STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DOA-2049 (R09/2016)

DIVISION OF EXECUTIVE BUDGET AND FINANCE
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ADMINISTRATIVE RULES
Fiscal Estimate & Economic Impact Analysis

1. Type of Estimate and Analysis	2. Date
☐ Original ☒ Updated ☐ Corrected	12/08/2023

3. Administrative Rule Chapter, Title and Number (and Clearinghouse Number if applicable)
Ch. NR 140 – Groundwater Quality

4. Subject
Amendments to ch. NR 140 to set numerical standards to minimize the concentration of polluting substances for certain Per- and Polyfluoroalkyl Substances (PFAS) in groundwater.
DG-17-22

5. Fund Sources Affected	6. Chapter 20, Stats. Appropriations Affected
☒ GPR ☐ FED ☐ PRO ☐ PRS ☐ SEG ☐ SEG-S	20.370 (4)(ma) & 20.370 (4)(mq)

7. Fiscal Effect of Implementing the Rule

☐ No Fiscal Effect	☐ Increase Existing Revenues	☐ Increase Costs	☐ Decrease Costs
☐ Indeterminate	☐ Decrease Existing Revenues	☒ Could Absorb Within Agency's Budget	

8. The Rule Will Impact the Following (Check All That Apply)

☐ State's Economy	☒ Specific Businesses/Sectors
☒ Local Government Units	☐ Public Utility Rate Payers
	☐ Small Businesses **(if checked, complete Attachment A)**

9. Estimate of Implementation and Compliance to Businesses, Local Governmental Units and Individuals, per s. 227.137(3)(b)(1).

As described more fully below, the department has revised the department's estimate of the implementation and compliance costs that are reasonably expected to be incurred by or passed along to businesses, local governmental units, and individuals as a result of the proposed rule. The department's revised estimate is $16,608,810 in the first year, $16,740,850 in the second year, and a total of $33,349,660 in the first two years.

10. Would Implementation and Compliance Costs Businesses, Local Governmental Units and Individuals Be $10 Million or more Over Any 2-year Period, per s. 227.137(3)(b)(2)?
☒ Yes ☐ No

11. Policy Problem Addressed by the Rule
The objective of the proposed rule is to set numerical groundwater quality standards for four per- and polyfluoroalkyl substances (PFAS) for consistent use in state regulatory programs to minimize the concentration of polluting substances in groundwater [ss. 160.001 and 160.07(5), Stats.]. The new groundwater quality standards for PFAS include: perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorobutanesulfonic acid (PFBS), and hexafluoropropylene oxide dimer acid (HFPO-DA/"GenX"). Proposed groundwater quality standards are based on recommendations developed by the WI Department of Health Services (DHS).

The groundwater quality standards in ch. NR 140, Wis. Adm. Code, include enforcement standards (ES) and preventive action limits (PAL). The rule proposes the ES and PAL standards in Table 1:

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Table 1: Proposed groundwater quality standards		
Substance	**Enforcement Standard (ES)**	**Preventive Action Limit (PAL)**
PFOA[1]	20 ng/l	2 ng/l
PFOS[1]	20 ng/l	2 ng/l
PFBS	450 µg/l	90 µg/l
HFPO-DA	300 ng/l	30 ng/l

The purpose of the proposed standards is to protect public health, given that groundwater is the primary source of drinking water throughout Wisconsin. PFAS breaks down very slowly and can accumulate in people. PFAS may cause reproductive effects such as decreased fertility and pregnancy-induced hypertension, developmental effects or delays in children including birth defects and low birth weight, increased risk of some cancers including prostate, kidney, and testicular cancers, decreased antibody response to vaccines, and increased cholesterol. Specific health effects for PFAS are described more fully below and are included in the DHS recommendations for groundwater standards, available here: https://www.dhs.wisconsin.gov/publications/p02807.pdf and https://www.dhs.wisconsin.gov/water/gws-cycle10.htm.

12. Summary of the Businesses, Business Sectors, Associations Representing Business, Local Governmental Units, and Individuals that may be Affected by the Proposed Rule that were Contacted for Comments.

The department held virtual (via Zoom) stakeholder and informational meetings on July 14, 2023, and October 20, 2023, to solicit comments and information relevant to the potential economic impacts of the proposed rule. Notification of these meetings were emailed to over 11,958 members of the Drinking Water and Groundwater Study Group, Landfill, NR 140 Rule Changes, PFAS Contamination in Wisconsin, Remediation & Redevelopment Newsletter and Waste and Materials Management Study Group distribution lists. The department received written comments from organizations and individuals, including Cindy Boyle, Citizens for Safe Water Around Badger, Clean Wisconsin, League of Wisconsin Municipalities, Madison Metropolitan Sewerage District, Municipal Environmental Group-Wastewater Division, Save Our Water and League of Women Voters of Wisconsin, Wisconsin Conservation Voters, Wisconsin's Greenfire, Wisconsin Manufacturers and Commerce and Wisconsin Paper Council.

In 2021, the department initiated rulemaking for new and updated groundwater standards for 28 substances, including PFOA and PFOS (DG-15-19). The department solicited and received comments on a draft EIA prepared for that proposed rulemaking. When preparing this EIA, the department considered the comments related to the cost of implementing PFAS groundwater standards received on the prior draft EIA, as well as those received in 2023.

13. Identify the Local Governmental Units that Participated in the Development of this EIA.

Many local government units were included in the notifications for the July 14, 2023, and October 20, 2023, virtual stakeholder and informational meetings. The department offered local government units an opportunity to submit comments and information relevant to the potential economic impacts of the proposed rule at both meetings. All local government units that may be affected by the proposed rule were invited to participate in the development of this EIA during the comment period. The department received written comments from the League of Wisconsin Municipalities, an association with 607 member cities and villages, the Municipal Environmental Group-Wastewater Division, an organization of over 100 municipalities statewide who own and operate wastewater treatment plants, and Madison Metropolitan Sewerage District.

[1] This standard applies to the sum of PFOA and PFOS concentrations in groundwater.

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14. Summary of Rule's Economic and Fiscal Impact on Specific Businesses, Business Sectors, Public Utility Rate Payers, Local Governmental Units and the State's Economy as a Whole (Include Implementation and Compliance Costs Expected to be Incurred)

The department acknowledges that PFAS is an expensive problem facing Wisconsin. The costs of dealing with PFAS through the various regulatory and voluntary actions happening across the state are substantial. The complexity of the problem, the many regulatory programs it impacts, and the high cost of certain treatment options are reflected in a recent Minnesota Pollution Control Agency report that examined the options and cost of removing PFAS from waste streams in Minnesota. To help address Wisconsin's statewide PFAS issues, the legislature appropriated $125 million for PFAS projects and research. The department also recognizes, as several commenters emphasized, that there is a substantial, indeterminate benefit derived from preventing and remediating PFAS contamination, including benefits to human health and wellbeing, economic productivity (avoided costs), and ecosystem integrity.

Many of the costs associated with addressing PFAS contamination in Wisconsin are not directly related to the implementation of this proposed rule – namely, the establishment of numeric groundwater standards in ch. NR 140, Wis. Adm. Code, for PFOA, PFOS, PFBS, and HFPO-DA. For example, some of the costs of addressing PFAS contamination in Wisconsin are related to the surface water and drinking water standards that have already been adopted. Other costs are related to voluntary actions that private individuals and facilities may choose, but are not required by law, to take in relation to private wells. Still other costs stem from remedial actions that are currently required by existing laws for addressing discharges of hazardous substances. These other actions are necessary to effectively address the public health and environmental risks of PFAS in Wisconsin and have a substantial cumulative cost. However, many of these costs do not relate to groundwater standards or would be incurred whether or not this proposed rule is adopted.

In accordance with the directive in s. 227.137, Wis. Stat., the department focused this EIA on the economic impact of setting numeric standards for the four PFAS proposed in this rule, including the implementation and compliance costs that are reasonably expected to be incurred by or passed along to the businesses, local governmental units, and individuals that may be affected, based on the current administrative and statutory authority in the department's regulatory programs and rules that refer to ch. NR 140 standards. The department's revised analysis takes into consideration those costs that have been identified in public comments as implementation and compliance costs stemming from the proposed PFAS groundwater standards, particularly those that may be incurred relating to landspreading of wastewater biosolids and discharges to groundwater from construction project dewatering if PFAS contamination is present.

The department expects that both the technology and the regulatory requirements for addressing PFAS will be the subject of continued attention and development. All state regulatory agencies including DNR, Department of Transportation, Department of Agriculture, Trade, and Consumer Protection, and Department of Safety and Professional Services, are required under ss. 160.19 to 160.25, Wis. Stat., to review any new groundwater standards and if necessary, commence promulgation or amendment of their administrative rules for their regulatory programs that use ch. NR 140 groundwater standards. The implementation and compliance costs of this rule could be affected – either increased or decreased – by changes in the regulatory authority or requirements of the programs that use the standards.

Implementation and compliance costs that are reasonably expected to be incurred by setting numeric groundwater standards for the four PFAS, as proposed in this rule, are provided below.

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Open and Future Remediation and Redevelopment Sites with PFAS Contamination
Wisconsin's remediation and redevelopment program requires responsible parties to take actions necessary to restore the environment from a discharge of a hazardous substance. The definition of hazardous substance is a narrative standard defined in s. 292.01(5), Wis. Stat. Since 2018, the department has regulated PFAS as a hazardous substance, requiring responsible parties to test for 36 PFAS compounds including PFOA, PFOS, PFBS, and HFPO-DA. When remediating for hazardous substances in groundwater that do not have a ch. NR 140, Wis. Adm. Code standard, administrative code authorizes the development of a site-specific standard, which is usually based on the DHS recommended levels, to protect public health, safety or welfare, or to prevent a significant damaging effect on groundwater or surface water quality for present or future consumptive or non-consumptive uses. (*see* s. NR 722.09(2)(b)2., Wis. Adm. Code).

To date, there are 99 open remediation sites with identified PFAS. These sites are at various stages of remediation, and sites that have selected remedial actions are using site-specific PFAS standards proposed by the responsible party. The department recognizes that the costs for PFAS site investigations and remedial actions can be substantial. The department received comments estimating costs of well over $10 million in a two-year period for remedial action site investigation, and cleanup costs. The department recognizes these existing and ongoing costs, which are based on remedial action site investigations and actions that are being undertaken today because PFAS contamination at those sites meets the definition of a "hazardous substance" as defined by the legislature in s. 292.01(5), Wis. Stats. (namely, any substance or combination of substances which may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or which may pose a substantial present or potential hazard to human health or the environment because of its quantity, concentration, or physical, chemical or infectious characteristics).

If numeric standards for PFOS, PFOA, PFBS, and HFPO-DA are added to the groundwater standards in ch. NR 140, Wis. Adm. Code, responsible parties will no longer be required to propose a site-specific standard for remedial action. Responsible parties with open remediation sites will be able to use the site-specific standards that are already established for their cleanup site. Responsible parties for sites that do not yet have an established site-specific standard may benefit from a promulgated standard for these four PFAS, as they will not be required to do additional steps under s. NR 722.09, Wis. Adm. Code, to propose groundwater cleanup standards for PFOA, PFOS, PFBS, and HFPO-DA. Once standards are promulgated, the cleanup goal established in s. 722.09(2)(b)1., Wis. Adm. Code, is the preventive action limit.

Whether the remedial goal is site-specific or based on a promulgated standard, the remedial action statute requires responsible parties to take the remedial actions that are practicable to restore the environment and minimize the harm (s. 292.11(3), Wis. Stat.). Remedial actions that are practicable, taking into consideration what is technically and economically feasible, will likely be similar regardless of whether there are promulgated or site-specific standards. While remediation costs are significant, those costs will not likely change as a result of the promulgation of standards for these 4 PFAS.

Landfills
There are hundreds of landfills (active and closed) in Wisconsin that are required to monitor groundwater quality on a regular basis. During the previous rulemaking effort that included groundwater standards for PFOA and PFOS, a public comment estimated sampling costs of $1 million for PFOS and PFOA for a subset (100) of those landfills. To date, the department has not generally required sampling by landfills for PFAS. The department has existing authority to approve sampling parameters for particular landfills and may "require analysis of additional parameters depending on the characteristics of the waste, the raw process materials used, or the provisions of ch. NR 140." s. NR 507.17(3), Wis. Adm. Code.

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The department does not require routine monitoring at landfills for all contaminants listed in ch. NR 140. For active landfills, the department intends to require routine monitoring for PFAS only if there is evidence that modern landfill designs allow infiltration of PFAS-containing leachate into groundwater.

For closed landfills, the department will likely require PFAS monitoring where there is evidence that the landfill is leaking or has designs that are susceptible to release of PFAS. There are approximately 140 landfills (generally closed landfills or closed units at large landfill complexes) in Wisconsin with known releases of other contaminants in the past 8 years. Many of these are already in investigation or remediation, and others have only singular or sporadic detections of a release that was not confirmed in subsequent sampling. Based on department data, it is estimated that 70 of the 140 closed landfills will be required to add PFAS to their routine monitoring. Assuming a cost of $400 per sample for an average of 10 sample locations per site and 2 samples per year, the total annual cost per closed landfill is $8,000 [*$400 x 10 landfills x 2 samples per year*]. For 70 landfills, the total cost per year for monitoring is **$560,000** [*$8,000 x 70 landfills*].

The department estimates that as a result of monitoring, the solid wastes program may require 10 sites to conduct further investigation and sampling of on-site wells to determine if the site contains significant PFAS discharges to the environment that require remedial action. Costs for follow-up investigation would include an additional 15 sample locations, sampled 2 times per year, at a cost of $400 per sample, totaling $12,000 per landfill [*$400 x 15 sample locations x 2 samples per year*]. For 10 landfills, the total cost is **$120,000** [*$12,000 x 10 landfills*]. These follow-up investigation costs will likely occur no sooner than the second year of implementation of the proposed rule. Therefore, these costs are added in year 2 of the total estimate.

Active and closed landfills generally dispose of leachate by sending it for treatment to a wastewater treatment facility. Treatment may result in the landspreading of biosolids. The department's assessment of the costs associated with the land application of wastes, subject to Wisconsin Pollutant Discharge Elimination System (WPDES) permitting, is discussed below. In response to PFAS groundwater standards, landfills may seek alternative disposal options where available, or in some cases, waste water treatment facilities (WWTF) may require pre-treatment of incoming landfill leachate to reduce PFAS levels in biosolids. The department estimates that 5 landfills will incur additional costs for leachate pre-treatment. The department assumes that technology for the pre-treatment of landfill leachate would be similar to the technology used to reduce PFAS levels in groundwater. Based on cost information from Solid Waste Association of North America relating to groundwater treatment, the department estimates leachate pretreatment costs summarized in Table 2.

Table 2: Costs for Leachate Pre-Treatment to Reduce PFAS Concentrations in First Year	
Mobilization of equipment (first year only)	$140,000
Equipment rental	$140,000
Consumables	$200,000
System operation	$150,000
Subtotal	$630,000
First Year Total *[5 landfills required to pre-treat x $630,000]*	**$3,150,000**

The total first-year cost for leachate pre-treatment is estimated to be **$3,150,000**. The total second-year cost for leachate pre-treatment is estimated to be **$3,010,000** [*$3,150,000 - $140,000 of mobilization costs*].

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Private Wells
Private wells are regulated under ch. NR 812, Wis. Adm. Code. Based on the department's research, approximately 0.71% of private wells have PFAS detections exceeding the DHS recommendations. Wisconsin has approximately 800,000 private wells, meaning that an estimated 5,700 private wells may exceed the DHS PFAS recommendations. Individual well owners may choose to provide treatment or drill a new well, and in some cases, where contamination is the result of a discharge of PFAS to groundwater, responsible parties may be required to take remediation actions necessary to provide an alternative source of drinking water. For responsible parties, there are no regulatory or implementation costs because, as noted above, the remedial action statute already requires action to address PFAS as a hazardous substance. For individual private well owners, there may be a benefit to promulgation of standards, to help prevent PFAS contamination of the groundwater. There are no regulatory implementation or compliance costs for individual private well owners due to the promulgation of groundwater standards.

Public Water Systems
Public water systems are regulated under ch. NR 809, Wis. Adm. Code, and are not subject to groundwater standards. Therefore, there are no implementation or compliance costs for public water systems as a result of the proposed groundwater standards. As of 2022, ch. NR 809, Wis. Adm. Code requires that public water systems sample for PFOA and PFOS and establishes a maximum contaminant level of 70 ppt individually and combined. If a public water system exceeds the maximum contaminant level, it must take corrective action to reduce PFAS. To date, there is one public water system that has exceeded the PFOA and PFOS maximum contaminant level of 70 ppt.

Pit Trench Dewatering
The department received public comments suggesting that the department underestimated construction dewatering costs because the proposed PFAS groundwater standards would (a) increase the number of construction dewatering projects that either need to treat prior to discharge or need to send the discharge to the WWTF, (b) increase administrative costs at WWTFs needing to determine whether they can or should receive construction dewatering discharges, and (c) increase the amount of PFAS in biosolids or effluent at WWTFs. In recognition of the commenters' concerns, the department has revised its analysis of construction dewatering costs.

The vast majority of dewatering discharges are made to surface water, since the purpose of construction dewatering is to remove groundwater from construction trenches or pits so that work may be completed. Contractors typically strive to avoid a discharge back to groundwater because it is more difficult to establish a cone of depression in the water table. Since the department began collecting PFAS data and screening for PFAS in dewatering discharges in 2017, there has been one instance where a permittee elected to infiltrate a PFAS-contaminated groundwater discharge. For comparison, since 2017, there have been at least 7 dewatering projects treated for PFAS that discharged to surface water, and several that discharged to sanitary sewers.

Wisconsin promulgated surface water quality standards for PFOS and PFOA in 2022, which regulate most construction dewatering discharges. The proposed PFAS groundwater standards will not impact surface water discharges.

The department further estimates that dewatering discharges in many locations will not likely exceed proposed PFAS groundwater standards. The department recently completed a study of the occurrence of PFAS in shallow groundwater in Wisconsin. For the study, water samples from 450 homes throughout the state were collected and analyzed for PFAS. All sample locations were selected to be at least three miles away from any known PFAS release or investigation site. At least one type of PFAS was detected in 71% of the study samples, and 22 of the 44 types of PFAS were detected in one or more samples. PFAS levels exceeded DHS PFAS groundwater quality enforcement standards in less than 1% of study samples. Based on these study results, it appears that very few construction site pit trench dewatering projects are likely to cause an exceedance of the proposed PFAS groundwater standards, especially considering that very few dewatering

projects discharge to groundwater.

Although the department anticipates that PFAS-contaminated dewatering discharges to groundwater will be rare, the department makes a conservative assumption that one dewatering project every two years will need to treat dewatering discharge as a result of the proposed PFAS groundwater standards. The cost for this treatment is expected to be **$292,040** every two years for a 6-month dewatering project (see Table 3 below).

Table 3: Costs for Granulated activated carbon treatment of PFAS contaminated dewatering discharges (100 gallons per minute facilities)	
Activities	Cost ($)
Frac tank mobilization/demobilization to/from site	$5,200
Rental costs for bag filter housing units, pumps, and frac tank [*$3,000 per month x 6 months*]	$18,000
Carbon Changeout [*one vessel per 3 weeks = 8 vessels; $3.10 per lb carbon x 4,000 lbs carbon per vessel = $12,400; 8 vessels x $12,400 = $99,200*]	$99,200
Carbon Disposal Costs [*8 changeouts x $209.44 per ton ($190 per metric ton x 1.10) x 1.814 tons (4000 lbs x 0.000454 ton per lb) = 8 changeouts x $209.44 per ton x 1.814 tons = $3039.39*]	$3,040
Disposal Hauling Fee [*8 changeouts x $3,200 each*]	$25,600
Rental Costs: 3xGAC Vessels [*$1,500 per month per vessel x 3 vessels x 6 months = $27,000] (does not include carbon cost)*]	$27,000
Operations/Maintenance Labor [*estimated at $19,000 per month x 6 months*]	$114,000
Total	**$292,040**

If a dewatering project occurs in an area where the groundwater is contaminated with PFAS, it is likely that contractors would first explore the option to discharge to a sanitary sewer before resorting to returning the discharge to groundwater. Therefore, the department assumes that one WWTF per year would use 20 hours of staff time to screen the discharge at the average operator rate of $24.81 per hour,[2] for a total cost of approximately **$496 per year**. If the WWTF would decline to receive the discharge without treatment, there are no additional costs to the WWFT as a result of increases in PFAS in the biosolids or WWTF effluent. Even if a WWTF accepted a PFAS-contaminated discharge, the department does not expect that these discharges would result in a lasting increase in PFAS in biosolids or effluent. Due to dilution with other influent, any short-term increase would likely fall within the natural variability in effluent or biosolids PFAS concentrations and would not likely create an exceedance of the proposed groundwater standards.

WPDES Permitted Discharges

Surface water quality standards for PFOA and PFOS are now in effect that may impact the cost of compliance and implementation for groundwater standards. Surface water standards for PFOS are 8 ppt, except for water that cannot naturally support fish. Surface water standards for PFOA are 20 ppt for surface waters classified as public water supplies and 95 ppt for waters that are not classified for public water supply (*see* s. NR 102.04(8)(d), Wis. Adm. Code). The surface water quality standards include Wisconsin Pollutant Discharge Elimination System (WPDES) permit implementation procedures for source reduction and treatment of PFOS and PFOA in wastewater discharges. Many of

[2] Water and Wastewater Treatment Plant and System Operators: Occupational Outlook Handbook: U.S. Bureau of Labor Statistics.

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the industries and facilities impacted by this proposed rule are also already regulated by surface water quality standards.

Facilities regulated by the department that discharge under a WPDES permit, are required to comply with state groundwater quality standards in ch. NR 140 Wis. Adm. Code. Under s. 283.31(3) and (4), Wis. Stat., WPDES permits must include terms and conditions that prevent exceedances of groundwater standards. The discharge of waste through a land treatment/disposal system is considered a discharge to groundwater, and therefore a discharge to waters of the state. Industrial and municipal wastewater land treatment/disposal systems are required to be designed and operated to minimize the level of substances in groundwater, to comply with ch. NR 140 groundwater quality enforcement standards, and to prevent exceedance of ch. NR 140 groundwater quality preventive action limits to the extent technically and economically feasible.

The department regulates the discharge of industrial and municipal/domestic wastewater, by-product solids, biosolids and sludges through land treatment/disposal systems. Land treatment/disposal systems include both systems located on "dedicated sites," such as absorption/seepage pond systems, and systems where waste is land applied/land spread on multiple agricultural fields for beneficial use as a fertilizer or soil conditioner. Because wastes are discharged on a relatively continuous basis, groundwater monitoring systems are often installed at land treatment/disposal systems located on dedicated sites. Wastes that are land spread are generally applied on a rotational basis to multiple agricultural fields, with different fields being used on different years. Because waste is not applied to a single field on a continuous basis groundwater monitoring systems are not installed at land spreading land treatment/disposal sites.

Industrial and municipal/domestic waste may contain PFAS and recognizing this possibility the department has, since October 1, 2022, included PFOA/PFOS monitoring of discharges to surface water in WPDES permits (in accordance with the requirements of Subchapter VIII of ch. NR 106, Wis. Adm. Code). As of January 1, 2024, the department will begin putting annual PFAS monitoring of industrial and sewage sludges in WPDES permits (in accordance with the requirements of ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code). EPA is currently developing a risk assessment to better understand the potential public health and ecological risks associated with PFAS in land-applied biosolids. The department may adjust its current biosolids strategy in response to the EPA risk assessment.

Certain sampling and monitoring costs for PFAS are excluded from this EIA, because the department is currently using existing authority to require monitoring and sampling of discharges to land treatment/disposal systems.

Some WPDES-permitted waste treatment facilities that discharge municipal/domestic or industrial liquid waste through a land treatment/disposal system such as an absorption/seepage pond land treatment system will be impacted by the proposed rule groundwater standards. These permits are reissued every 5 years. Generally, requirements related to sampling and reducing PFAS levels in discharged wastewater would be added to a facility's next reissuance of its WPDES permit and subsequent reissuances. Therefore, the department anticipates that approximately 20% of permitted facilities would be affected every year for the first 5 years after proposed PFOA, PFOS, PFBS, and HFPO-DA groundwater standards go into effect.

Whether WPDES permitted facilities that have discharges to groundwater must take actions to reduce discharges of PFOA, PFOS, PFBS, and HFPO-DA depends on the concentrations in their discharge and whether the levels in the discharge has the reasonable potential to attain or exceed standards. Actions may include identifying sources of PFOA, PFOS, PFBS, and HFPO-DA and implementing feasible measures and best management practices to reduce PFOA, PFOS, PFBS, and HFPO-DA concentrations in a discharge. For facilities where source reduction measures do not sufficiently reduce levels of PFOA, PFOS, PFBS, and HFPO-DA in their discharge, treatment, reduced land application loading, and/or alternate disposal may be necessary.

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1. Industrial facilities that discharge liquid wastewater through a land treatment system (6 facilities total)

The department used data outlined in the Michigan Dept. of Environment, Great Lakes and Energy (EGLE)'s comprehensive study of industrial sources of PFOS in Michigan to identify potential sources of PFOS in Wisconsin. After a review of EGLE's Standard Industrial Classification codes of industries with significant PFAS levels, the department identified industrial facilities from the department's data base of industrial facilities with an individual or general WPDES permit as potential sources of PFOS/PFOA.

It is reasonable to expect that one of the current identified industrial facilities in Wisconsin would have to install treatment if the proposed groundwater standards for PFOA, PFOS, PFBS, and HFPO-DA are promulgated. Using a flow rate of 20 gallons per minute, the cost of treatment using a granulated activated carbon (GAC) system for that facility is estimated to be **$449,852** [*$70,000 as one time treatment system installation cost and $379,852 as annual operation cost for the installed treatment*] in the first year of operation and **$379,852** in recurring operation costs each year thereafter.

2. Municipal WWTFs that discharge treated wastewater through a land treatment discharge to groundwater (6 facilities total)

There are 6 publicly owned WWTFs in Wisconsin that discharge effluent to groundwater with at least one significant industrial user (SIU) contributing flow to their discharge. These facilities may be discharging wastewater that could cause an exceedance of proposed PFOA, PFOS, PFBS, or HFPO-DA groundwater standards. Based on parallel surface water quality data, the department assumes 12% of the 6 municipal wastewater treatment facilities – i.e. 1 facility – is anticipated to discharge wastewater effluent that would exceed the proposed PFOA, PFOS, PFBS, and HFPO-DA groundwater enforcement standards.

It is reasonable to expect that this facility will be required to sample their land treatment/disposal system site groundwater monitoring wells. The cost to sample groundwater for PFOA, PFOS, PFBS, and HFPO-DA is expected to be $600 per sample. Assuming at least 3 monitoring wells, sampled quarterly at $600 per sample, the total annual cost is $7,200 [*$600 per sample x 3 monitoring wells x 4 samples per year*]. The department anticipates that the impacted municipal wastewater treatment facility will identify the source of PFAS in its incoming wastewater and require an identified PFAS source facility to install treatment before accepting the waste. The department assumes that wastewater effluent has an average flow rate of 10 gallons per minute (based on the department's data of potential industrial sources discharging to a WWTF).

Based on this assumed flow rate, the GAC treatment costs are estimated to include a one-time cost of $70,000 to install the treatment system, and annual treatment system operating costs of $358,126 per year. The total cost per year for sampling and treatment is **$435,326** [*$7,200 + $358,126 + $70,000*] in the first year and **$365,326** [*$7,200 + $358,126*] per year thereafter.

3. Municipal WWTFs that land apply biosolids and waste haulers that accept municipal biosolids

When a municipally-owned WWTF treats wastewater from industries and residences through a wastewater treatment system facility, it produces an effluent liquid wastewater discharge and a solid/semi-solid or semi-liquid sludge (biosolids). The biosolids are either:

- Land applied (pollutants can reach groundwater), or
- Sent to another wastewater treatment facility, or

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- Sent to a permitted contractor (for land application), or
- Disposed of through alternate disposal method (typically incineration/landfilling)

If a biosolid contains elevated concentrations of PFAS, then a permitted facility that generates or manages biosolids may need to take additional measures to reduce concentrations of PFOA, PFOS, PFBS, or HFPO-DA, including source identification/reduction, storing biosolids, applying sludge to more acreage, or in some limited situations, finding alternative methods of disposing of biosolids. It is anticipated that there will be increased costs for facilities requiring these additional measures should the proposed groundwater standards be promulgated.

The department has revised the estimated costs to address PFAS in biosolids based on public comments received from industries and municipalities that currently land spread biosolids. Commenters suggested the department use various studies in its EIA, including: 1) a 2020 report from the National Association of Clean Water Agencies (NACWA), North East Biosolids & Residuals Association (NEBRA) and Water Environment Federation (WEF), which was based on a nationwide survey of wastewater treatment facilities (2020 NACWA Report); 2) a 2023 report from the Minnesota Pollution Control Agency, which evaluated alternatives and costs for total PFAS removal and destruction at certain facilities; and 3) a 2023 fact sheet from a coalition of water associations regarding PFAS clean-up costs as it relates to water ratepayers. The department considers the 2020 NACWA Report to be particularly useful because it relies on data collected from facilities across the country and case studies that illuminate the range of costs facing regulated entities because of a variety of PFAS regulations. The 2023 Minnesota study is of limited value for purposes of this EIA, given that it evaluates industry responses that are beyond the regulatory requirements triggered by this proposed rule. The 2023 fact sheet also is of limited value because it does not describe a basis for the general number or estimates it refers to.

To develop a reasonable estimate of the costs of implementation and compliance for the proposed rule, the department relied on information from other states and reports, and applied that information using best professional judgment to known information about Wisconsin. The department relied on information complied by the State of Michigan on biosolid management. Based on information obtained from the state of Michigan's experience evaluating the number of wastewater treatment facilities that may be impacted by PFAS, the department estimates that about 26% [*70 of 272*] of the WWTFs in the state will likely have a concentration of PFAS in their biosolids that will necessitate additional management measures. Records sent to the department show that approximately 171,067 metric tons (MT) of biosolids were generated and land applied in Wisconsin in 2022.

This is the best current reasonable estimate of annual solids generated, and future regulatory action or updated data may alter these estimates. For example, due to the wide range of soil/water partitioning coefficients for PFAS derived in literature and limited data on PFAS in biosolids in Wisconsin, it is challenging to forecast a precise number of facilities that will need to take action to address PFAS in biosolids until EPA's risk assessment for PFOA and PFOS in biosolids is released in late 2024.

<u>WWTFs with Highly PFAS-Contaminated Biosolids that will be Required to Use Alternate Methods of Biosolids Disposal</u>

Based on review of information compiled by the State of Michigan, the department estimates that a small number of WWTFs may have biosolids that are so contaminated with PFAS that land application for beneficial reuse will not be an option. Based on Michigan's data, the department estimates that there will be 4 facilities in Wisconsin that will have to manage their PFAS-contaminated biosolids using an alternative method to land

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application. These 4 facilities are not specifically known or identified; it is a reasonable estimate based on known data of the number of facilities that may be impacted.

Alternative treatment/disposal methods include landfilling and incineration. To estimate costs, the department relied on sample cases, including public comments from the Madison Metropolitan Sewerage District (Madison Met) [*Madison Met cost to landfill 6,364 MT (7,000 tons) estimated at up to $5,000,000 = $786 per MT*] and information related to the need to store and transfer highly PFAS-contaminated biosolids to an out of state landfill [*Marinette cost to store/transport and dispose of PFAS contaminated biosolids in landfill in Oregon estimated at about $1,250,000 for 236 MT = $5,297 per MT*]. It is assumed that the landfilling cost estimated by Madison Met likely represents a "lower end" of the cost range, given the large scale of its operation and its potential to achieve greater cost efficiency. Further, it is assumed that the cost incurred by Marinette to manage its PFAS-contaminated biosolids represents a "higher end" of the cost range based on the nature of the operation (transportation of biosolids out of the state). Based on these "low end" and "high end" estimates, the costs to dispose of highly PFAS-contaminated biosolids in a landfill is expected to range from approximately $786 per MT to $5,297 per MT.

The department makes the following reasonable assumptions and estimates regarding the 4 facilities that cannot land apply their PFAS-contaminated biosolids:

- The facilities will send their biosolids to a landfill.
- The 4 facilities manage approximately 2,515 MT of biosolids per year [*4 of 272 total facilities = 1.47%; 1.47% of 171,067 MT = 2,515 MT*]
- The cost to landfill these biosolids is approximately $3,042 per MT [*average between $786 - $5,297*]
- The total cost to the 4 facilities to landfill their PFAS-contaminated biosolids is $7,650,630 [*$3,042 per MT x 2,515 MT = $7,650,630*] per year.
- The 4 facilities' total cost to land apply the same volume of non-PFAS-contaminated biosolids would be $792,225 [*$315 per MT x 2,515 MT = $792,225*].
- The estimated cost of implementation and compliance with the proposed rule per year for the 4 facilities to landfill PFAS-contaminated biosolids is **$6,858,405** [*$7,650,630 of costs to landfill PFAS-contaminated biosolids – $792,225 of existing costs for biosolid management = $6,858,405*].

Land Application Biosolids Management Costs at WWTFs

Public comments suggest that the current cost of managing biosolids via land application at a large municipal wastewater treatment facility is approximately $286 per ton [*Madison Met comment describing $2,000,000 to manage 7,000 tons of biosolids*]. Converting this estimate to metric tons results in an estimated cost of approximately $315 per MT to manage the land application of municipal biosolids at a large municipal wastewater treatment facility. A large wastewater treatment facility will likely benefit from economies of scale not available to the majority of wastewater treatment facilities in the state, most of which are medium to small size. For example, larger facilities often own bigger hauling trucks that transport larger amount of biosolids than the smaller trucks often used by smaller facilities. As a result, the per unit transportation cost is likely to be lower for larger facilities. Further, larger facilities are likely to rent larger areas of land for biosolid spreading to manage higher quantities of biosolids than small and medium sized facilities. Therefore, larger facilities may incur lower per unit cost due to PFAS for biosolid spreading and application.

Using an average cost of $315 per MT to manage biosolids, the total cost to manage 168,552 MT [*171,067 MT – 2,515 MT landfilled = 168,552 MT*] of biosolids generated statewide is $53,093,880 per year. The department

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assumes (based on Michigan's assessment data as applied to the total WWTFs in Wisconsin) that 26% of WWTFs will incur costs as a result of implementing additional biosolids management measures to address PFAS [*70 of 272 WWTFs*]. The current cost estimated for biosolids management at these facilities is $13,804,409 per year [*26% x $53,093,880 = $13,804,409*].

The 2020 NACWA Report's nationwide survey of wastewater treatment facilities found that average biosolids management cost increase by approximately 37% in response to PFAS concerns. Applying the 37% increase to current biosolids management costs to address PFAS results in an estimated compliance and implementation cost for the proposed rule of **$5,107,631** per year [*37% x $13,804,409 = $5,107,631*].

Smaller WWTFs that Intermittently Manage Biosolids

Not all WWTFs that land apply biosolids will land apply each year. Some WWTFs do not land apply wastewater biosolids on an annual basis. These WWTFs may treat wastewater in a lagoon treatment system that accumulates solids over time, or may use multi-cell systems like reed beds to further treat their wastewater solids. These WWTFs then intermittently land apply and dispose of biosolids based on the type of treatment at the WWTF. These facilities are generally small community systems that generally do not handle large volumes of wastewater and therefore do not generate large volumes of biosolids. Periodically these WWTF must remove their biosolids and dispose of them. The time frame for removal and disposal of biosolids from these systems is conservatively estimated in the range of 10 to 15 years.

The department estimates that there are approximately 80 small WWTFs statewide that discharge their biosolids on an intermittent basis. Based on review of past records, the department estimates that the volume of biosolids that these small facilities must discharge intermittently is small, typically no more than 100 MT per discharge event. On a yearly basis the department estimates that about 5 of these facilities will discharge their biosolids. Of those 5 facilities, the department assumes that only 1 will need to take additional management measures because of PFAS-contaminated biosolids. A reasonable scenario would be for that facility to send its biosolids to a landfill. The department estimates that the additional costs for a small WWTF to send biosolids to a landfill rather than land applying the biosolids is **$47,100** for one year. This assumes the cost to landfill 100 MT of biosolids is approximately $78,600 and the estimated cost to land apply 100 MT of biosolids is $31,500 [*100 MT x $786 per MT to landfill = $78,600; 100 MT x $315 per MT to land apply = $31,500; the additional cost is $78,600 - $31,500 = $47,100*].

Table 4: Total Implementation and Compliance Cost for Management of PFAS-Contaminated Biosolids	
Facilities with highly PFAS-contaminated biosolids that will be required to use alternate methods of biosolid disposal	$ 6,858,405
Land application biosolid management costs at WWTFs	$ 5,107,631
Smaller WWTFs that intermittently manage biosolids	$ 47,100
One-year total implementation and compliance costs	**$ 12,013,136**
Two-year total implementation and compliance costs	**$ 24,026,272**

The department's reasonable estimated implementation and compliance costs from all regulatory programs impacted by the proposed rule for groundwater standards for the four PFAS are summarized in Table 5.

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Table 5: Total Implementation and Compliance Costs Expected to be Incurred by Proposed Rule			
	First Year	Second Year	**2-Year Total**
Landfills – monitoring	$560,000	$560,000	**$1,120,000**
Landfills – follow-up investigation	-	$120,000	**$120,000**
Landfills – leachate pre-treatment	$3,150,000	$3,010,000	**$6,160,000**
Pit trench dewatering – GAC treatment of PFAS-contaminated discharge	-	$292,040	**$292,040**
Pit trench dewatering – POTW administrative cost	$496	$496	**$992**
WPDES - Industrial facilities that discharge liquid waste through a land treatment system	$449,852	$379,852	**$829,704**
WPDES – Municipal WWTFs that discharge treated wastewater through a land treatment discharge to groundwater	$435,326	$365,326	**$800,652**
WPDES – Municipal WWTFs that land apply biosolids and waste haulers that accept municipal biosolids	$12,013,136	$12,013,136	**$24,026,272**
Total costs	**$16,608,810**	**$16,740,850**	**$33,349,660**

Specific Businesses and Business Sector (Private Businesses)

Specific businesses anticipated to be impacted include: industrial facilities that currently land apply sludge, waste haulers, treatment facilities that discharges industrial liquid waste through an absorption/seepage pond land treatment system and businesses that contribute wastewater to WWTFs.

Impacts on Public Utility Rate Payers

The department does not anticipate this rule to significantly impact public utility rate payers.

Impacts on Local Governmental Units

The department assumes that municipal-owned utilities will incur some cost that is primarily related to publicly owned WWTFs and classifies this as a cost to local government.

Fiscal Impact and Impact on State Economy

The department does not anticipate that this rule will impact the state's economy adversely. Additional cost to the DNR in terms of staff time would be absorbed in the agency's current budget. The department also recognizes that there is an indeterminate benefit derived from preventing and remediating PFAS contamination, including benefits to human health, safety and wellbeing, economic productivity (avoided costs), and ecosystem integrity.

15. Benefits of Implementing the Rule and Alternative(s) to Implementing the Rule

Overall, the benefit from compliance with the proposed PFAS groundwater standards is likely to outweigh the cost of compliance. A recent study estimated the annual health care cost of $5.5 billion attributable to the PFAS related disease cost in the United States. Based on the national cost estimate and assuming case rates and exposure in Wisconsin are similar to the U.S. as a whole, it is projected that the Wisconsin can attribute $99.4 million in annual health care costs

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due to PFOA and PFOS exposure.[3] This cost is the lower bound, as it does not include the potential damage from PFAS contamination to fishery, livestock, agriculture industry, and property value reduction.

As Wisconsin's rural communities mainly rely on groundwater as the source of drinking water, PFAS contamination is more likely to affect rural poor. A recent analysis found positive relationship between PFAS levels in rural community water systems and the proportion of residents below the federal poverty line in 18 states, including Wisconsin.[4] This suggest that the PFAS contamination disproportionately affects disadvantaged communities. Groundwater is often the source of irrigation water for crops and livestock drinking water. Many states (Colorado, Maine, Michigan, New Mexico) have faced significant economic impacts in their livestock industry, including disposing of products like milk, pulling products from shelves, culling herds, or even farm shutdowns due to PFAS contamination.[5]

The benefits of establishing new and revised groundwater quality standards in ch. NR 140, Wis. Adm. Code, include:

1. Providing human health protection, as the standards protect groundwater from substances which pose a hazard to human health. For instance, the substance may increase the risk of illness, disease, or death or may increase the risk or severity of a long-term disease.
2. Allowing state regulatory agencies to establish rules that define specific design and management criteria to reduce concentrations of a substance in groundwater, if concentrations are found to exceed established groundwater standards.
3. Providing clarity and consistency to regulated entities on how to address these compounds if they are detected at sites or facilities.
4. Providing standards for bottled water providers.
5. Allowing homeowners to apply for grants under the well compensation program where samples indicate the water in a private well exceeds standards in established NR 140 for these PFAS.

Human health impacts potentially avoided. These human health impacts are described in detail in the DHS scientific support documents, available at DHS's website: https://www.dhs.wisconsin.gov/water/gws.htm.

> **Perfluorooctanoic acid (PFOA):** Studies in workers and people living in areas with high levels of PFOA show that PFOA may increase cholesterol, damage the liver, cause pregnancy-induced hypertension, increase the risk for thyroid disease, decrease antibody response to vaccines, decrease fertility, and cause small decreases in birth weight. Studies in research animals have found that PFOA can cause damage to the liver and the immune system, birth defects, delayed development, and newborn deaths in lab animals. The International Agency for Research on Cancer classifies PFOA as possibly carcinogenic to humans and the United States Environmental Protection Agency (EPA) states there is suggestive evidence of carcinogenic potential for PFOA. PFOA has been shown to be genotoxic in some tests, but has not been shown to be mutagenic. Both PFOA and PFOS have been shown to cause the same or similar effects on the immune system, development, and reproduction in people and research animals indicating that PFOA can cause interactive effects.

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[3] Obsekov et al. 2023. Leveraging systematic reviews to explore disease burden and costs of per- and polyfluoroalkyl substance exposures in the United States. Exposure and Health 15: 373-394. Wisconsin population is 1.8% of the US population.
[4] Liddie et al. 2023. Sociodemographic factors are associated with the abundance of PFAS sources and detection in U.S. community water systems. Environmental Science & Technology 57: 7902-7912.
[5] Art Schaap's Dairy Dilemma - New Mexico In Focus (newmexicopbs.org).

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Perfluorooctanesulfonic acid (PFOS): Studies in workers and people living in areas with high levels of PFOS in drinking water show that PFOS may increase cholesterol, damage the liver, cause pregnancy-induced hypertension, increase the risk for thyroid disease, decrease antibody response to vaccines, decrease fertility, and cause small decreases in birth weight. Studies in research animals have found that PFOS can cause damage to the liver and the immune system. PFOS has also been shown to cause birth defects, delayed development, and newborn deaths in animals, indicating that PFOS can cause teratogenic effects. The EPA has classified PFOS as having suggestive evidence of carcinogenic potential. PFOS has not been shown to have mutagenic effects. Both PFOA and PFOS have been shown to cause the same or similar effects on the immune system, development, and reproduction in people and research animals indicating that PFOS can cause interactive effects.

Perfluorobutanesulfonic acid (PFBS): Studies among people exposed to high levels of PFAS have shown that PFBS can increase the risk of total cardiovascular disease; infertility and high blood pressure disorders in pregnant women, including preeclampsia; and asthma in male children. Studies in research animals found that high levels of PFBS can cause damage to the liver and kidneys, alter blood chemistry and thyroid hormone levels, and affect development.

Hexafluoropropylene oxide dimer acid (HFPO-DA/"GenX"): High levels of HFPO-DA can decrease red blood cell numbers, hemoglobin, and offspring weight, and increase kidney and liver damage in mice and rats. Limited studies suggest HFPO-DA has been shown to cause mutagenic and carcinogenic (cancer) effects in research animals and cell cultures. One study found that HFPO-DA can promote DNA damage in rat thyroid cells and disrupt DNA transcription-factors in genes. A long-terms study in rats found that high levels of HFPO-DA increased the incidence of liver and pancreatic tumors. The EPA determined that there is suggestive evidence of carcinogenic potential for HFPO-DA in humans.

Chapter 160, Wis. Stats., directs the department to propose rules establishing new groundwater quality standards based on recommendations developed by the WI DHS. Chapter 160, Stats. does not include an alternative to the department proposing new groundwater quality standards based on recommendations developed by the WI DHS.

16. Long Range Implications of Implementing the Rule

It may be necessary for state regulatory agencies to conduct future rulemaking to establish specific design and management criteria to ensure that regulated facilities and activities will not cause the concentration of a substance in groundwater, affected by the facilities or activities, to exceed new state groundwater quality standards. Economic and fiscal impacts associated with any future design and management criteria rules, promulgated by state regulatory agencies to ensure that regulated facilities, practices and activities comply with new or revised groundwater standards, would be evaluated at the time of that future rulemaking.

17. Compare With Approaches Being Used by Federal Government

The EPA establishes health-based drinking water maximum contaminant levels (MCLs), cancer risk levels and health advisories (HAs), that are used to assess the quality of groundwater drinking water supplies. Federal drinking water MCLs are established based on scientific risk assessments and, in some cases, economic and technological considerations. Cancer risk levels are established as the concentration of a chemical in drinking water that corresponds to a specific excess estimated lifetime cancer risk. Federal lifetime health advisories (LHAs) are developed based on an established health risk acceptable daily intake (ADI) level or reference dose (RfD). An ADI or RfD is the daily oral exposure to a chemical that is likely to be without an appreciable risk over a lifetime.

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The proposed amendments to ch. NR 140, Wis. Adm. Code, would add new state numeric groundwater quality standards for PFOA, PFOS, PFBS and HFPO-DA. Federal public drinking water MCLs have not yet been established for these PFAS compounds, however, in 2022 EPA released "interim updated" health advisories for PFOA at 0.004 ng/L, and for PFOS at 0.02 ng/L, and "final" health advisories for PFBS at 2,000 ng/L, and for HFPO-DA at 10 ng/L.

In March of 2023, EPA announced proposed National Primary Drinking Water Regulation (NPDWR) public drinking water system MCLs for six PFAS: PFOA, PFOS, PFBS, HFPO-DA, perfluorohexane sulfonic acid (PFHxS) and perfluorononanoic acid (PFNA). Proposed are a PFOA MCL at 4.0 ng/L and a PFOS MCL, also at 4.0 ng/L. Also proposed is to regulate mixtures of one or more of four PFAS: PFBS, HFPO-DA, PFHxS and PFNA, using a hazard index (HI) approach. With this approach, a ratio called a hazard quotient (HQ) would be calculated for each of four PFAS (PFBS, HFPO-DA, PFHxS and PFNA) by dividing the measured concentration of each of the four PFAS in drinking water, by a Health Based Water Concentration (HBWC), established for each of the four PFAS (2,000 ng/L for PFBS, 10.0 ng/L for HFPO-DA, 9.0 ng/L for PFHxS and 10.0 ng/L for PFNA). The individual PFAS HQs would then be summed to yield the mixture HI. The proposed MCL for the four PFAS mixture is an HI of 1.0 (unitless). EPA has stated that they anticipate finalizing these regulations by the end of 2023.

18. Compare With Approaches Being Used by Neighboring States (Illinois, Iowa, Michigan and Minnesota)

The states adjacent to Wisconsin: Minnesota, Michigan, Illinois, and Iowa use groundwater protection values/levels/standards in their regulation of practices and activities that might impact the quality of groundwater. Minnesota, Michigan, and Illinois have promulgated individual state groundwater protection standards. Iowa uses established federal standards (federal drinking water MCLs, LHAs and established cancer risk levels) as its state groundwater protection standards.

Groundwater protection quality values/levels/standards are usually developed based on health risk assessments. States are often required to follow state-specific health risk assessment methodology when establishing groundwater protection quality standards. States may use state-specific health risk assessments, factors and methodology in calculating and developing their groundwater protection standards. This use of different health risk assessment factors and methodologies has led to the establishment of different state groundwater protection values/levels/standards for the same substance. For example, the health-based groundwater protection level for PFOA used by the states surrounding Wisconsin varies by state. The level established in Minnesota is 35 ng/L, the level established in Michigan is 8 ng/L, and Illinois has developed a drinking water health-based guidance level (HBGL) for PFOA at 2 ng/L. Iowa uses federal lifetime health advisory levels as its groundwater protection levels and is currently using the federal "interim updated" health advisory level for PFOA of 0.004 ng/L.

Minnesota The state of Minnesota has established state groundwater protection "Health Risk Limits" (HRLs) under Minnesota Statutes Section 103H.201. The state of Minnesota established a HRL for PFOA in 2018 at 35 ng/L. The Minnesota Department of Health has also calculated "Health Based Values" (HBVs) for some groundwater contaminants. Minnesota HBVs are not standards that have been promulgated by rule but are calculated concentrations that may be used as advisory levels by Minnesota state groundwater and environmental protection programs. The state of Minnesota established an HBV for PFOS in 2020 at 15 ng/L and an HBV for PFBS in 2022 at 100 ng/L.

Michigan The state of Michigan has established state groundwater protection quality standards. Michigan "Drinking Water Criteria and Risk Based Screening Levels (RBSLs) are Michigan state groundwater protection standards authorized in accordance with Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451 (NREPA). As established under Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended [MCL 324.20120a(5)], Michigan state drinking water standards become the PFOA and PFOS

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generic cleanup criteria for groundwater used as drinking water. Michigan has established RBSLs for PFOA at 8 ng/L, for PFOS at 16 ng/L, for PFBS at 420 ng/L, and for HFPO-DA at 370 ng/L.

Illinois The Illinois Environmental Protection Agency has developed drinking water health-based guidance levels (HBGLs) for PFOA at 2 ng/L, PFOS at 14 ng/L, PFBS at 2,100 ng/L and HFPO-DA at 21 ng/L. These guidance levels are not drinking water standards, but indicate an increased risk for PFAS-related health effects when the level of PFAS in drinking water exceeds them. The state of Illinois establishes state groundwater quality standards for "potable resource groundwater" in 35 Ill. Adm. Code 620, environmental protection regulations. Illinois state "Groundwater Quality Standards for Class I: Potable Resource Groundwater" have not yet been established for PFOA, PFOS, PFBS or HFPO-DA, however, the Illinois Pollution Control Board is currently considering proposed amendments to the Illinois Part 620 groundwater regulations that would establish groundwater standards for six PFAS, including PFOA, PFOS, PFBS and HFPO-DA. These proposed amendments would establish groundwater standards for PFOA at 2 ng/L, PFOS at 7.7 ng/L, PFBS at 1,200 ng/L and HFPO-DA at 12 ng/L.

Iowa The state of Iowa has not established specific state groundwater protection standards. In accordance with Iowa Environmental Protection Regulations 567 IAC Chapter 133, Iowa uses established federal EPA lifetime health advisory levels, "negligible risk levels" (NRLs) for carcinogens (estimate of one additional cancer case per million people over a lifetime of exposure) and federal drinking water MCLs as "Action Levels" in their regulation of practices and activities that may adversely impact groundwater quality. Iowa is currently using the federal "interim updated" health advisories for PFOA (0.004 ng/L) and PFOS (0.02 ng/L), and the "final" health advisories for PFBS (2,000 ng/L) and HFPO-DA (10 ng/L), in its PFAS Contaminated Sites Site Investigation Protocol and public water supply PFAS sampling efforts.

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