Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS

Version3
Date: July 2, 2026 (revised typo in worksheet)
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Background

Per- and polyfluoroalkyl substances

Per- and polyfluoroalkyl substances (PFAS) is a group of more than 9,000 manmade chemicals that are fire, oil, grease, water and stain resistant. PFAS are often referred to as "forever chemicals" due to the exceptionally strong carbon-fluorine bonds within the various molecules limiting the ability for these chemicals to decompose in the environment.

PFAS are found in consumer and industrial products, such as non-stick cookware, food packaging, dental floss, cleaning products, cosmetics, water repellent & fire retardant clothing, sealants, carpeting and upholstery.

Emerging Contaminants

Per- and polyfluoroalkyl substances (PFAS) are viewed as emerging contaminants. Contaminants are "emerging" due to new research revealing their presence in the environment, new pathways of exposure, or a newly recognized threat to health. PFAS have been found to pose potential risks to human health and the environment, yet only a few of the substances are subject to very limited regulations. Their impacts are not yet fully understood, and they are the focus of active research.

Legacy Pollution

Legacy pollution refers to persistent environmental and health damage caused by past industrial activities. Often, this pollution is the result of substances that are no longer in common use such as lead, mercury, PCBs, and organochlorine pesticides. This contamination can remain in soil, water, and other parts of the environment long after the pollution events occurred.

It is believed that highly concentrated PFAS discharges have created legacy pollution at multiple sites in Wisconsin. This contamination has the potential to impact human health via exposure routes such as drinking water and ingestion of wildlife food sources (fish, duck & deer) containing PFAS. The department is continuing to test sources such as drinking water to identify potential exposure routes, to protect the public from this legacy contamination while still learning more about PFAS as a whole.

Targeted Analytes – PFOA and PFOS

While the larger class of PFAS are identified as emerging contaminants, Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) have been specifically shown to create legacy

pollution when disposed of at high concentrations. As a result, these two PFAS compounds, PFOA and PFOS, are targeted through this Interim Biosolids and Industrial Sludge Strategy.

Municipal Wastewater Treatment and Sewage Sludge (Biosolids) Generation

Biological sludge generated from municipal wastewater treatment facilities (WWTF) is referred to as sewage sludge. When sewage sludge is further treated, it is often referred to as biosolids. (In Wisconsin, biosolids and sewage sludge are defined as the same pursuant to s. NR 204.03 (55), Wis. Adm. Code.) Biosolids are nutrient rich, organic materials that have significant beneficial properties when applied as a fertilizer for food and crop production.

Municipal WWTFs treat wastewater generated from homes, commercial businesses and industrial facilities that discharge to sewage collection systems. Municipal WWTFs do not generate or create PFAS but rather may be passive recipients of PFAS in the wastewater. Because biosolids are a byproduct of treating wastewater that may contain PFAS, biosolids may contain PFAS. There is no known technologically or economically viable methods for treating PFAS at wastewater treatment facilities.

Industrial Wastewater

PFAS can be found in industrial wastewaters such as that of the metal plating, automotive, aerospace and semiconductor industries, as well as the production of paints, coatings and textiles. PFAS are used for the purpose of fire, oil, grease, water and stain resistant properties in the final product where residual PFAS is lost into wastewater. Additionally, PFAS in the wastewater can also be the result of various industrial processes where industrial production requires a water resistant, grease resistant, non-stick, sealant or other property for the product to be manufactured.

Industrial Sludge Generation and Reuse

Industrial sludges are the solids portion resulting from physical, chemical and biological wastewater treatment processes. Organic based industrial sludges are often beneficially reused as soil amendments (carbon, liming substitutes) and/or nutrient sources (nitrogen, phosphorus, micronutrients) for crop production. These organic based sludges include those from: cheesemaking, vegetable processing, slaughterhouse and meat processing, and paper production. In some cases, the organic based sludges potentially contain higher concentrations of PFAS as the result of coatings and additives used in particular non-food industries. Additionally, the use of recycled feedstocks in the production process may also be impacted by PFAS resulting in PFAS carryover into the industrial sludge.

Interim Strategy Criteria Goals

Identify and Reduce PFAS in Municipal Wastewater/Biosolids

Wastewater treatment processes do not use PFAS. Municipal WWTFs passively receive PFAS from the wastewater generated at homes, businesses and industries. Since PFAS are “forever chemicals,” the destruction or removal of PFAS in wastewater is challenging and expensive. Because current treatment processes are extremely expensive, the source identification and

reduction of PFAS in wastewater is critical to reducing PFAS in the environment. Source reduction can reduce PFAS concentration in biosolids and reduce the need for additional disposal alternatives.

Municipal WWTFs are highly encouraged to monitor for PFAS in their influent to identify commercial and industrial sources within their service area. Once sources are identified, municipalities are encouraged to work with commercial and industrial sources to reduce PFAS concentrations that result in PFOA and PFOS in their biosolids.

The department has developed guidance to assist facilities with developing PFOS and PFOA Minimization Plans. The guidance document can be found on the department's website at:

Water Quality PFAS Initiatives (https://dnr.wisconsin.gov/topic/PFAS/WaterQuality.html)

Recent Wisconsin Legislation

2025 Wisconsin Act 201 was enacted on April 6, 2026, addressing monitoring for PFAS in sewage sludge (biosolids). The Act created s. 283.82(4), Wis. Stats., and requires the department to:

- Include PFOA & PFOS limitations or conditions in WPDES permits.
- Issue a general WPDES permit for land application of sludge if facilities do not already have PFOA & PFOS requirements in an individual WPDES permit.
- If a treatment facility is issued a general permit, then modify individual WPDES permits to add limitations and/or conditions if the average of at least 2 sample results exceeds a 20 ug/kg concentration of PFOA + PFOS combined.

Changes from Previous Version

Reduced Interim Strategy Concentration Thresholds for Continued Land Application including Prohibitions

Biosolids and industrial sludge threshold concentrations have been updated within this interim strategy. With the updated concentration thresholds, additional activities may be triggered at a lower concentration than previously included in Version 2 of the Interim Strategy. For Municipal and Industrial WWTFs that cannot meet these updated thresholds, landfilling and other potential treatment and/or disposal will be required.

Tracking Cumulative PFOA/PFOS Contributions to Approved Fields

Beginning with this version of the Interim Strategy, all WPDES permittees >20 ug/kg with PFAS monitoring requirements and concentrations should begin tracking cumulative loadings of PFOA and PFOS on each landspreading field receiving sewage sludge and/or industrial sludge. See Attachment A for additional information.

In the future, the department is anticipating electronic reporting similar to that in the current Annual Land Application Report (Electronic Form 3400-055) found in DNR's Switchboard. Until

such time as electronic reporting includes PFAS loading capabilities, WWTFs will need to maintain their own annual PFAS field loading records for PFOA and PFOS.

Implement thresholds for Bagging and Distribution of Exceptional Quality Biosolids

Similar to policies in Michigan and Minnesota, the department suggests a more stringent concentration for EQ biosolids that are individually bagged and distributed to the general public.

Continued Landowner and Farmer Communication

Previously the department provided sample letters for biosolids and industrial sludge generators to use to communicate PFOA and PFOS concentrations to landowners and farmers. These letters are updated to include additional information for landowners and farmers. Additionally, treatment facilities are able to modify the letters to explain the efforts the treatment facilities make to ensure that the biosolids meet specific thresholds. Examples could include: monitoring of wastewater influent concentrations, identifying sources, reducing sources, education within the community(ies) and more.

PFAS Monitoring/Reporting for Biosolids and Industrial Sludges

USEPA Method 1633A

When monitoring PFAS concentrations in sludge, WPDES permitted facilities shall follow USEPA Method 1633A. Results include 40 different PFAS analytes. This method is validated for biosolids, soil and tissue. To report on a dry weight basis, a percent-solids determination is required of the sludge. Dry weight units are often reported in ug/kg (ppb).

PFAS Monitoring

All facilities that produce biosolids or industrial sludge will be required to monitor for PFAS consistent with their individual WPDES permit. Pursuant to 2025 Wisconsin Act 201 and corresponding to changes to s. 283.82 (4) Wis. Stats, facilities with biosolids outfalls that do not currently have limitations or conditions addressing PFAS in their WPDES individual permit will be covered under a WPDES General Permit (GP) for monitoring and land applying biosolids. GP coverage will be discontinued when the facility's individual WPDES permit is reissued with PFAS monitoring requirements. These facilities with biosolids outfalls will be required to comply with both their individual WPDES permit and the WPDES General Permit requirements.

PFAS monitoring requirements will be included in permits at each biosolids and/or industrial sludge outfall. Regular monitoring is required from typically used biosolids and industrial sludge outfalls. Monitoring is also required from infrequently used outfalls when biosolids and/or industrial sludges are discharged from these outfalls. (Note: Often with Class A biosolids treatment processes, additional outfalls are included in the WPDES permit to provide flexibility to the WWTF should an individual treatment process fail or is required to be taken offline. When these outfalls are used, the WWTF will monitor for PFAS. If the infrequently used outfall is not used, PFAS is not required to be monitored at that outfall.)

Reporting

In addition to reporting the 40 PFAS analytes, a calculated PFOA + PFOS concentration result is required. Reporting is completed through the department's SWAMP program including with the WPDES permit application and in Discharge Monitoring Reports. (Electronic Form 3400-49). In addition, PFAS monitoring laboratory reports shall be submitted to both the department assigned compliance staff as well as to the following email address: DNRWYPFASSludgeMonitoring@wisconsin.gov.

Results are reported within the timeframes of the WPDES permits.

Note: Due to complexities associated with electronic reporting, the 3400-49 forms will not be available for the WPDES GP to report PFAS monitoring performed in 2026. The electronic 3400-49 forms for the WPDES GP will be available in 2027 and subsequent years.

Interim Strategy Tiers and Corresponding Actions

The following tiers have been developed for biosolids and industrial sludges to delineate specific action items based on monitoring results. These tiers are provided for WWTF operators to determine how/when land application may occur and when to implement source reduction measures. The department may recommend alternative actions based on site specific circumstances.

Tier 1: PFOA + PFOS at or less than 20 ug/kg (ppb)

- Notify the property owner/farmer of the results.
- Land apply the biosolids or industrial sludge without additional requirements.

Tier 2: PFOA + PFOS above 20 ug/kg (ppb) and at or less than50 ug/kg (ppb)

- Track cumulative PFAS loading on each field for the following.
    - PFOA
    - PFOS
    - PFOA + PFOS
- Notify the property owner/farmer of the results.
- Begin to monitor WWTF effluent discharges for PFAS within 30 days if not already required under the WPDES permit. Report the results to the department.
- Create and implement a (or continue an existing) PFAS source identification and reduction plan.
- If PFOA is greater than 20 ug/kg (ppb), notify the department and reduce application rate to 1.5 dry tons per acre or propose an alternative risk mitigation strategy for approval from the department to land apply.
- The department will modify the facility's WPDES permit to incorporate numeric limits or conditions to address PFAS in biosolids.

Tier 3: PFOA + PFOS above 50 ug/kg (ppb) and at or less than100 ug/kg (ppb)

- Track cumulative PFAS loading on each field for the following.

    - PFOA
    - PFOS
    - PFOA + PFOS
- Notify the property owner/farmer of the results.
- Begin to monitor WWTF effluent discharges for PFAS within 30 days if not already required under the WPDES permit. Report the results to the department.
- Create and implement a (or continue an existing) PFAS source identification and reduction plan.
- Land apply at a reduced application rate of 1.5 dry tons per acre or propose an alternative risk mitigation strategy for approval from the department to land apply.
- If PFOA is greater than 20 ug/kg (ppb) notify the department.
- The department will modify the facility's WPDES permit to incorporate numeric limits or conditions to address PFAS in biosolids.

Tier 4: PFOA + PFOS greater than 100 ug/kg (ppb)

- Land application is not allowed. Arrange for alternative management and/or disposal.
- Notify and provide results to the department
- Begin to monitor WWTF effluent discharges for PFAS within 30 days if not already required under the WPDES permit. Report the results to the department.
- Create and implement a (or continue an existing) PFAS source identification and reduction plan.
- Site specific requirements may be necessary.
- Requests for new land application site requests by the WPDES permitted facility are not approved.
- Requests to transfer sites to the WPDES permitted facility are not approved.
- The department will modify the facility's WPDES permit to incorporate numeric limits or conditions to address PFAS in biosolids.

Exception Quality (EQ) Biosolids

Often exception quality (EQ) bagged biosolids are distributed to the public for home gardens, golf courses and other public locations. When bagging biosolids for larger distributions, PFAS monitoring should occur more frequently than annually to demonstrate the less than or equal to 20 ug/kg (ppb) PFOA+PFOS concentration.

Monitoring frequencies for bagged biosolids are as follows:

- <1500 metric tons bagged per year: Once per year.
- ≥1500 metric tons bagged per year: Once per quarter.

Note: When increased monitoring results are available, WPDES permitted facilities may be able to use rolling averages to show compliance with the 20 ug/kg (ppb) PFOA + PFOS concentration.
Example 1: Monthly results are available when quarterly frequency is requested.
Example 2: Quarterly results are available when annual frequency is requested.

Additionally, when WPDES permitted facilities are aware that biosolids are being distributed to the public for personal and commercial use and the biosolids are not being applied to farmland, the 20 ug/kg PFOA + PFOS combined concentration threshold should apply. Some examples of where this would apply are:

- Example 1: The 20 ug/kg threshold limit applies to EQ biosolids that are available for public pick up.
- Example 2: The 20 ug/kg threshold limit applies to EQ biosolids are provided to a contractor who then uses the biosolids for commercial and residential lawns.

Bulk EQ distribution onto farmland may continue with annual PFAS monitoring as required for standard land application activities provided the WPDES permittee adheres to the tiers as listed above.

Contacts

For questions related to this interim strategy or other PFAS water quality initiatives contact:

- Fred Hegeman, P.E., Biosolids & Industrial Sludge – Frederick.Hegeman@wisconsin.gov
- Amy Garbe, P.E., Compliance & Sampling Techniques – Amy.Garbe@wisconsin.gov
- Nate Willis, P.E., Wastewater Section Manager – Nathaniel.Willis@wisconsin.gov

Sample Landowner/Farmer Letters:

See the attached Sample Landowner/Farmer Letters for both biosolids and industrial sludges.

Biosolids Communication Sample Letter

Date:

[Farmer Name / Landowner Name]:

[Address]:

Subject: Biosolids Application Notification

[Generator Name] is preparing to land apply biosolids on land you own and/or farm. As you likely know Biosolids are nutrient rich organic materials resulting from the treatment of domestic sewage in wastewater treatment facilities. When applied to land, they act as highly effective agricultural fertilizers and soil conditions that improve crop yields, supply essential macro and micronutrients, and enhance overall soil structure. Biosolids are great sources of nitrogen (N) and phosphorus (P). They provide secondary nutrients that crops need including calcium, magnesium, zinc, iron, copper and sulfur. They improve soil structure with increased organic matter, provide better water retention, help with erosion control, provide an excellent food source for beneficial soil microbes which break down nutrients to make the nutrients more accessible to plant roots.

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 perflurooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), 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 has released a draft risk-based assessment of PFAS in biosolids. Until the risk-based assessment 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 impacted biosolids from being land applied.

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

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

Date:

Note: DNR's current threshold PFOA + PFOS concentration for prohibiting land application of biosolids is 100 ppb.

Industrial Sludge Sample Letter

Date:

Farmer Name / Landowner Name:

Address:

Subject: Industrial Sludge Land Application Notification

(Please add generator name) is preparing to apply industrial sludge on land you own and/or farm.

Industrial sludges can be quite beneficial to agricultural farm land. These sludges can provide soil conditioners, carbon and nutrients such as nitrogen (N) and phosphorus (P) to soils improving nutrient supply, improved soil structured and improved soil health, and increased crop production.

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 industrial sludge, our recent industrial sludge sample results, and where additional information can be obtained.

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Should you have additional questions concerning Wisconsin's strategy to monitor and reduce sources of PFAS in industrial sludges, please do not hesitate to reach out to Statewide Wastewater ResidualsCoordinator, Fred Hegeman, via e-mail at Frederick.Hegeman@wisconsin.gov

Our most recent PFOS plus PFOA testing result is: [Result number] in parts per billion (ppb):
Date:

Note: DNR's current PFOS + PFOA concentration threshold concentration for prohibiting land application of biosolids is 100 ppb.

ATTACHMENT A: CALCULATIONS FOR TRACKING

Part 1: Calculation of Dry Tons of Sludge Applied (US Dry Tons)

A. Actual Volume of Sludge applied. Use gals/acre OR cubic yards/acre.

1. _____ Gal/Acre _____ Cubic Yards/Acre
2. _____ % Total Solids Content (in percent)

B. Calculate dry tons of sludge applied to site.

1. Using Gallons per Acre

_____ Gal/ac X _____ % solids X 0.0000417 = _____ Dry Tons/Acre

2. Using Cubic Yards per Acre

_____ Cu Yds/ac X _____ % solids X 0.008425 = _____ Dry Tons/Acre

Part 2: Calculation of PFOA, PFOS and PFOA+PFOS per Acre

A. Calculation Table

PFAS Parameter	Sludge Conc (ug/kg)		Dry Tons/Acre applied		Lbs/Acre of PFAS Parameter		Historical Loading (lbs/Acre)		Cumulative PFAS Parameter Loading (lbs/acre)
PFOA		X		div by 500,000		+		=	
PFOS		X		div by 500,000		+		=	
PFOA+PFOA		X		div by 500,000		+		=	

ATTACHMENT A--EXAMPLE

Part 1: Calculation of Dry Tons of Sludge Applied (US Dry Tons)

A. Actual Volume of Sludge applied. Use gals/acre OR cubic yards/acre.

1. 5118 Gal/Acre ____ Cubic Yards/Acre
2. 5.01% % Total Solids Content (in percent)

B. Calculate dry tons of sludge applied to site.

1. Using Gallons per Acre

5118 Gal/ac X 5.01 % solids X 0.0000417 = 1.07 Dry Tons/Acre

2. Using Cubic Yards per Acre

____ Cu Yds/ac X ____ % solids X 0.008425 = ____ Dry Tons/Acre

Part 2: Calculation of PFOA, PFOS and PFOA+PFOS per Acre

A. Calculation Table

PFAS Parameter	Sludge Conc (ug/kg)		Dry Tons/Acre applied		Lbs/Acre of PFAS Parameter		Historical Loading (lbs/Acre)		Cumulative PFAS Parameter Loading (lbs/acre)
PFOA	7.3	X	10.7	div by 500,000	1.562x10^-4	+	0	=	1.56x10^-4
PFOS	10.5	X	10.7	div by 500,000	2.247x10^-4	+	0	=	2.25x10^-4
PFOA+PFOA	17.8	X	10.7	div by 500,000	3.809x10^-4	+	0	=	3.81x10^-4