS, including Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), which is commonly found in biosolids, have been phased out of production in the United States

and are no longer approved for use. Even though they have not been used for years, their legacy remains given their strong chemical bonds resistant to degradation in the environment.

Wastewater Treatment Facilities (WWTFs) do not generate PFAS chemicals, though they may receive discharges from certain industrial or commercial sources who have used PFAS. As a result, PFAS may be found in treated wastewater and biosolids. Some of those PFAS are known to travel through water, can linger in the environment, and have the potential to impact the soil, water, and crops. PFAS has been found to build up in the tissue of fish and wildlife. Studies are underway to determine the impact of PFAS on animals, animal products, and crops.

Currently, the United States Environmental Protection Agency is conducting a risk-based assessment of PFAS in biosolids. Until that is completed, the Wisconsin Department of Natural Resources, Water Quality Bureau (which regulates the land application of biosolids) has developed an interim strategy working with WWTFs to implement an approach, focusing on identifying and reducing significant sources of PFAS entering a WWTF and preventing industrially impacted biosolids from being land applied.

Should you have additional questions concerning Wisconsin's strategy to monitor and reduce sources of PFAS in biosolids, please do not hesitate to reach out to Statewide Residuals Coordinator Fred Hegeman via e-mail at Fredrick.Hegeman@wisconsin.gov or Permits Section Chief Wade Strickland via e-mail at Wade.Strickland@wisconsin.gov.

Our most recent PFOS plus PFOA testing result is: **Result number in parts per billion (ppb):** _____

Date: _____

Note, presently DNR's threshold concentration for PFOS plus PFOA in biosolids to be considered industrially impacted is 150 ppb.