Form 1100-001P (Rev. 01/21)

Wisconsin Department of Natural Resources
Natural Resources Board Agenda Item

Item No. 4.C.

SUBJECT:
Request adoption of Board Order DG-15-19, proposed rules affecting chapter NR 140 related to numerical standards to minimize the concentration of polluting substances in groundwater

FOR: February 2022 Board meeting

PRESENTER'S NAME AND TITLE: Steve Elmore, Drinking Water and Groundwater Program Director

SUMMARY:
The objective of the proposed rule is to set numerical standards for consistent use in state regulatory programs to minimize the concentration of polluting substances in groundwater. Wisconsin's groundwater law directs the department to propose numerical groundwater protection standards for harmful substances that have been detected in, or have a reasonable probability of entering, the groundwater resources of the state. Amendments are being proposed to ch. NR 140, Wis. Adm. Code, Groundwater Quality, to establish new and revised public health standards for 25 substances. As directed by Wisconsin's groundwater law these proposed standards are based on recommendations developed by the Department of Health Services (DHS). These DHS recommendations are commonly referred to as the "Cycle 10" group of DHS recommended standards, and are listed at https://www.dhs.wisconsin.gov/water/gws-cycle10.htm.

The department solicited input on the possible economic impacts associated with the proposed rule amendments. Concerns were expressed about potential economic impacts related to some of the proposed new and revised standards, particularly the proposed new standards for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), and the proposed revised standards for trichloroethylene (TCE) and 1,4-dioxane. These substances have been detected in groundwater at regulated sites above proposed standards. Based on its environmental impact assessment the department expects the rule to have a moderate (level 2) economic impact on small businesses. Based on input the department received on the draft rule, DHS has changed their recommendations for molybdenum to revise the current enforcement standard (ES) from 40 ug/L to 60 ug/L, and the recommended thiamethoxam ES from 100 ug/L to 120 ug/L, and the department is proposing to remove the ES and preventive action limit (PAL) for total coliform bacteria and to add indicator parameter groundwater standards for total coliform bacteria, pursuant to s. 160.15(3), Wis. Stat., in a future rule.

The Board last acted on this rule on January 22, 2020 when it approved the scope statement. The department has completed the external review process for Board Order DG-15-19, including holding a public hearing and review by the Legislative Council Rules Clearinghouse. Comments received have been considered in the draft final rule. If the final rule language of DG-15-19 is approved, the rule will be submitted to the Governor and, if the Governor approves, to the legislature. The 30-month time frame for submission of a final rule to the legislature for approval expires on March 3, 2022.

RECOMMENDATION: That the Board adopt Board Order DG-15-19.

LIST OF ATTACHED MATERIALS (check all that are applicable):

- ☒ Background Memo
- ☒ Fiscal estimate and economic impact analysis (EIA) form
- ☒ Response summary
- ☐ Attachments to background memo
- ☒ Board order/rule
- ☐ (insert document name)

Approved by	Signature	Date
Steven B. Elmore, Drinking Water and Groundwater Program Director	DocuSigned by: Steven B. Elmore B8DE32772A10468...	2/9/2022 | 11:43 AM CST
Gail E. Good, Acting Environmental Management Division Administrator	DocuSigned by: Gail E. Good 8A9B1B46A49C4A3...	2/9/2022 | 11:52 AM CST
for Preston D. Cole, Secretary	DocuSigned by: Sarah Barry A7D70DC3770642F... by Sarah Barry	2/9/2022 | 11:54 AM CST

cc: Board Liaison - AD/8 DS WR Program attorney – LS/8 Department rule officer – LS/8

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CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: February 8, 2022

TO: All Members of the Natural Resources Board

FROM: Preston D. Cole, Secretary

SUBJECT: Background memo on Board Order DG-15-19, proposed rules affecting chapter NR 140, related to numerical standards to minimize the concentration of polluting substances in groundwater

1. **Subject of Proposed Rule:**
Proposed amendments to ch. NR 140, Wis. Adm. Code, to add new or revised numeric groundwater quality standards for: hexavalent chromium, strontium, thiamethoxam, imidacloprid, clothianidin, isoxaflutole, isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, Dacthal TPA and MTP degradates, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, sulfentrazone, *Escherichia coli* (*E. coli*) bacteria, perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), trichloroethylene (TCE), tetrachloroethylene (PCE), 1,2,3-trichloropropane (1,2,3-TCP), aluminum, boron, molybdenum, cobalt, and 1,4-dioxane.

2. **Background:**
Chapter NR 140, Wis. Adm. Code, was adopted by the Natural Resources Board in 1985 to comply with Chapter 160, Wis. Stat. Chapter 160, Wis. Stat., was created in May of 1984, as part of 1983 Wisconsin Act 410, and requires the Department of Natural Resources (department) to establish groundwater quality standards for substances detected in, or having a reasonable probability of entering the groundwater resources of the state. In accordance with ch. 160, Wis. Stat., amendments to ch. NR 140, Wis. Adm. Code, groundwater quality standards for substances of public health concern are based on recommendations received from the Wisconsin Department of Health Services (DHS). Section 160.07, Wis. Stat., requires DHS to develop recommendations based on a hierarchy of existing standards and significant technical and scientifically valid information.

After the department promulgates those groundwater standards, state regulatory agencies are required under ss. 160.19 to 160.25, Wis. Stat., to review the new groundwater standards and if necessary, commence promulgation or amendment of their administrative rules for their regulatory programs in order to comply and respond to the new groundwater standards. Numerous DNR administrative programs refer to the groundwater standards in ch. NR 140, Wis. Adm. Code, along with regulatory programs at the Wisconsin Department of Transportation, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and Wisconsin Department of Safety and Professional Services. This administrative rule only amends and adds groundwater standards; it does not amend or create any regulatory authority that implements programs that use or enforce groundwater standards.

The department engaged in outreach to the public and stakeholders and provided opportunities for public comment throughout the rulemaking process, including:

- November 2019 – Public hearing and public comment on the scope statement
- February 2020 – Stakeholder meeting on Cycle 10 PFAS rules
- March 2020 – Stakeholder meeting on Cycle 10 PFAS
- June 2020 – Stakeholder meeting on Cycle 10 metals and metalloids
- July 2020 – Stakeholder meeting on Cycle 10 VOCs
- August 2020 – stakeholder meeting on Cycle 10 pesticides

- October 2020 – stakeholder meeting on Cycle 10 bacteria
- June 2021 - Public comment period on draft economic impact analysis
- December 2021-January 2022 – Public comment period on the proposed rule
- January 2022 – Public hearing on proposed rule

3. Why is the rule being proposed?

Chapter 160, Wis. Stat., requires the department to develop numerical groundwater quality standards, consisting of enforcement standards and preventive action limits. Chapter NR 140, Wis. Adm. Code, establishes these Wisconsin state groundwater quality standards. These proposed amendments to ch. NR 140, Wis. Adm. Code, would add new state groundwater quality standards for 17 substances and revise existing standards for another 8 substances.

Wisconsin groundwater quality standards are used by several state regulatory agencies to ensure their regulatory practices are protective of the state's groundwater. For example, groundwater standards are used by regulatory agencies to develop clean up goals at contaminated sites, to establish design and management criteria for regulated activities and to ensure that regulated facility practices do not endanger state drinking water supplies.

4. Summary of the rule.

The proposed rule for new and revised groundwater quality standards are grouped into five categories: Per- and Polyfluoroalkyl Substances (PFAS), Volatile Organic Compounds (VOCs), Metals/Metalloids, Agricultural Chemicals, and Bacteria. PFAS includes new public health related groundwater standards for perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). VOCs includes revised public health related groundwater standards for: trichloroethylene (TCE), tetrachloroethylene (PCE), 1,4-dioxane, and 1,2,3-trichloropropane (1,2,3-TCP). Metals/Metalloids includes new public health related groundwater standards for hexavalent chromium and strontium, and revised public health related groundwater standards for: aluminum, boron, molybdenum, and cobalt. Agricultural Chemicals includes new public health related groundwater standards for: thiamethoxam, imidacloprid, clothianidin, isoxaflutole plus isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, and sulfentrazone, and revised public health related groundwater standards for Dacthal that would include the Dacthal Tetrachloroterephthalic Acid (TPA) and Monomethyl tetrachloroterephthalic acid (MTP) degradates. Bacteria includes new public health related groundwater standards for *Escherichia coli* (*E. coli*) bacteria.

DHS recommendations for Cycle 10 substances is available on their website: https://www.dhs.wisconsin.gov/water/gws-cycle10.htm. For ease of the table below summarizes the DHS recommendations, including modifications made in response to the public comment period:

Substance	New or Existing	Enforcement Standard Recommended Value		Preventive Action Limit Recommended Value	
1,1-Dichloroethane	Existing	No change	850 µg/L	No change	85 µg/L
1,2,3-Trichloropropane	Existing	↓	0.3 ng/L	↓	0.03 ng/L
1,4-Dioxane	Existing	↓	0.35 µg/L	↓	0.035 ng/L
Aluminum	Existing	No change	200 µg/L	↓	20 µg/L
Bacteria (*E. coli*)	New	n/a	0	n/a	0
~~Bacteria (total coliform)~~	Existing	ES and PAL removed; indicator parameter to be added			
Barium	Existing	No change	2,000 µg/L	No change	400 µg/L
Boron	Existing	↑	2,000 µg/L	↑	400 µg/L
Clothianidin	New	n/a	1,000 µg/L	n/a	200 µg/L
Cobalt	Existing	No change	40 µg/L	↓	4 µg/L
Dacthal MTP (monomethyl tetrachloroterephthalic acid) and Dacthal TPA (tetrachloroterephthalic acid)	New	n/a	70 µg/L	↓	7 µg/L
Glyphosate	New	n/a	10 mg/L	n/a	1 mg/L
Glyphosate AMPA (aminomethylphosphonic acid)	New	n/a	10 mg/L	n/a	2 mg/L
Hexavalent chromium	New	n/a	70 ng/L	n/a	7 ng/L
Imidacloprid	New	n/a	0.2 µg/L	n/a	0.02 µg/L
Isoxaflutole and Isoxaflutole diketonitrile (DKN)	New	n/a	3 µg/L	n/a	0.3 µg/L
Isoxaflutole benzoic acid (BA)	New	n/a	800 µg/L	n/a	160 µg/L
Molybdenum	Existing	↑	60 µg/L	↑	6 µg/L
PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonic acid)	New	n/a	20 ng/L	n/a	2 ng/L
Strontium	New	n/a	1,500 µg/L	n/a	150 µg/L
Sulfentrazone	New	n/a	1,000 µg/L	n/a	100 µg/L
Tetrachloroethylene (PCE)	Existing	↑	20 µg/L	↑	2 µg/L
Thiamethoxam	New	n/a	120 µg/L	n/a	12 µg/L
Thiencarbazone-methyl	New	n/a	10 mg/L	n/a	2 mg/L
Trichloroethylene (TCE)	Existing	↓	0.5 µg/L	↓	0.05 µg/L

After review of comments and new scientific information received during the proposed rule public comment period, DHS revised its initial recommendations for enforcement standards (ES) and preventive action limits (PAL) for two of the above substances, molybdenum and thiamethoxam:

- Molybdenum
  - Initial recommendation: ES: 40 ug/L PAL: 4 ug/L
  - Modified recommendation: ES: 60 ug/L PAL: 6 ug/L
- Thiamethoxam
  - Initial recommendation: ES: 100 ug/L PAL: 10 ug/L
  - Modified recommendation: ES: 120 ug/L PAL: 12 ug/L

The department received a public comment suggesting that the rule should be revised to be consistent with the Revised Total Coliform Rule (RTCR) regulatory standards for bacteria in public drinking water. The comment suggested that to do so, the department should establish an indicator parameter for total coliform bacteria, rather than an enforcement standard and preventive action limit. The department agrees with this comment and has revised the proposed rule to remove the total coliform bacteria enforcement standard and preventive action limit from s. NR 140.10 Table 1, Wis. Adm. Code. The department intends to promulgate in a future rule indicator parameter groundwater standards for total coliform bacteria pursuant to s. 160.15(3), Wis. Stat.

Minor revisions to clarify rule language and update rule reference information are also proposed to ch. NR 140. These revisions include:

- Revising order of Antimony and Anthracene in s. NR 140.10, Table 1 to correct their alphabetical order in the table.
- Removing, in s. NR 140.20, Table 3, the indicator parameter for ammonia nitrogen. Health standards were established for ammonia (as N), in s. NR 140.10, Table 1, as part of the "Cycle 9" revisions to ch. NR 140.
- Making needed additions and revisions to ch. NR 140 Appendix I to Table 1 substance names, Chemical Abstracts Service (CAS) registry numbers, and common synonyms.

Minor corrections and revisions were also made to address Wisconsin Legislative Council Rules Clearinghouse (LCRC) comments on clarity, grammar, punctuation and use of plain language. Changes to the proposed rule made to address LCRC comments include:

- Adding the identifier "Cr^{6+}" as a synonym for hexavalent chromium in Appendix I to Table 1.
- Replacing the "DPCA" synonym, listed for the Dacthal entry in Appendix I to Table 1 with "dimethyl tetrachloroterephthalate (DCPA)".
- Replacing the "Dacthal" entry in Table 1, and Appendix I to Table 1, with "DCPA (dacthal)", and adding "Chlorthal-dimethyl" as a synonym for "DCPA (dacthal)" in Appendix I to Table 1.

5. How does this proposal affect existing policy?

There are currently 146 groundwater quality standards in ch. NR 140, Wis. Adm. Code, for substances of public health and welfare concern. The proposed rule amendments continue the existing policy of protecting Wisconsin's groundwater by utilizing the procedures in ch. 160, Wis. Stats., to establish new state groundwater quality standards for 17 substances of public health concern. These new groundwater quality standards would be added to the present ch. NR 140 groundwater standards. The rule would also revise state groundwater standards for 8 substances of public health concern to reflect new scientific information and understanding of the substances. The addition of new standards, and revision of existing standards, does not affect the evaluation and response procedures in ch. NR 140 used by regulatory programs when standards are attained or exceeded.

6. Has Board dealt with these issues before?

Yes. The Board approved the scope statement and conditionally authorized hearings for DG-15-19 at its January 2020 meeting.

7. **Who will be impacted by the proposed rule? How?**
Both the public and regulated entities will be impacted by the proposed rule. Establishing new and revised groundwater quality standards in ch. NR 140, Wis. Adm. Code, will:
   - Provide human health protection, as the standards protect groundwater from substances that pose a hazard to human health
   - Set health-based levels for substances in water supplies that would allow homeowners to evaluate the safety of their home well water supply
   - Provide clarity on the appropriate concentrations that would be considered by the state for a drinking water advisory and provision of temporary emergency water
   - Allow homeowners to apply for well compensation well replacement funds in cases where sampling shows home well water exceeds established ch. NR 140 enforcement standards for groundwater quality standards
   - Provide safe standards for bottled water providers
   - Provide clarity to regulated entities and property redevelopers on how to address groundwater contaminants if they are detected at remediation and redevelopment sites, with the ability to accurately determine costs to complete redevelopment and achieve case closure
   - Provide state regulatory agencies the ability to manage, close and redevelop spill/release sites where substances in groundwater exceed established ch. NR 140 groundwater standards, where natural attenuation is effectively addressing the contamination
   - Allow 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 ch. NR 140 groundwater standards.

8. **Soliciting public input on economic impact synopsis**
The department solicited comments on the economic impact of the rule from May 14 through June 13, 2021. See the Economic Impact Analysis Attachment B for a list of stakeholders contacted.

   The department solicited information and advice from businesses, associations representing businesses, local governmental units, and individuals that may be economically affected by the regulatory programs that use groundwater standards included in this proposed rule. The department received a total of 8 letters with comments. Comments received pointed out specific requirements of ch. 227, Wis. Stat., that must be included in the rule economic impact analysis (EIA). Comments also suggested that:

   - there is not a consistent opinion in the scientific community on the health impacts of PFAS, and that different standards for PFAS have been adopted in other places
   - numerical PFAS standards could have net benefits that outweigh costs associated with compliance, as reducing exposure to PFAS compounds in drinking water could reduce potential health care treatment costs and associated losses of economic production and income of those impacted
   - PFAS standards could have the benefit of reducing PFAS contaminated groundwater that might be used for livestock or irrigation, therefore reducing the likelihood of PFAS ending up in agricultural products and entering the food chain
   - economic impacts of reducing the groundwater standard for TCE, including on additional investigation and remedial actions, need to be better defined, and that lowered TCE standards could have significant economic impacts on small businesses already remediating TCE in groundwater

- economic impacts of reducing the groundwater standard for 1,4-dioxane, including on additional investigation and remedial actions, need to be better defined
- new groundwater standards for PFOS and PFOA could have significant economic effects on small business remediation and redevelopment sites, construction site dewatering activities, land application of wastewater biosolids and solid waste landfills, and that the economic impacts of proposed PFOS and PFOA groundwater standards need to be better defined
- proposed imidacloprid standards should be based on EPA's imidacloprid assessment and current registration review, and that proposed standards could significantly reduce the use of imidacloprid
- groundwater standards for pesticides could have the benefit of protecting Wisconsin pollinators, as pesticide contaminated irrigation water could adversely affect pollinators and non-target insects

In response to comments received, the department further evaluated costs associated with new and revised groundwater standards in the proposed rule. The department also reviewed its legal authority to address groundwater contamination at specific types of regulated sites. The department added information on the economic impacts of proposed PFOS and PFOA groundwater standards on the land application of wastewater, and wastewater related solids and added information on the economic impacts of proposed revised TCE and 1,4-dioxane groundwater standards.

9. Small Business Analysis

The regulatory programs in state regulatory agencies that use ch. NR 140, Wis. Adm. Code groundwater standards may impact small business, particularly groundwater quality standards for VOCs including TCE and PCE. Revisions to these standards may impact small businesses such as dry cleaners whose properties are the sites of spills or releases of these substances that have contaminated groundwater. Revised standards may necessitate additional site monitoring and investigation, and potentially additional compliance response actions. It should be noted that while the proposed standards for TCE are lower than current standards, the proposed PCE standards are higher than the current standards. Therefore, while site investigation and compliance action costs may increase in some cases, they may decrease in others, depending on the contaminant of concern at a specific regulated site.

For entities impacted by ch. NR 140, Wis. Adm. Code, groundwater standards, the department assumed the following are small business based on available data and the agency's expertise: Approximately 30% of the entities impacted by revisions to 1,4-dioxane and TCE standards are small businesses. As a result, the department assumes small businesses will incur 30% of the average annual compliance cost for revisions to 1,4-dioxane and TCE standards ($209,208 per year). Approximately 30% of biosolids management source identification and reduction cost over a 5-year permitting cycle ($346,800) is anticipated to be a small business compliance cost. Based on these assumptions, the department estimates $556,008 per year of compliance costs to small businesses.

Additional details on the economic impact analysis and small business analysis can be found in the Economic Impact Analysis narrative.

Drafter: Bruce Rheineck

Proposed Groundwater Quality Standards

Response to Comments

Board Order DG-15-19, relating to revisions to Chapter NR 140

February 4, 2022

Wisconsin Department of Natural Resources
101 S. Webster St., Box 7921
Madison, WI 53707-7921

I. Overview of Rule, Public Outreach, and Public Input Opportunities

Chapter 160, Wis. Stat., Wisconsin's Groundwater Standards Protection law requires the Department of Natural Resources to establish numerical groundwater quality standards, consisting of enforcement standards and preventive action limits in ch. NR 140, Wis. Adm. Code. This rulemaking proposes amendments to ch. NR 140, Wis. Adm. Code, include adding new state groundwater quality standards for 17 substances and revising existing standards for 8 substances. In accordance with ch. 160, Wis. Stat., amendments to NR 140 groundwater quality standards for substances of public health concern are based on recommendations from the Department of Health Services (DHS). DHS's recommendations for new and revised groundwater standards are available at: https://www.dhs.wisconsin.gov/water/gws-cycle10.htm.

The department has engaged in outreach to stakeholders and the public and provided opportunities for public comment throughout the rulemaking process, including:

- November 2019 – Public hearing and public comment on the scope statement
- February 2020 – Stakeholder meeting on Cycle 10 PFAS rules
- March 2020 – Stakeholder meeting on Cycle 10 PFAS
- June 2020 – Stakeholder meeting on Cycle 10 metals and metalloids
- July 2020 – Stakeholder meeting on Cycle 10 VOCs
- August 2020 – stakeholder meeting on Cycle 10 pesticides
- October 2020 – stakeholder meeting on Cycle 10 bacteria
- May - June 2021 - Public comment period on draft economic impact analysis
- December 6, 2021 – January 11, 2022 – Public comment period on the proposed rule
- January 6, 2022 – Public hearing on proposed rule

The department held a public comment period on the draft economic impact analysis from May 14, 2021 to June 13, 2021. The department received 8 comments from individuals and organizations on the draft economic impact analysis. Those comments were taken into consideration when preparing the final economic impact analysis and its explanation and assumptions.

II. Wisconsin Legislative Council Rules Clearinghouse

The Legislative Council Rules Clearinghouse (LCRC) submitted comments on clarity, grammar, punctuation and use of plain language. Changes to the proposed rule were made to address all recommendations by the Legislative Council Rules Clearinghouse, except for those discussed below.

Comment: (LCRC Comment 5.d.) In the common synonyms for hexavalent chromium provided in SECTION 3 of the rulemaking order, should "Cr6+" instead read "Cr^{6+}"?

Response: The identifier "Cr^{6+}" has been added as a synonym for hexavalent chromium in Appendix I to Table 1 (Section 3) in the final rulemaking order, as the National Library of Medicine PubChem chemistry database lists both "Cr6+" and "Cr^{6+}" as identifiers/synonyms for hexavalent chromium.

Comment: (LCRC Comment 5.e.) In SECTION 3 of the rulemaking order, the table entry for Dacthal lists "DPCA" as a synonym. This should instead read "DCPA".

Response: The "DPCA" synonym, listed for the Dacthal entry in Appendix I to Table 1 (Section 3) in the final rulemaking order has been replaced with "dimethyl tetrachloroterephthalate (DCPA)".

Comment: (LCRC Comment 5.f.) Both SECTIONS 1 and 3 of the rulemaking order refer to Dacthal. However, it appears that "Dacthal" is a trade name, rather than a technical name for the substance in question. Given the agency's proposed removal of trade names from Appendix I to Table 1, the agency could consider referring to the chemical as dimethyl tetrachloroterephthalate (DCPA) in Table 1 and Appendix I to Table 1, rather than using the term "Dacthal".

Response: The "Dacthal" entry in Sections 1 and 3 of the final rulemaking order have been changed to "DCPA (dacthal)", and "Dimethyl tetrachloroterephthalate (DCPA)" and "Chlorthal-dimethyl" have been added as synonyms for "DCPA (dacthal)" in Appendix I to Table 1 (Section 3). It does appear that "Dacthal" is used as a trade name for DCPA, however, the National Library of Medicine PubChem chemistry database lists both "dacthal" and "DCPA" as synonyms for Dimethyl tetrachloroterephthalate (Chlorthal-dimethyl). EPA refers to "dacthal" in its 2008 Drinking Water Health Advisory document for the substance, and in its *2018 Edition of the Drinking Water Standards and Health Advisories Tables* document EPA identifies the compound as "DCPA (Dacthal)". The "Dacthal" designation has been included in ch. NR 140, and associated DHS scientific support documentation, since 1993, when the substance was first added to the rule. Considering that "dacthal" has been commonly used to identify Dimethyl tetrachloroterephthalate (DCPA), that the term is listed as a synonym in PubChem, and to be consistent with EPA, the "Dacthal" entry in Sections 1 and 3 of the final rulemaking order have been changed to "DCPA (dacthal)", and "Dimethyl tetrachloroterephthalate (DCPA)" and "Chlorthal-dimethyl" have been added as synonyms for "DCPA (dacthal)" in Appendix I to Table 1 (Section 3).

III. Public Comments and Responses

1. Written comments received from Wisconsin Legislators

1) Comment: Received from State Representative Kristina Shelton. Representative Shelton expressed comments in support of the proposed rule amendments and noted that they will "have wide impacts on constituents across northeastern Wisconsin in the quality of their drinking and ground water."

Response: Comments noted. The department appreciates the support for this rulemaking effort.

2) Comment: Received from State Senator Melissa Agard. Senator Agard expressed comments in support the proposed rule revisions related to PFAS contamination and groundwater. Senator Agard also commented that it is "imperative that standards are put in place to limit the level of PFAS in our water," for the protection of our health, wildlife, and water.

Response: Comments noted. The department appreciates the support for this rulemaking effort.

2. Written comments received from individual commenters

Comment: 233 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS. The commenters expressed the opinion that PFOA and PFOS groundwater standards are needed in order to prevent further exposure of PFAS, and to protect the health of Wisconsinites. They also commented that development of groundwater

standards for PFAS chemicals will enable the state to identify and control polluted sites where PFAS chemicals may leach to groundwater and that Wisconsin should set groundwater standards for PFAS chemicals, such as PFBS, GenX and PFHxS, which are replacing PFOS and PFOA in many industrial applications.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.a. Comments received from individuals who depend on private wells

Comment: 15 members of the public who live in rural areas and depend on wells for drinking water provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS. Their comments pointed out that they rely on the state and the DNR to ensure that their water supply is safe, and that clean groundwater is necessary for crops and animals as well as people.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.b. Comments received from individuals concerned about PFAS and public health

Comment: 67 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS, and stated that they have concerns about PFAS affecting their health, their children's health and the health of future generations. These comments also stated they are concerned for the poor and vulnerable who depend on access to safe water supplies, and are especially concerned for children, who might accumulate more of the chemicals over a longer period of time.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.c. Comments received from individuals concerned about emerging contaminants and public health

Comment: 2 members of the public provided similar comments in support of proposed groundwater standards and voiced concerns about emerging contaminants, such as neonicotinoid insecticides, in our groundwater.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.d. Comments received from individuals concerned about new PFAS chemicals

Comment: 1 member of the public provided comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS, and voiced concerns about short chain PFAS, and other alternatives to currently used PFAS chemicals, that may be detrimental and even worse than current legacy PFAS in groundwater.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort.

2.e. Comments received from individuals concerned about economic and financial costs

Comment: 24 members of the public provided similar comments in support of proposed groundwater standards, and expressed concerns about the financial burden on individuals to deal with industrial pollutants contaminating our water resources. The comments expressed the opinion that contaminating our waters today for potential short-term gains is short-sighted and will eventually result in increased medical and health care costs associated with contaminated resources. Comments also specifically mentioned the loss of property value to homes with undrinkable water and the high cost of drinking water treatment.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.f. Comments received from individuals concerned about recreation and tourism

Comment: 3 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS, and expressed concerns about the need to be able to enjoy recreational activities, such as boating and swimming, without fear of PFAS pollution. Comments also emphasized the importance of PFAS regulation for recreational opportunities, and that failing to regulate these pollutants could have a negative impact on our state tourism industry.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.g. Comments received from individuals related to PFAS and agriculture

Comment: 1 member of the public provided comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS, and stated that farmers need clean irrigation sources and depend on well water for their livestock.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort.

2.h. Comments received from individuals related to PFAS and fish and wildlife

Comment: 18 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS, and expressed concerns about the effect of PFAS contamination on the health of wildlife and ecosystems. Comments specifically pointed out that anglers are worried about the quality of water in our streams for fish, and the need for fish consumption advisories.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.i. Comments received from individuals related to PFAS and other states' regulations

Comment: 6 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS. Comments also expressed the opinion that other states, such as Michigan, had passed stricter standards and that Wisconsin should not wait for EPA regulations.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.j. Comments received from individuals related to stricter groundwater standards

Comment: 6 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS. Comments expressed the opinion that scientists have not found any safe level of PFAS contamination above zero. The commenters favor lower limits on PFAS compounds than the proposed 20 part per trillion groundwater standard. Comments stated that we need to think about the future when setting regulations because "forever chemicals" have extremely long half-lives and can accumulate in the food chain. Comments were also expressed that the benefits from these chemicals are not worth the cost in human and ecosystem health and they should be discontinued and replaced with less harmful alternatives.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

2.k. Comments received from individuals related to specific PFAS contamination sites

Comment: 4 members of the public provided similar comments in support of proposed groundwater standards for the two PFAS chemicals, PFOA and PFOS. These commenters indicated that they live in the vicinity of PFAS contamination sites in Marinette and Douglas Counties. Comments expressed concerns about the health effects associated with the PFAS contamination found in family, friends, and neighbors at rates higher than average, and the need for safe, stable supplies of drinking and bathing water. Comments also pointed out that a number of communities are impacted by PFAS contamination, PFAS contamination exists for a long time in groundwater, and the "up to 3 year" time frame for rulemaking to address PFAS is of concern, and may be detrimental to public health protection.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

3. Oral comments given at January 6, 2022 public hearing

The department held a public hearing and accepted oral testimony regarding the proposed rule. Eighty-six individuals attended the public hearing. Sixteen individuals and individuals on behalf of organizations provided oral testimony. A recording of the full hearing can be found here: https://widnr.widen.net/view/video/r02vp7uvro/DG_DG1519PublicHearing_20220106.mp4

Comment: 16 individuals and organizations commented in favor of the department's proposed groundwater standards and specifically in favor of PFOA and PFOS groundwater standards. Comments included concern about public health, access to clean drinking water, and environmental harm from PFAS.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort.

4. Comments received from companies, organizations and associations

4.a. General comments

1) Comment: Received from a coalition of state manufacturing and commerce organizations/associations that includes: WI Manufactures & Commerce, WI Paper Council, WI Civil Justice Council, WI Water Alliance, WI Dairy Alliance, Midwest Food Products Association, American Chemistry Council and Venture Dairy Cooperative. The coalition expressed comments on the rule compliance costs, methodology used by DHS to develop their standard recommendations and the department's statutory authority to establish combined standards. The coalition specifically commented that the department: should adopt the United States Environmental Protection Agency (US EPA) health advisory levels for PFOA and PFOS, should use the EPA federal public drinking water maximum contaminant level (MCL) as the TCE groundwater standard, should not establish groundwater quality standards for hexavalent chromium but should wait for EPA to propose a hexavalent chromium standard under the Safe Drinking Water Act, and should not propose a revised 1,4-dioxane standard of 0.35 micrograms per liter (ug/L) but should wait for EPA to complete its review of the need for a federal MCL for the substance.

Response: In response to comments, DHS has reviewed its groundwater standard recommendations for: PFOA, PFOS, trichloroethylene (TCE), hexavalent chromium and 1,4-dioxane (see PFOA/PFOS, Trichloroethylene (TCE), Hexavalent Chromium and 1,4-Dioxane in *DHS NR140 Public Comment Responses* - Attachment 1). After review, DHS has made some corrections to its scientific support document recommendation for PFOS and PFOA groundwater quality standards and confirmed its original standards recommendations for PFOA, PFOS, TCE, hexavalent chromium, and 1,4-dioxane. The department has authority to promulgate combined standards for groundwater contaminants of public health concern that are recommended by DHS, under ch. 160, Wis. Stat. Chapter 140, Wis. Adm. Code, already includes combined standards that have been lawfully promulgated under the department's authority. Based on department program staff expertise, and information provided by stakeholders during its draft economic impact analysis (EIA) public comment period, the department has, in its final EIA, evaluated possible economic impacts on regulated activities associated with proposed new and revised groundwater standards.

2) Comment: Received from International Molybdenum Association. The Association commented that the DHS recommendations for molybdenum groundwater standards should be reviewed and updated as new toxicologic information, not available at the time DHS developed their recommendations, is now available.

Response: In response to comments, DHS has reviewed its recommendations for molybdenum groundwater quality standards and has revised its original recommendations to recommend an enforcement standard of 60 µg/L, and a preventive action limit of 6 µg/L, for molybdenum (see Molybdenum in *DHS NR140 Public Comment Responses* - Attachment 1).

3) Comment: Received from American Chemistry Council. The Council commented that the proposed 70 part per trillion (ppt) enforcement standard for hexavalent chromium is below the background level

of hexavalent chromium in Wisconsin drinking water. The council also commented that the proposed hexavalent chromium standards are not consistent with the "best available science" as the DHS recommendations omitted research, published since 2011, on hexavalent chromium mode of action and used "out of date" toxicologic analysis.

Response: In response to comments, DHS has reviewed its recommendations for hexavalent chromium groundwater quality standards, and has confirmed its original standards recommendation (see Hexavalent Chromium in *DHS NR140 Public Comment Responses* - Attachment 1). Note that s. NR 140.28, Wis. Adm. Code, contains exemptions for when there is background concentration of a contaminant, allowing for site-specific "alternative concentration limit" groundwater standards.

4) Comment: Received from Badger Mining Corporation. The company commented that it is not in support of the proposed revised groundwater standards for TCE because there is not a strong toxicologic basis for the revised standards, current laboratory analytical detection limits for TCE may be an issue for the proposed revised standards, and there could be significant economic impacts on landfill sites.

Response: In response to comments, DHS has reviewed its recommendations for trichloroethylene (TCE) groundwater quality standards, and has confirmed its original standards recommendation (see Trichloroethylene (TCE) in *DHS NR140 Public Comment Responses* - Attachment 1). Note that s. NR 140.14, Wis. Adm. Code, addresses situations where groundwater quality standards are equal to, or less than, laboratory analytical limits. Based on department program staff expertise, and information provided by stakeholders during its draft economic impact analysis (EIA) public comment period, the department has, in its final EIA, evaluated possible economic impacts on regulated activates associated with proposed new and revised groundwater standards.

5) Comment: Received from Syngenta Crop Production LLC. The company commented that the DHS recommendation for thiamethoxam groundwater standards contained a minor error, misinterpreted the teratogenic potential of the chemical, and should be corrected.

Response: In response to comments, DHS has reviewed its recommendations for thiamethoxam groundwater quality standards and has revised its original recommendations to recommend an enforcement standard of 120 µg/L, and a preventive action limit of 12 µg/L, for thiamethoxam (see Thiamethoxam in *DHS NR140 Public Comment Responses* - Attachment 1).

6) Comment: Received from a coalition of state agricultural and food production associations/organizations that includes: WI Farm Bureau, Corn Growers Association, Dairy Business Association, WI Potato and Vegetable Growers Association, Midwest Food Products Association, WI Pork Association, WI Agri-Business Association and CropLife America. This coalition commented that it supports Wisconsin's continued commitment to establish science-based groundwater standards for agricultural pesticides, but that it opposes the proposed preventive action limit groundwater standard for glyphosate because DHS incorrectly asserts that glyphosate is genotoxic or mutagenic. The coalition also commented that recommended groundwater standards for glyphosate should be reviewed to be sure the recommended standards are "science-based" and follow Wisconsin's statutory requirements.

Response: Comments noted. The department appreciates commenters' support of science-based groundwater standards for agricultural pesticides. In response to comments, DHS has reviewed its recommendations for glyphosate groundwater quality standards and has confirmed its original

standards recommendation (see Glyphosate in *DHS NR140 Public Comment Responses* - Attachment 1).

7) Comment: Received from the 3M Company. The company commented that the department violated Wisconsin's groundwater statute by not categorizing and ranking the substances before sending the substances to DHS for recommendations. The company also commented that the DHS's recommendation for PFOS and PFOA groundwater standards contains errors and inconsistencies that require review, and that DHS should develop separate standards for PFOS and PFOA because it has not demonstrated that the substances "act through the same mode of action" or that their "effects are sufficiently similar" to justify a combined standard.

Response: The department categorized and ranked the Cycle 10 substances, and included the category and rank on the list of substances sent to DHS on March 2, 2018 requesting their review and recommendations for groundwater quality standards. In response to comments, DHS has reviewed its recommendations for PFOS and PFOA, made corrections to its scientific support document, and confirmed its original standards recommendations (see PFOA/PFOS in *DHS NR140 Public Comment Responses* - Attachment 1).

8) Comment: Received from the Milwaukee Riverkeeper. The organization commented in support of the proposed rule, and in particular the proposed groundwater standards for PFOS and PFOA. The organization also commented that contaminated groundwater can affect surface water in streams and downstream drinking water supplies. The organization noted that glyphosate drinking water standards in Minnesota are lower than proposed WI glyphosate groundwater quality standards and expressed comments that proposed WI glyphosate groundwater standards may not be stringent enough.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort. In response to comments, DHS has reviewed its recommendations for glyphosate groundwater quality standards and has confirmed its original standards recommendation (see Glyphosate in *DHS NR140 Public Comment Responses* - Attachment 1).

9) Comment: Received from the League of Wisconsin Municipalities. The organization commented that it supports the groundwater standards setting process in Wisconsin and that it generally supports the approach to the regulation of emerging contaminants in the proposed rule. The organization also commented that the department should review the costs of proposed PFOA and PFOS groundwater standards on biosolids management alternatives and construction site pit trench dewatering activities.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort. Based on department program staff expertise, and information provided by stakeholders during its draft economic impact analysis (EIA) public comment period, the department has, in its final EIA, evaluated possible economic impacts on regulated activates associated with proposed new and revised groundwater standards.

10) Comment: Received from a coalition of state agricultural and food production associations/organizations that includes: WI Farm Bureau Federation, CropLife America, Midwest Food Products Association, WI Corn Growers Association, WI Potato and Vegetable Growers Association, WI Association of Professional Agricultural Consultants, Dairy Business Association, Cooperative Network, WI Pork Association, WI Soybean Association, WI Agri-Business Association, WI Cattleman's Association, WI State Cranberry Growers. This coalition commented that it supports Wisconsin's continued commitment to establish science-based groundwater standards for agricultural

pesticides, but that it opposes the proposed groundwater quality enforcement standard for imidacloprid because the DHS recommendation does not reflect the most recent federal number and current science.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort to establish science-based groundwater standards for agricultural pesticides. In response to comments, DHS has reviewed its recommendations for imidacloprid groundwater quality standards and has confirmed its original recommendation (see Imidacloprid in *DHS NR140 Public Comment Responses* - Attachment 1).

11) Comment: Received from Clean Wisconsin. The organization commented that it supports the proposed rule amendments, PFAS contamination of groundwater needs to be addressed immediately, there are multiple known PFAS contamination sites around the state, and PFAS have been detected in private water supply wells above proposed standards. The organization commented that proposed groundwater standards for pesticides addresses known contamination concerns, as pesticides have been found in private water supply wells in "vulnerable" agricultural areas in the state. The organization commented that proposed pesticide standards may not be "sufficiently protective" given the potential interactive effects of pesticides with "co-occurring contaminants."

Response: Comments noted. The department appreciates the commenter's support of this rulemaking effort. In response to comments, DHS has reviewed its recommendations for pesticide groundwater quality standards and has confirmed its original recommendations for pesticides (see Pesticides in *DHS NR140 Public Comment Responses* - Attachment 1).

12) Comment: Received from Bayer Crop Science and Capitol Strategies, LLC. The organizations commented in support of protecting groundwater resources and ensuring the safety of drinking water but opposes the proposed groundwater quality enforcement standard for imidacloprid because the DHS recommendation does not reflect the most recent federal number and current science. The organizations oppose the proposed preventive action limit groundwater standard for glyphosate because the DHS incorrectly asserts that glyphosate is mutagenic and teratogenic.

Response: Comments noted. The department appreciates commenters' support of this rulemaking effort to protect groundwater resources and ensure the safety of drinking water supplies. In response to comments, DHS has reviewed its recommendations for imidacloprid and glyphosate groundwater quality standards and has confirmed its original recommendations (see Imidacloprid and Glyphosate in *DHS NR140 Public Comment Responses* - Attachment 1).

13) Comment: Received from Municipal Environmental Group - Wastewater Division. The organization commented that it supports regulation of PFAS compounds based on "due deliberation" and credible science, and generally supports the approach to regulation of PFOA and PFOS in groundwater in the proposed rule. The organization commented that some of the economic impacts related to PFOS and PFOS regulation, associated with municipal wastewater biosolids management, have been underestimated and that the biosolids management approach outlined in the economic impact analysis (EIA) should be promulgated as rule or guidance. The organization also commented that the potential economic impacts of construction site pit trench dewatering activities, associated with the proposed PFOA and PFOS groundwater standards, have not yet been adequately addressed.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort. Amending regulatory programs administrative rules that use ch. NR 140 groundwater standards is outside the scope of the proposed rule. Based on department program staff expertise,

and information provided by stakeholders during its draft economic impact analysis (EIA) public comment period, the department has, in its final EIA, evaluated possible economic impacts on regulated activates associated with proposed new and revised groundwater standards.

14) Comment: Received from Midwest Environmental Advocates. The organization commented in support of the draft rule, and specifically in support of proposed PFOS and PFOA standards. The organization commented on the need to regulate PFAS chemicals as a "family," on the science that supports the proposed standards as necessary to protect vulnerable populations including infants and toddlers, the need to use groundwater standards to protect safe drinking water, and the need to promulgate standards as an environmental justice issue to ensure vulnerable communities are protected. The organization also discouraged the department from waiting for federal PFOS and PFOA standards.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort.

15) Comment: Received from Madison Metropolitan Sewerage District. The District commented supporting the rulemaking process in general, but commented that the potential impacts of proposed PFOS and PFOA standards on biosolids land application, major construction projects and administration of industrial pretreatment programs have not been "fully considered." The District commented that the preventative action limit for PFOA and PFOS of 2 ppt could impact the ability of wastewater utilities to land apply biosolids and accept contaminated wastewater from dewatering.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort. The economic impact on regulatory programs outside of ch. NR 140 was considered as part of the economic impact analysis. However, changes to those regulatory programs is outside the scope and authority of ch. 160, Wis. Stat., and ch. NR 140, Wis. Adm. Code. Based on department program staff expertise, and information provided by stakeholders during its draft economic impact analysis (EIA) public comment period, the department has, in its final EIA, evaluated possible economic impacts on regulated activates associated with proposed new and revised groundwater standards.

16) Comment: Received from League of Women Voters of Wisconsin. The organization commented in support of the proposed rule amendments to establish new and revised groundwater quality standards and that PFAS and pesticide standards are important to protect the state's public health and welfare and safe drinking water.

Response: Comments noted. The department appreciates commenters support of this rulemaking effort.

17) Comment: Received from Citizens for Safe Water Around Badger. The organization commented in support of the proposed rule amendments to establish new and revised groundwater quality standards and that promulgated state environmental standards may be used by the military to access federal funding for investigation and cleanup of state contamination sites.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort.

18) Comment: Received from Wisconsin Conservation Voters. The organization expressed comments in support of proposed rule amendments to establish groundwater quality standards for PFOA and PFOS.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort.

19) Comment: Received from Clean Water Action Council of Northeast Wisconsin. The organization expressed comments in support of proposed rule amendments to establish groundwater quality standards for PFOA and PFOS, and encouraged the department to follow the growing evidence in support of managing PFAS chemicals as a class.

Response: Comments noted. The department appreciates commenter's support of this rulemaking effort.

4.b. Comments regarding the cost of the proposed rule

Several commenters listed above commented on the department's economic impact analysis (EIA) and the department's estimation of the implementation and compliance costs of the proposed rule.

Comments: WI Manufactures & Commerce et. al commented on the rule compliance costs, specifically that it exceeds the $10 million dollar statutory threshold that triggers legislative action and that certain statutory requirements in ch. 227, Wis. Stat., were not met, that the department should not have excluded costs of PFAS and hexavalent chromium within the Remediation and Redevelopment program, and that the department made incorrect assumptions related to the cost of regulating PFAS contaminated biosolids.

Badger Mining Corporation commented that there could be significant economic impacts on landfill sites associated with application of proposed revised standards for TCE.

League of Wisconsin Municipalities commented that the department should provide more review of the costs of biosolids management alternatives and construction site pit trench dewatering activities associated with the proposed PFOA and PFOS groundwater standards. It also commented that there may be significant municipal wastewater treatment facility costs associated with treatment of PFAS contaminated groundwater from construction site pit trench dewatering activities that were not addressed in the EIA.

Municipal Environmental Group - Wastewater Division commented that the department underestimated the cost of PFOS and PFOS groundwater standards on municipal wastewater biosolids management and construction site pit trench dewatering activities. It commented that biosolids management and disposal land application alternatives such as landfilling and incineration may require expensive investment and create significant new operation and management challenges, and that the EIS's approach to estimating biosolids management should be incorporated in rule or guidance.

Madison Metropolitan Sewerage District commented that the department did not fully consider the cost of PFOS and PFOA groundwater standards on biosolids land application, major construction projects, and administration of industrial pretreatment programs. It commented that proposed PFAS groundwater standards may limit a municipal wastewater utility's ability to land apply wastewater

biosolids and that alternative options to land application, such as landfilling and incineration, may be technically infeasible, costly and "environmentally fraught." It also commented that a wastewater utility's construction pit trench dewatering activities could necessity treatment before discharging to groundwater.

Response: In completing its EIA the department solicited information and advice from businesses, associations representing businesses, local governmental units, and individuals that may be economically affected by the regulatory programs that use groundwater standards included in the proposed rule. The department received a number of comments on its draft EIA. In response to those comments, the department further evaluated costs specifically associated with new and revised groundwater standards in the proposed rule. The department reviewed its legal authority to address groundwater contamination at specific types of regulated sites and additional information on the economic impacts of proposed PFOS and PFOA groundwater standards on the land application of wastewater, and wastewater related solids was added to the EIA. Additional information on the economic impacts of proposed revised TCE and 1,4-dioxane groundwater standards was also added.

Because ch. NR 140, Wis. Adm. Code, groundwater standards are not self-implementing and have no regulatory or enforcement mechanism, there is no cost directly attributable to the standards. Amendment of the groundwater standards alone do not create an implementation or compliance cost. The cost of implementation and compliance for groundwater standards is dictated entirely by the regulatory agencies and their numerous regulatory programs with their own statutory and administrative code authority. To the extent that the groundwater standards are used in other regulatory programs, the estimation of those costs is limited by the statutory requirement that the regulatory agencies review, amend, or create rules to implement the standards after the groundwater standards are promulgated.

The department anticipates that rulemaking activity in other regulatory programs may significantly decrease the cost of this groundwater standards rule. The department is in the process of promulgating a permanent rule adding numeric thresholds for PFOS and PFOA to the surface water quality standards. The surface water quality standards proposed rule includes WPDES permit implementation procedures for source reduction and treatment of PFOS and PFOA in wastewater discharges. Many of the industries and facilities governed by surface water quality standards would also be subject to the changes in this groundwater proposed rule. If the surface water quality rule is promulgated, the department anticipates the implementation and compliance cost of the proposed groundwater rule will substantially decrease. The WPDES permit program may also propose rules amending how the WPDES permit program regulates the land application of biosolids that contain PFOA and PFOS.

Any reasonable estimate of the implementation and compliance costs of this rule will be altered by the statutorily required review and ongoing promulgation of regulatory program rules outside the scope and authority of this rule. To comply with the directive in s. 227.137, Wis. Stat., the department analyzed and is providing a detailed quantification of the economic impact of the proposed 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 by the proposed rule, based on the current administrative and statutory authority in the regulatory programs that rely on groundwater standards.

5. Comments received from DNR Programs

1) Comment: Received from DNR Public Water Supply Program. The Program commented that the proposed amendments to ch. NR 140, Wis. Adm. Code, related to groundwater standards for bacteria, do not appear to be consistent with the public water supply Revised Total Coliform Rule (RTCR). The comment was expressed that, while under the RTCR a public drinking water maximum contaminant level (MCL) has been established for *E. coli* bacteria, there is no longer an MCL for total coliform bacteria. Under the RTCR, total coliform bacteria are regulated with a "treatment technique" sanitary investigation response action. The Program commented that, to be more consistent with the RTCR regulation of bacteria in drinking water, the department should consider revising the status of total coliform bacteria in ch. NR 140, Wis, Adm. Code, to change it from a public health parameter to an indicator parameter.

Response: The department agrees with the comment that regulatory standards for bacteria in groundwater in ch. NR 140, Wis. Adm. Code, should be consistent with regulatory standards for bacteria in drinking water in the RTCR and Public Water Supply Program rules. To be consistent, the department agrees that public health groundwater quality standards should be established for E. coli bacteria, as proposed in the current rulemaking effort, and that total coliform bacteria should be removed from s. NR 140.10 Table 1, Wis. Adm. Code, and that total coliform should have assigned indicator parameter groundwater standards under s. NR 140.20, Wis. Adm. Code. Adding the indicator parameter for total coliform is outside the scope of this proposed rule. The department plans to begin promulgating a separate permanent rule to establish indicator parameter groundwater standards for total coliform bacteria pursuant to s. 160.15(3), Wis. Stat.

Attachment 1

Department of Health Services Ch. NR 140, Wis. Adm. Code Public Comment Responses

PFOA/PFOS

In their comments, the 3M Company and Wisconsin Manufacturers and Commerce (WMC) stated that the DNR is misapplying research from DHS in proposing the 20 ppt combined standard for PFOA and PFOS. In their statement, WMC comments that that the recommended groundwater standard is not peer-reviewed, the critical study is not a toxicology study and, therefore, should not be used to set the groundwater standard; and the standard is based on inappropriate exposure factors. The 3M Company also mentioned that there are errors in the table summarizing the results of the Kieskamp et al. study in DHS' scientific support document.

Response:

The agency respectfully disagrees with the statement that DHS misapplied research when establishing the proposed groundwater standards. The scientific support documents for PFOA and PFOS have been available to the public since June 2019 and is based on a body of peer-reviewed research. Furthermore, the critical study used to establish the proposed standards (Kieskamp et al., 2018) was published in a peer-reviewed journal and builds on results from previously peer-reviewed studies (Rodriguez et al., 2009 and Verner et al., 2016).

Pharmacokinetic modeling is a widely accepted method of accounting for differences in absorption and distribution of compounds (i.e., volume of distribution, half-life, and clearance rates) between animals and humans. In fact, the United States Environmental Protection Agency (EPA) relied on pharmacokinetic modeling to establish the oral reference doses for their health advisories for PFOA and PFOS. As such, there is an established precedence for the use of pharmacokinetic modeling studies in setting groundwater enforcement standards for PFOA and PFOS, making such studies appropriate and necessary in ensuring the protection of the health and safety of the people of Wisconsin.

Ch. 160.13(2)(c) requires that DHS use exposure parameters for a young child (1 L/d and 10 kg) when establishing an enforcement standard. Current evidence does not allow for derivation of a child-specific reference dose. Thus, the proposed standards use an acceptable daily intake based on fetal/infant dosimetry to ensure that the standard protects young children and unborn and breastfeeding babies – the most sensitive populations to the impacts of PFOA and PFOS.

DHS has corrected the errors in the table summarizing results from the Kieskamp et al. paper in the scientific support documents.

Molybdenum

The International Molybdenum Association (IMOA) stated that the proposed enforcement standard for molybdenum should be updated to reflect more recent health information.

Response:

The Wisconsin Department of Health Services (DHS) has reviewed the toxicological profile published by the Agency for Toxic Substances and Disease Registry (ATSDR) in 2020 and the additional information provided by the IMOA. DHS has determined the proposed public health enforcement standard for molybdenum should be revised to be based on an acceptable daily intake (ADI) of 0.06 mg/kg-d – the intermediate duration oral minimum risk level established by

ATSDR in 2020. Using the exposure parameters specified in Ch. 160, Wisc. Statute[1], the revised enforcement standard recommendation for molybdenum is 60 micrograms per liter (µg/L). The revised preventive action limit recommendation for molybdenum is 6 µg/L, 10% of the enforcement standard, due to potential teratogenic and interactive effects as required by Ch. 160.15(1)c.

1,4-Dioxane

In a joint comment submitted by the Wisconsin Manufacturers and Commerce (WMC), multiple organizations stated that DNR should wait to revise the enforcement standard for 1,4-dixoane until EPA reviews the need for a federal MCL.

Response:

The agency respectfully disagrees with this statement. According to Ch. 160.07(4)(b), DHS must set the recommended enforcement standard based on the most recently established federal number unless significant technical information indicates an alternative value is appropriate. Ch. 160.01(3) defines a federal number as a numerical expression of the concentration of a substance in water based on a drinking water standard or maximum contaminant level; a suggested no-adverse-response level; or for oncogenic substances, a concentration based on a risk level determination or a concentration based on a probability of risk model.

DHS re-affirms that the proposed enforcement standard of 0.35 µg/L for 1,4-dioxane represents the most recently established federal number. In 2010, the EPA's Integrated Risk Assessment System (IRIS) program updated their cancer slope factor for 1,4-dioxane and then used this cancer slope factor to establish drinking water concentrations at specified cancer risk levels. DHS recommends using EPA's drinking water concentration at a cancer risk level of 1 in 1,000,000 as the enforcement standard for 1,4-dioxane to be consistent with the risk thresholds established in Ch. 160.13(2)(b)4.

Cancer Risk Level	Water Concentration
1 in 10,000	35 µg/L
1 in 100,000	3.5 µg/L
1 in 1,000,000	**0.35 µg/L**

Imidacloprid

Bayer Crop Science and the Ag Coalition stated that the recommended enforcement standard for imidacloprid does not reflect the most recent federal number available from EPA or utilize studies that are relevant and science based.

Response:

The agency respectfully disagrees with this statement. According to Ch. 160.13(2)(b)(2), DHS may use information different than that which was established by the EPA if the information is scientifically valid; the information was not considered when the federal value was established; and the department concludes, with a reasonable scientific certainty, that such a value is justified.

DHS re-affirms that the studies used to establish the proposed groundwater standards for imidacloprid are scientifically valid and were not considered when EPA established chronic oral reference doses in 2010 and 2017. When setting the proposed enforcement standards, DHS conducts a literature search for the best available evidence, this includes current peer-reviewed publications related to the substance's toxicity or effects on a disease state. From these studies, DHS first identifies key studies of priority relevance for additional review. Key studies are those

[1]Body weight = 10 kilograms; water consumption rate = 1 liter per day; relative source contribution = 100%

that use *in vivo* (live animal) models; describe and document the study design, methods, study population, data, and results; and use appropriate analytical and statistical methods to test a hypothesis. DHS then subjects these studies to additional review to determine if they are appropriate to use to establish a candidate acceptable daily intake (ADI). To be considered a critical toxicity study, the study should provide data for multiple doses over an exposure duration proportional to the lifetime of humans; demonstrate results that are biologically plausible in humans and consistent with or confirmatory of other studies; and have an identifiable toxicity value. For imidacloprid, DHS located fifteen studies that met these criteria (Table A-1 and A-2 in DHS' support document).

DHS re-affirms that the proposed groundwater standards for imidacloprid are scientifically justified. DHS' review of peer-reviewed data indicates that imidacloprid can cause health effects at values much lower than EPA's chronic oral reference dose (see the figure in DHS' support document). The health effects observed in these peer-reviewed research studies include altered male reproduction, decreased insulin and glucose regulation, and impaired learning and memory abilities. Given that multiple published studies saw effects at levels below EPA's chronic oral reference dose, the wide range of health effects observed, and the relevance of these effects to human health, using an ADI of 0.00002 mg/kg-d is necessary to protect the health and safety of the people of Wisconsin. DHS' recommended enforcement standard and preventive action limit for imidacloprid are 0.2 and 0.02 micrograms per liter (µg/L), respectively.

Trichloroethylene (TCE)

In a joint comment submitted by the Wisconsin Manufacturing and Commerce (WMC), multiple organizations stated that the Department should continue to follow the EPA's MCL for TCE of 5 micrograms per liter, as provided by Wisconsin statutes. Additionally, Badger Mining Company stated that there is not a strong toxicological basis for standards to be reduced.

Response:

The agency respectfully disagrees with these statements. According to Ch. 160.07(4)(b), DHS must set the recommended enforcement standard based on the most recently established federal number unless significant technical information indicates an alternative value is appropriate. Ch. 160.01(3) defines a federal number as a numerical expression of the concentration of a substance in water based on a drinking water standard or maximum contaminant level; a suggested no-adverse-response level; or for oncogenic substances, a concertation based on a risk level determination or a concentration based on a probability of risk model.

DHS re-affirms that the proposed enforcement standard of 0.5 µg/L for TCE represents the most recently established federal number and that this standard is necessary to protect public health. In 2011, the EPA's Integrated Risk Assessment System (IRIS) program updated their cancer slope factor for TCE. The cancer slope factor is based on increased risk of renal cell carcinoma, non-Hodgkin's lymphoma, and liver tumors. The EPA used this cancer slope factor to establish drinking water concentrations at specified cancer risk levels.

Cancer Risk Level	Water Concentration
1 in 10,000	50 µg/L
1 in 100,000	5 µg/L
1 in 1,000,000	**0.5 µg/L**

DHS recommends using EPA's drinking water concentration at a cancer risk level of 1 case in 1,000,000 people as the enforcement standard for TCE to be consistent with the risk thresholds established in Ch. 160.13(2)(b)4 and ensure adequate protection of the people of Wisconsin.

Pesticides

Clean Wisconsin commented that the proposed pesticide standards may not sufficiently protect against interactive effects.

Response:

In establishing the proposed groundwater standards for any contaminant, DHS reviews available information from federal and internal agencies and peer-reviewed research studies to evaluate the ability for the contaminant to cause interactive and other negative health effects. In evaluating whether a substance can cause interactive effects, DHS considers the ability for the substance to increase the toxicity of other substances and the ability for the substance's toxicity to be increased by the presence of other substances.

In their review, DHS concluded that imidacloprid may cause interactive effects. This conclusion is based on two recent studies in research animals that observed increased toxicity when rats were co-exposed to imidacloprid and arsenic. More information on these studies can be found in Table A-1 of DHS' support document. However, the information available does not indicate the potential for interactive effects for clothianidin, dacthal and its degradates, glyphosate, aminomethylphosphonic acid (AMPA), sulfentrazone, thiamethoxam, and thiencarbazone-methyl.

Thiamethoxam

Syngenta stated that there was a minor error in the calculation of the enforcement standard concentration based on the chronic oral point of departure dose. They also stated that the teratogenic potential of thiamethoxam was misinterpreted and that the observed effects on development are due to maternal toxicity.

Response:

The Wisconsin Department of Health Services (DHS) has revised the proposed groundwater enforcement standard for thiamethoxam to be based on an acceptable daily intake of 0.012 mg/kg-d – as provided by EPA in their 2017 human health risk assessment. DHS' revised enforcement standard recommendation for thiamethoxam is 120 µg/L.

However, the agency respectfully disagrees with the statements that teratogenic potential of thiamethoxam was misinterpreted and that the observed effects on development are due to maternal toxicity. Ch. 160.15(1)c requires DHS to recommend a preventive action limit (PAL) of 10% for substances that have teratogenic properties. The EPA's Integrated Risk Information System defines a teratogen as a substance that is capable of causing birth defects. The ATSDR expands on this definition to state that a teratogen is a substance that causes structural or functional defects in development between conception and birth. Both of the developmental toxicity studies of thiamethoxam reviewed by EPA indicate that thiamethoxam can cause skeletal anomalies in offspring after mothers were exposed to thiamethoxam during pregnancy. DHS considers these skeletal anomalies to be teratogenic effects.

While these effects did occur at levels at which maternal effects were observed, EPA's developmental toxicity risk assessment guidelines only cautions against the interpretation of these effects at doses that cause excessive maternal toxicity. In these studies, the skeletal effects in offspring were observed at the lowest observed adverse effect level (LOAEL) for the mothers – meaning that the exposure levels were not excessive. EPA goes on to state that "current information is inadequate to assume that developmental effects at maternally toxic doses result only from maternal toxicity; rather, when the LOAEL is the same for the adult and developing organisms, it may simply indicate that both are sensitive to that dose level." Together, the available information and policies established by EPA support DHS' decision to recommend a

PAL of 10% due to teratogenic effects. As such, DHS recommends a preventive action limit of 12 µg/L recommendation for thiamethoxam – 10% of the revised enforcement standard recommendation.

Glyphosate

Bayer Crop Science and the Ag Coalition stated that the preventive action limit of 10% for glyphosate is based on the incorrect assertion that glyphosate is genotoxic or mutagenic. They also state that the teratogenic potential glyphosate was misinterpreted and that the observed effects on development are due to maternal toxicity.

Response:

DHS has reviewed the toxicological profile published by the Agency for Toxic Substances and Disease Registry (ATSDR) in 2020 and the additional resources provided by Bayer Crop Science. This information is scientifically sound and indicates that a clear link between glyphosate exposure and mutagenic effects is not present.

However, the agency respectfully disagrees with the statement that teratogenic potential of glyphosate was misinterpreted and that the observed effects on development are due to maternal toxicity. Ch. 160.15(1)c requires DHS to recommend a preventive action limit (PAL) of 10% for substances that has teratogenic properties. The EPA's Integrated Risk Information System defines a teratogen as a substance that is capable of causing birth defects. The ATSDR expands on this definition to state that a teratogen is a substance that causes structural or functional defects in development between conception and birth. The developmental toxicity studies of glyphosate reviewed by EPA indicate that glyphosate cause can unossified sternebrae (underformed rib bones) in offspring after mothers were exposed to glyphosate during pregnancy. DHS considers unossified sternebrae to be a teratogenic effect.

While these effects did occur at levels at which maternal effects were observed, EPA's developmental toxicity risk assessment guidelines only cautions against the interpretation of these effects at doses that cause excessive maternal toxicity. In these studies, the skeletal effects in offspring were observed at the LOAEL for the mothers – meaning that the exposure levels were not excessive. EPA goes on to state that "current information is inadequate to assume that developmental effects at maternally toxic doses result only from maternal toxicity; rather, when the LOAEL is the same for the adult and developing organisms, it may simply indicate that both are sensitive to that dose level." Together, the available information and policies established by EPA support DHS' decision to recommend a PAL of 10% due to teratogenic effects. DHS' recommended enforcement standard and preventive action limit for glyphosate are 10 and 1 milligrams per liter (mg/L), respectively.

The Milwaukee Riverkeeper asked why Wisconsin's proposed enforcement standard for glyphosate is higher than EPA's maximum contaminant level and MN's drinking water standard for glyphosate.

Response:

According to Ch. 160.13(2)(b)(2), DHS may base a recommended groundwater standard on available technical information if this information is scientifically valid; the information was not considered when the federal value was established; and the department concludes, with a reasonable scientific certainty, that such a value is justified.

EPA's MCL for glyphosate was adopted in 1994. Since the MCL was adopted, both the EPA and ATSDR have updated their health assessments for glyphosate. Both of these agencies established an acceptable daily intake (ADI) of 1 mg/kg-d. These assessments represent the best available science on health impacts of glyphosate. As such, DHS' proposed enforcement standard for

glyphosate uses an ADI of 1 mg/kg-d. DHS' recommended enforcement standard and preventive action limit for glyphosate are 10 and 1 milligrams per liter (mg/L), respectively.

Hexavalent Chromium

In comments submitted by the American Chemistry Council and Wisconsin Manufacturers and Commerce (WMC), multiple organizations stated that the proposed standard for hexavalent chromium is inconsistent with the best available science and is substantially below naturally occurring levels. The ACC also mentioned that there are two errors in the cancer slope factor portion of DHS' scientific support document.

Response:

DHS re-affirms that the proposed standards for hexavalent chromium of 70 ng/L (enforcement standard) and 7 ng/L (preventive action limit) are appropriate. Ch. 160.13(2)(b)4 requires that DHS evaluate the oncogenic (cancer) potential when establishing recommended groundwater standards. If a substance has oncogenic potential and there is no federal number, DHS must identify the level at which the estimated additional cancer risk is no more than 1 case in 1,000,000 people. At this time, the EPA has classified hexavalent chromium as likely to be carcinogenic to humans and there is no federal number available. Given that the EPA has not yet completed a review of the mode of action for these effects, DHS is obliged to follow the process specified in Ch. 160 for oncogenic substances. DHS has corrected the errors related to the cancer slope factor section in the scientific support.

The process for establishing groundwater standards for the protection of public health does not take into account naturally occurring levels. However, DNR has the ability to address background concentrations of a contaminant when requiring regulatory actions.

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

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1. Type of Estimate and Analysis	2. Date
☒ Original ☐ Updated ☐ Corrected	11/4/2021

3. Administrative Rule Chapter, Title and Number (and Clearinghouse Number if applicable)
NR 140 – Groundwater Quality
(CR 21-101)

4. Subject
Amendments to ch. NR 140 to set numerical standards to minimize the concentration of polluting substances in groundwater. Board Order DG-15-19

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).
Chapter NR 140, Wis. Adm. Code, contains numerical groundwater quality standards for harmful substances that may enter the groundwater resources of the state. The department is required to propose rules based on recommendations from the Wisconsin Department of Health Services (DHS) for groundwater quality standards, to be contained in s. NR 140.10, Table 1, Wis. Adm. Code. The Table, which contains groundwater enforcement standards (ES) and preventive action limits (PAL), is a tool available to the department and other state regulatory agencies that provides uniform standards for regulatory programs contained in other parts of the state's statutes and administrative codes. Chapter NR 140 is not a self-implementing administrative rule and is independent from the regulatory programs that use the groundwater standards in regulatory actions, requirements, responses, and enforcement mechanisms.

After the department promulgates those groundwater standards, state regulatory agencies are required under ss. 160.19 to 160.25, Wis. Stat., to review the new groundwater standards and if necessary, commence promulgation or amendment of their administrative rules for their regulatory programs in order to comply and respond to the new groundwater standards. Numerous DNR administrative programs refer to the groundwater standards in ch. NR 140, Wis. Adm. Code, along with regulatory programs at the Wisconsin Department of Transportation, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and Wisconsin Department of Safety and Professional Services. This administrative rule only amends and adds groundwater standards; it does not amend or create any regulatory authority that implements programs that may use or enforce groundwater standards.

Because ch. NR 140, Wis. Adm. Code groundwater standards are not self-implementing and have no regulatory or enforcement mechanism, there is no cost directly attributable to the standards. Amendment of the groundwater standards alone do not create an implementation or compliance cost. The cost of implementation and compliance for groundwater standards is dictated entirely by the regulatory agencies and their numerous regulatory programs with their own statutory and administrative code authority. To the extent that the groundwater standards are used in other regulatory programs, the estimation of those costs is limited by the statutory requirement that the regulatory agencies review, amend, or create rules to implement the standards *after* the groundwater standards are promulgated.

The department anticipates that rulemaking activity in other regulatory programs may significantly decrease the cost of this groundwater standards rule. The department is in the process of promulgating a permanent rule adding numeric thresholds for PFOS and PFOA to the surface water quality standards. The surface water quality standards proposed rule includes WPDES permit implementation procedures for source reduction and treatment of PFOS and PFOA in wastewater discharges. Many of the industries and facilities governed by surface water quality standards would also be subject to the changes in this groundwater proposed rule. If the surface water quality rule is promulgated, the department anticipates the implementation and compliance cost of the proposed groundwater rule will substantially decrease. The WPDES permit program may also propose rules amending how the WPDES permit program regulates the land application of biosolids that contain PFOA and PFOS.

Any reasonable estimate of the implementation and compliance costs of this rule will be altered by the statutorily require review and ongoing promulgation of regulatory program rules outside the scope and authority of this rule. To comply with the directive in s. 227.137, Wis. Stat., the department analyzed and is providing a detailed quantification of the economic impact of the proposed 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 by the proposed rule, based on the current administrative and statutory authority in the regulatory programs that rely on groundwater standards.

To the extent possible, this economic impact analysis includes estimated costs of implementation and compliance incurred by other regulatory programs and rules that refer to ch. NR 140 standards. The estimated average annual costs incurred by other regulatory programs and rules is $3,284,171 in any year over a 5-year permitting cycle and $9,537,243 maximum over any two-year period. See Attachment C for a detailed derivation of these figures. However, review and possible amendment of those regulatory program rules are outside the scope of this rule. Any amendment to regulatory program rules may alter the cost of implementation and compliance of ch. NR 140 groundwater standards estimated here.

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 standards 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 standards are used by other administrative programs that regulate facilities and activities such as: solid and hazardous waste management, land application of wastewater and wastewater solids/sludges regulated under the Wisconsin Pollutant Discharge Permit ("WPDES") program, mining operations, spills and remediations sites, and pesticide applications. The standards also apply to water bottled in Wisconsin and the well compensation grant program.

The proposed rule establishes new state groundwater quality standards for substances presently without a numeric standard, having been detected in or having a reasonable probability of entering, the groundwater resources of the state. To develop proposed groundwater standards, DHS follows the process described in sections ss. 160.09 to 160.17, Wis. Stat. This includes a review of federal numbers, state drinking water standards, and acceptable daily intake values from the United States Environmental Protection Agency (EPA), research studies and a search of peer-reviewed scientific research. DHS then develops a scientific support document describing the findings of their review and basis for the recommended proposed groundwater standards.

The proposed rule also revises existing state groundwater quality standards in cases where established federal numbers or health based reference doses for substances have changed, or where significant technical information, not considered when federal numbers or reference doses were established, justifies revision. Again, proposed revisions to existing groundwater quality standards are based on recommendations developed by the DHS after scientific review of peer-reviewed research.

The proposed rule for new and revised groundwater quality standards are grouped into five categories: Per- and Polyfluoroalkyl Substances (PFAS), Volatile Organic Compounds (VOCs), Metals/Metalloids, Agricultural Chemicals, and Bacteria. The proposed amendments are for: Per- and polyfluoroalkyl substances (PFAS), including perfluorooctanoic acid (PFOA), and perfluorooctane sulfonate (PFOS); volatile organic compounds (VOCs), including trichloroethylene (TCE), tetrachloroethylene (PCE), 1,2,3-trichloropropane (1,2,3-TCP), and 1,4-dioxane; metals/metalloids, including aluminum, boron, molybdenum, cobalt, hexavalent chromium, and strontium; agricultural chemicals, including thiamethoxam, imidacloprid, clothianidin, isoxaflutole and isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, Dacthal TPA and MTP degradates, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, and sulfentrazone; and bacteria, including *Escherichia coli* (*E. coli*).

The enforcement standards and preventive action limits for substances in groundwater under this chapter provide uniform and predictable guidelines and procedures for the exercise of regulatory authority, which is established elsewhere in the statutes and does not create independent regulatory authority. No particular type of regulation is required. Regulatory agencies are free to establish any type of regulation that assures that regulated facilities and activities will not cause the concentration of a substance in groundwater affected by the facilities or activities to exceed the enforcement standards and preventive action limits under this chapter at a point of standards application. For each substance for which the department adopts an enforcement standard or a preventive action limit, each regulatory agency shall promulgate rules which set forth the range of responses the regulatory agency may take or which it may require the person controlling a facility, activity or practice which is a source of the substance exceeding a standard in groundwater at a point of standards application to take.

Responses may vary depending on the type and age of the facility, the hydrogeological conditions of the site, and the cost-effectiveness of alternative responses that will achieve the same objectives under the conditions of the site. Responses shall take into account the background water quality at the site.

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 five stakeholder meetings in 2020 on the rulemaking effort to establish new and revised groundwater quality standards in ch. NR 140, Wis. Adm. Code. These meetings provided an opportunity for stakeholders to submit comments and information relevant to the proposed rule and its potential economic impacts. A number of individuals and organizations were contacted and offered an opportunity to participate in the ch. NR 140 stakeholder meetings, and to provide comments and information relevant to the economic impacts associated with rule implementation. A listing of the individuals and organizations contacted is provided in Attachment B.

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

A number of local government units were contacted and offered an opportunity to submit comments and information relevant to the proposed rule and its potential economic impacts during the stakeholder meetings held in 2020. The local

government units that were offered an opportunity to provide comments and information relevant to the economic impacts associated with implementation of the proposed revisions to ch. NR 140 are included in the Attachment B list. We received comments related to the EIA from representatives/associations of local government units and a utility owned by a local government.

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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)

In addition to the rulemaking requirements in ch. 227, Wis. Stat., the legislature has prescribed specific procedures for promulgating groundwater standards and separate procedures for promulgating rules for regulatory agencies and programs that implement those groundwater standards. Chapter 160, Wis. Stat., describes those processes.

Chapter NR 140, Wis. Adm. Code, contains numerical groundwater quality standards for harmful substances that may enter the groundwater resources of the state. The department is required to propose rules based on recommendations from DHS for groundwater quality standards, to be contained in s. NR 140.10, Table 1, Wis. Adm. Code. The Table is a tool available to the department and other regulatory agencies that provides uniform standards for regulatory programs contained in other parts of the state's statutes and administrative codes. Chapter NR 140 is not a self-implementing administrative rule and is independent from the regulatory programs that contain actions, requirements, responses, and enforcement mechanisms for the various activities or facilities they regulate.

After the department promulgates those groundwater standards, regulatory agencies are required under ss. 160.19 to 160.25, Wis. Stat., to review the new standards and commence promulgation or amendment of their administrative rules for their regulatory programs in order to comply and respond to groundwater standards. Numerous DNR administrative programs refer to the groundwater standards in ch. NR 140, Wis. Adm. Code, along with administrative regulatory programs at the Wisconsin Department of Transportation, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and Wisconsin Department of Safety and Professional Services.

The cost of implementation and compliance for groundwater standards is dictated entirely by the regulatory agencies and their numerous regulatory programs based on authority outside of ch. NR 140, Wis. Adm. Code. Implementation and compliance costs for regulatory agencies may change after they complete their statutorily require review of new or amended groundwater standards and, if necessary, amend or create administrative rules to ensure compliance with the new groundwater standards.

To the extent possible, the department is providing an estimate of the cost of implementation and compliance for other regulatory program rules that refer to ch. NR 140, Wis. Adm. Code groundwater standards. This is limited by the fact that these programs will undergo the statutorily required review and possibly amend their administrative rules, which may alter the costs described here. As described above, there is ongoing rulemaking for surface water quality standards relating to PFOA and PFOS that, if promulgated, will significantly decrease the cost of this proposed rule. Similarly, additional rulemaking is anticipated regarding the WPDES permitting process that may impact the cost for permitting biosolid management.

To the extent it is possible to estimate, the department estimates average annual costs incurred by other regulatory programs and rules is $3,284,171 in any year over a 5-year permitting cycle and $9,537,243 maximum over any two-year period.

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Table 1 below shows a summary of the categories of costs incurred for compliance and implementation. The department does not anticipate costs to regulated entities from the addition of standards for metals/metaloids, agricultural chemicals, and bacteria (see sections 3, 4, and 5 of Attachment C). A detailed assessment of the estimated compliance cost associated with this rule can be found in the EIA narrative document (Attachment C).

Table 1: Estimated Average Compliance Cost Per Year

Categories	Average Annual Cost
PFAS	
Industrial and Municipals Wastewater and Industrial solids	$ 1,009,278
Municipal Biosolids	$ 1,577,533
VOC's	
TCE	$ 560,080
1,4 dioxane	$ 137,280
Total Annual cost (In Any Year Average Cost)	**$ 3,284,171**

The groundwater quality standards in ch. NR 140 are intended to be used by state regulatory programs to minimize the concentration of polluting substances in groundwater. In exercising their regulatory authority, state agencies establish specific rules and regulations to ensure that regulated facilities, activities, and practices do not attain or exceed established groundwater standards at applicable points of standards application. In situations where standards are attained or exceeded, each regulatory agency and program provides actions to address contaminant sources and, in some cases, actively remediate residual contamination in groundwater.

Regulating agencies evaluate alternate responses, including consideration of the technical and economic feasibility of those alternate responses, in determining the appropriate action to be required at a site to control further releases of a contaminating substance, or to restore contaminated groundwater.

The enforcement of state groundwater quality standards is done by state regulatory agencies through their groundwater protection programs. In exercising their statutory powers and duties, state regulatory agencies establish groundwater protection regulations that assure that regulated facilities and activities will not cause state groundwater quality standards to be exceeded. A state regulatory agency may 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 state groundwater quality enforcement standards or preventive action limits at applicable "point of standards application" locations.

Specific Businesses and Business Sector (Private Businesses):

Specific businesses anticipated to be impacted include: Paper and Packaging Manufacturers that currently land apply sludge, Waste Hauler, Treatment Facility that discharges industrial liquid waste through an absorption/seepage pond land treatment system, businesses that contribute wastewater to Wastewater Treatment Facilities (WWTFs) and businesses that use and handle TCE and 1,4 dioxane.

The average annual compliance cost to private businesses and business sector is expected to be $2,856,038 per year.

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A detailed assessment of compliance cost to specific businesses, business sectors and small businesses is presented in "Attachment C" to this document. Attachment C details assumptions, number of entities impacted and related compliance cost estimations.

Fiscal Impact and Impact on State Economy

The department does not anticipate that this rule will impact the state's economy adversely. The estimated fiscal impact of this rule ($1,500) on the state is associated with DATCP agricultural chemical sampling. A detailed assessment of this fiscal impact is provided in the agricultural chemical section of Attachment C. DATCP has indicated that it will be able to absorb this additional cost in the agency's current budget. Additional cost to the DNR in terms of staff time would be absorbed in the agency's current budget.

Impacts on Local Governmental Units

The department assumes that municipal-owned utilities will incur some cost that is primarily related to publicly owned treatment works (POTWs) and classifies this as a cost to local government. The department anticipates that the average cost to a local government over a 5-year permitting cycle to be $428,133 per year. This cost includes wastewater sampling, groundwater monitoring, and POTWs biosolids management.

Impacts on Public Utility Rate Payers

The department does not anticipate this rule to significantly impact public utility rate payers. Assuming impacted municipal-owned utilities will pass on the cost of compliance to rate payers, the total average cost to rate payers over a 5-year permitting cycle is anticipated to not exceed $428,133 per year.

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

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

1. Providing clarity to regulated entities and property redevelopers on how to address these compounds if they are detected at remediation and redevelopment sites, with the ability to accurately determine costs to completing their redevelopment and achieving case closure.
2. Providing clarity on the appropriate concentrations that would be considered by the state for a drinking water advisory and provision of temporary emergency water.
3. Providing human health protection, as the standards protect groundwater from substances that 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.
4. 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 ch. NR 140 groundwater standards.
5. Providing state regulatory agencies the ability to manage, close and redevelop spill/release sites where substances in groundwater exceed established ch. NR 140 groundwater standards, where natural attenuation is effectively addressing the contamination.
6. Providing standards for bottled water providers.
7. Setting health-based levels for substances in water supplies that would allow homeowners to evaluate the safety of their home well water supply.
8. Allowing homeowners to apply for well compensation well replacement funds in cases where sampling shows home well water exceeds established ch. NR 140 enforcement standards for groundwater quality standards.

Alternative(s) to Implementing the Rule

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Chapter 160, Wis. Stat., directs the department to propose rules establishing DHS recommendations as ES groundwater quality standards in ch. NR 140, Wis. Adm. Code. Chapter 160, Wis. Stat. does not include an alternative to the department proposing DHS recommendations as ch. NR 140 groundwater quality standards.

Benefits: Per- and Polyfluoroalkyl Substances (PFAS) Proposed amendments to ch. NR 140, Wis. Adm. Code, would add new groundwater quality standards for two per- and polyfluoroalkyl substances (PFAS): perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS).

Human health impacts potentially avoided include:

- 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 (IARC) classifies PFOA as possibly carcinogenic to humans and the 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.
- Perfluorooctane sulfonate (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.

Economics Benefits of PFOS/PFOA (Avoided Cost)
According to the EPA,[1] the documented adverse health effects of PFOA and PFOS include:

- Developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations);
- Cancer (e.g., testicular, kidney);
- Liver effects (e.g., tissue damage);
- Immune effects (e.g., antibody production and immunity); and
- Thyroid effects and other effects (e.g., cholesterol changes).

A benefit of establishing numerical standards in ch. NR 140 , Wis. Adm. Code., to minimize the concentration of polluting substances in groundwater, to be used by all groundwater regulatory programs, is the creation of defined thresholds for implementation that provides regulatory certainty for regulated entities and permittees.

One groups that may be particularly at risk are those residents who obtain their drinking water from municipal water systems that use groundwater as their source. Additionally, Wisconsin residents who own property near areas of known PFAS contamination may experience diminished property values, depressing their personal net worth as well as the wealth of local communities, as evidenced by Minnesota's experience with PFOS contamination from a 3M facility.[5]

Given that data specific to Wisconsin is not yet available, it is difficult to quantify PFOS/PFOA related health impacts in Wisconsin. For the purpose of this EIA, health impacts and recreational value impact studies presented here and the value transfer methods used to estimate potential Wisconsin-specific health impacts are based on a number of assumptions. The purpose of this analysis is to give estimate the potential economic value of PFOS/PFOA- related impacts given these assumptions. The economic value of potential impacts derived from this analysis are not deducted from or factored into the final total compliance costs of this rule.

Health Cost: To account for costs incurred to the State of Wisconsin as a result of not promulgating a PFOS/PFOA rule, the department analyzed two reports with health data linked to exposure to PFAS that were submitted by commenters during the EIA solicitation process.

The first study estimated that the total cost of PFOA-attributable low birthweight births in the United States for 2003 through 2014 was $13.7 billion.[2] These costs included the direct hospital costs at the time of birth as well as lost economic productivity due to low birthweight births being associated with a variety of longer-term outcomes including lower lifetime earning potential.

The department does not have data on PFOS/PFOA- attributable health incidents in Wisconsin. Using a value transfer method, the department assumed a linear relationship between impacts of PFOA – attributable low birthweight births quantified by Malits et al. (2018) and the total United States population. The department estimates that, based on 1.8% of the US population living in Wisconsin, the total costs due to low birth weight from PFOA exposure for the period (2003 – 2014) studied by Malits et al. (2018) to be $246.6 million (approx. $ 276.2 million in 2021 dollars). This cost value is likely not robust, given that this is an extrapolation based on non-specific population data, and recognizing that promulgation of both water quality standards and WPDES permit program regulations will not alone end PFAS exposure. However, it shows that it is reasonable to expect significant economic benefit (avoided cost) as a result of promulgation of these proposed thresholds of public health significance.

The second study examined background exposure to PFOA as it relates to widespread occurrence of hypertension. This study estimated that approximately 10.3 million Europeans would develop hypertension because of this exposure, which would cost Europe an estimated €10.7 – 35 billion[3] annually ($12.6 - $41.3 billion USD). Again, to use the value transfer method, the department assumed a linear relationship between European population and the estimated cost attributable to PFOA exposure. The department also assumed that the occurrence of PFOA-exposure related hypertension in the European population is the same in the United States as well as Wisconsin. Applying this occurrence to Wisconsin, and taking the lower end of that range, it is estimated that it would cost the state $99.9 million annually (approx. $103.9 million in 2021 dollars) if PFOA is not regulated.

It is important to note that the two studies cited above were specific to PFOA and low birthweights and hypertension. Total health-related costs associated with total PFAS reported by Goldenman, Gretta, et al. (2019) were between €52 billion to €84 billion annually in Europe, which could be several billions of dollars for United States and hundreds of millions for Wisconsin if the quantified values are transferred.[4]

Housing Value: In a study of the impact of PFAS groundwater contamination on property value in Oakdale Minnesota and other affected communities, Sunding (2017) found that the value of properties sold after PFAS contamination of groundwater decreased by 7.3% in Oakdale and 4.4% in other affected communities. This translates to an annualized value of $288 per year (approx. $326 in 2021 dollars) in Oakdale and 231 per year (approx. $261 in 2021 dollars) in the other affected communities. In other words, households in the affected communities were willing to pay to avoid PFAS contamination of groundwater.

The department estimates that to date, approximately 51 remediation sites in Wisconsin (within 25 communities) have been discovered with PFAS contamination in groundwater. Hedonic models of property value are specific to a housing market. Nevertheless, this study gives us a sense of the potential impacts of PFAS contamination of groundwater on the property value for local communities in Wisconsin that rely on groundwater as a source of drinking water.

[1] United States Environmental Protection Agency. Drinking Water Health Advisories for PFOA and PFOS. https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos#:~:text=These%20studies%20indicate%20that%20exposure,)%2C%20liver%20effects%20(e.g.%2C
[2] Malits J, Blustein J, Trasande L, Attina TM. 2018. Perfluorooctanoic acid and low birth weight: estimate of US attributable burden and economic costs from 2003 through 2014. International Journal of Hygiene and Environmental Health 221: 269-275.
[3] Goldenman, Gretta, et al. 2019. The cost of inaction: A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS. Nordic Council of Ministers.[4] Environmental Science and Technology. The True Cost of PFAS and the Benefits of Acting Now. https://pubs.acs.org/doi/10.1021/acs.est.1c03565

Benefits: Volatile Organic Compounds (VOCs) Proposed amendments to ch. NR 140, Wis. Adm. Code, would add revised groundwater quality standards for four VOCs: trichloroethylene (TCE), tetrachloroethylene (PCE), 1,2,3-trichloropropane (1,2,3-TCP) and 1,4-dioxane. Proposed revised groundwater quality standards for TCE, 1,2,3-TCP and 1,4-dioxane would be lower than existing standards. Proposed revised groundwater quality standards for PCE would be higher than existing standards.

Human health impacts potentially avoided include:

- Trichloroethylene (TCE); Known health effects from TCE come from animal studies and from studies of people who have come into contact with TCE in their environments. High levels of TCE in drinking water may cause nausea, convulsions, liver and kidney damage, impaired heart function, coma, or even death. There is strong evidence that TCE can cause kidney cancer in people and some evidence that it can cause liver cancer and malignant lymphoma. Lifetime exposure to TCE resulted in increased liver cancer in mice and increased kidney cancer and testicular cancer in rats. Additional animal studies indicate there may be an association between maternal exposure to TCE and specific heart defects in offspring. There is some evidence that human exposure to TCE while pregnant may be associated with similar effects. The EPA and the International Agency for Research on Cancer (IARC) have classified trichloroethylene as a human carcinogen by all routes of exposure. TCE has been shown to cause carcinogenic, mutagenic, and teratogenic effects.
- Tetrachloroethylene (PCE); Current knowledge about the health effects of PCE comes from studies in laboratory animals, workers, poisoning exposure reports, and epidemiological studies involving exposed communities, such as contaminated military bases. Short-term effects of PCE exposure in both humans and animals include liver and kidney damage and central nervous system effects. Longer-term PCE exposure causes changes in mood, memory, attention, reaction time, or vision. Long-term PCE exposure animal studies have also shown liver and kidney effects, as well as changes in brain chemistry. PCE may also have adverse effects on pregnancy and fetal development; problems such as miscarriage, birth defects, and slowed fetal growth have been observed in animal studies. The EPA has classified PCE as a likely human carcinogen. PCE has been shown not to be teratogenic, but it has been shown to have mutagenic effects and interactive effects with mixtures of trichloroethylene (TCE) and methylchloroform.
- 1,2,3-Trichloropropane; The known health information on 1,2,3-trichloropropane comes from studies with laboratory animals. Rats and mice exposed to large amounts of 1,2,3-trichloropropane for a long time developed tumors in the liver, digestive system, Harderian gland, and uterus. The EPA determined that 1,2,3-trichloropropane is likely to be carcinogenic to humans. Recent studies have shown that 1,2,3-trichloropropane can cause gene mutations and, therefore, is likely mutagenic.

- 1,1-Dichloroethane; The known information about the health effects of 1,1-dichloroethane comes from studies of humans and laboratory animals. In humans, breathing high levels of 1,1-dichloroethane for a short amount of time can cause central nervous system depression and an irregular heartbeat. In animals, 1,1-dichloroethane has been shown to cause kidney and liver damage, affect weight gain in pregnant animals, delay bone development of offspring, and death at very high levels. A study by the National Toxicology Program found that high levels of 1,1-dichloroethane cause tumors in mice after oral exposure. The United States Environmental Protection Agency (EPA) has classified 1,1- dichloroethane as a possible human carcinogen by oral exposure.
- 1,4-Dioxane; At high levels or long-term exposure, 1,4-dioxane can cause severe kidney and liver effects. Animals that drank water with high levels of 1,4-dioxane for a long time developed cancer in the liver and nasal passages. Because of these effects, EPA has classified 1,4-dioxane as a likely human carcinogen. Recent studies have shown that 1,4-dioxane may be mutagenic. Limited data in animals suggest that 1,4-dioxane may be teratogenic.

Benefits: Metals/Metalloids Proposed amendments to ch. NR 140, Wis. Adm. Code, would add new groundwater quality standards for hexavalent chromium. Chapter NR 140 currently includes groundwater quality standards for total chromium, which includes both trivalent chromium and hexavalent chromium. Consulting firms and sub-contractors, including laboratories, will likely benefit financially from new hexavalent chromium groundwater standards.

Human health impacts potentially avoided include:

- Hexavalent Chromium; Hexavalent chromium has no known biological role and can cause toxicity. Studies involving people who work with hexavalent chromium have led to a greater understanding about how it affects the body if it is inhaled. However, information on how chromium affects the body if it is swallowed (oral exposure) is more limited, and mostly comes from animal studies. Animals that were exposed to large amounts of chromium had problems with their stomach and small intestines. Chromium also caused damage to sperm in male animals. Recent studies have shown that exposure to large amounts of hexavalent chromium for a long time can cause cancer in research animals. Previous studies have also shown that hexavalent chromium can cause teratogenic effects and may cause mutagenic effects. New studies have shown that hexavalent chromium may cause interactive effects with other substances such as benzo(a)pyrene and arsenic.
- Strontium; Because strontium is chemically similar to calcium, it can be deposited in the skeleton after exposure to high levels. Studies in people and animals have shown that strontium can interfere with bone mineralization in the developing skeleton. Strontium can also compete with calcium in bones and suppress vitamin D metabolism and intestinal calcium absorption. Some studies have shown that strontium can cause teratogenic effects.
- Boron; Recent studies in people suggest that small amounts of boron in the diet have beneficial effects. In fact, the World Health Organization (WHO) has added boron to the possible essential elements category for nutritional purposes. On the other hand, eating or drinking large amounts of boron can impact human health. Some people who ate large amounts of boron have experienced effects on the stomach, intestines, liver, kidney, and brain and some have died. Male animals that ate large amounts of boron had damage to their reproductive organs. Boron has also been shown to decrease the weight of newborn animals if given to the mothers when pregnant.
- Molybdenum; Low levels of molybdenum are essential for good health. The Institute of Medicine's Food and Nutrition Board has recommended dietary molybdenum levels of 45 micrograms per day for adults. However, high levels of molybdenum can be harmful. Studies in animals suggested that ingesting very large amounts of molybdenum might damage the male and female reproductive system and might cause kidney and liver damage. Studies indicate that the copper content in the body can affect the toxicity of molybdenum. Molybdenum has shown to have interactive effects with copper in the body and cause teratogenic effects.
- Aluminum; While most people do not experience health effects from exposure to aluminum, some groups are at higher risk for aluminum toxicity. Most cases of human aluminum toxicity have involved patients with impaired

kidney function or patients who were exposed to high levels of aluminum from contaminated water used in medical fluids. Premature babies are at risk for aluminum toxicity because of their immature kidney function. Full-term infants with normal kidney function may also be at risk because they have lower kidney excretion rates than adults which affect their ability to excrete aluminum. Studies with laboratory animals have shown that exposure to high levels of aluminum over a long period of time can affect testosterone levels, body weight, memory, and sperm.

- Cobalt; Exposure to high levels of cobalt can result in lung and heart effects and dermatitis. Liver and kidney effects have also been observed in animals exposed to high levels of cobalt. Birth defects have been observed in animals exposed to high levels of nonradioactive cobalt. A recent study has shown that cobalt can cause teratogenic effects in mice and rats.

Benefits: Agricultural Chemicals There are positive long-range implications to establishing new groundwater quality standards for agricultural pesticides and pesticide degradation products. When a pesticide that has an established groundwater enforcement standard (ES) or preventive action limit (PAL) is detected in a drinking water well, the standards allow state and local health officials to more quickly communicate health-related concerns and any protective measures that should be taken by the homeowner and users of the water. Having groundwater standards allows faster decision-making about resampling efforts and helps provide clear criteria for well and/or water supply replacement. It also provides legal criteria for the department to determine if well compensation funding or other financial support could be provided to an affected homeowner.

One of the best reasons for having health-based groundwater quality standards is that they allow environmental engineers and other professionals to rapidly determine soil and groundwater cleanup goals in situations where a spill of an agricultural chemical occurs. DATCP responds to about 40 agricultural chemical spills annually in the state (https://datcp.wi.gov/Documents2/ACMAnnualReport2019.pdf). But, there are tangible benefits of having established ESs and PALs for individuals like growers who use pesticides in agriculture. DATCP provides communication and outreach about pesticides that are detected in groundwater to other state agencies, local governments, University and Extension professionals, and to growers through presentations at industry association meetings and in pesticide training materials and seminars. Where DATCP data shows a particular pesticide is entering groundwater in an area, growers often quickly learn of the concern. Such outreach informs and educates the pesticide user and can have a significant effect on a grower's pesticide selection in an area, particularly if the groundwater test results approach the established standards. If DATCP observes impacts in areas prone to groundwater contamination, growers may choose to use other pesticides that are safer for human health and the environment. For example, if DATCP finds a highly soluble insecticide in the groundwater, any reduced use of that insecticide could potentially benefit non-target insects in the area, like bees or other pollinators, that could be unintentionally exposed to the insecticide through contaminated irrigation water. This potential exists for highly soluble neonicotinoid insecticides like imidacloprid, clothianidin and thiamethoxam. These compounds have been used on crops widely across irrigated sandy vegetable growing areas of Wisconsin where they have been detected in numerous private wells, monitoring wells and irrigation wells (NeonicotinoidReport.pdf (wi.gov)). DATCP reports suggest that growers who choose to use other insecticides in these sensitive areas could reduce impacts to groundwater and surface waters, and thereby reduce the potential for unintended impacts to invertebrates and non-target organisms on the land, and in streams and other surface waters.

The compound imidacloprid is the only agricultural chemical in the proposed rule that DATCP has detected in groundwater at concentrations exceeding its proposed PAL. Imidacloprid is a low-cost systemic insecticide that is water soluble and is taken up by and travels throughout the plant to control biting and sucking pests. It is labeled for use on a wide variety of Wisconsin crops including but not limited to corn, soybeans, beans, peas, and a host of fruits and vegetables. It is often applied at planting time as a coating on seed, but it may also be used in-furrow or as a soil drench (i.e., for potatoes), or can be mixed into spray formulations for foliar applications on established plants like vines, trees,

shrubs and other plants. Evaluating costs for alternatives to imidacloprid is complicated and can be speculative. For foliar applications potential alternatives include a variety of insecticide options including pyrethroid, carbamate, organophosphate, and diamide insecticide products, as well as insecticides like sulfoxaflor and flupyradifurone and some others. Some alternatives for imidacloprid as a seed treatment include the insecticides clothianidin and thiamethoxam, both of which are also highly water soluble neonicotinoid-class insecticides, like imidacloprid. Both are comparably priced to imidacloprid, and which have new standards proposed in this rule due to similar groundwater contamination findings (NeonicotinoidReport.pdf (wi.gov)). As far as options for imidacloprid as a seed treatment goes, the decision to select an alternative insecticide for delivery on seed is complicated by the extent to which a grower can choose a particular coating on the seed they purchase to plant. Often, seed treatments come as a proprietary blend of crop protectants applied to a seed-line that has a unique set of genetic traits to address anticipated growing conditions and pest pressures.

Human health impacts potentially avoided include:

- Thiamethoxam; Most information about the health effects of thiamethoxam comes from studies with laboratory animals. Animals that ate large amounts of thiamethoxam for long periods of time had problems with their liver, adrenal glands, and blood. Male animals had problems with their reproductive system. Thiamethoxam has been shown to cause teratogenic effects (skeletal abnormalities) in several animal studies.
- Imidacloprid; Most information about the health effects of imidacloprid comes from studies with laboratory animals. Animals that swallowed large amounts of imidacloprid for long periods of time had thyroid, neurological, reproductive, and glucose regulation problems. Some studies have shown that imidacloprid can cause teratogenic effects in animals. Recent studies have shown that high levels of imidacloprid can cause mutagenic effects in mice and can have interactive effects with arsenic in rats.
- Clothianidin; Most information about the health effects of clothianidin comes from studies with laboratory animals. Animals that ate large amounts of clothianidin for long periods of time experienced liver, blood, and kidney problems.
- Isoxaflutole; Rats that ate large amounts of isoxaflutole for two years experienced liver, thyroid, eye, nerve, and muscle problems. Some rats also had tumors in their liver after eating isoxaflutole for several months to years. In these studies, scientists were not able to determine whether the effects were caused by isoxaflutole or isoxaflutole diketonitrile due to the fast conversion from isoxaflutole to isoxaflutole diketonitrile in the body. The EPA has classified isoxaflutole as a likely human carcinogen.
- Isoxaflutole Benzoic Acid; Compared to experiments with isoxaflutole, isoxaflutole benzoic acid has been shown to be much less toxic. High levels of isoxaflutole benzoic acid caused decreased weight gain and food consumption, increased salivation, and changes in clinical chemistry markers in rats.
- Thiencarbazone-methyl; Most information about the health effects of thiencarbazone-methyl comes from studies with laboratory animals. Animals that ate large amounts of thiencarbazone-methyl for long periods of time experienced problems with their kidney, bladder, and urinary tract.
- Dacthal Monomethyl tetrachloroterephthalic acid (MTP) degradate; In the body, Dacthal can turn into MTP and then TPA. While the studies on MTP are limited, Dacthal has been studied more extensively. Animals that ate large amounts of Dacthal for long periods of time experienced liver, lung, kidney, and thyroid problems. Some studies have shown that Dacthal can cause carcinogenic effects in animals and the EPA considers Dacthal a possible human carcinogen.
- Dacthal Tetrachloroterephthalic acid (TPA) degradate; In the body, Dacthal can turn into MTP and then TPA. While the studies on TPA are limited, Dacthal has been studied more extensively. Animals that ate large amounts of Dacthal for long periods of time experienced liver, lung, kidney, and thyroid problems. Some studies have shown that Dacthal can cause carcinogenic effects in animals and the EPA considers Dacthal a possible human carcinogen.

- Glyphosate; Studies in animals have shown that glyphosate can cause gastrointestinal effects and developmental effects. Ingestion of a large amount of glyphosate also caused inflammation in the gastrointestinal system in animal studies. High levels of glyphosate have also been shown to cause unossified breastbone (teratogenic effects) in offspring of pregnant animals given large amounts of glyphosate orally. The carcinogenic potential of glyphosate has been intensively discussed by multiple federal and international agencies. While the International Agency for Research on Cancer (IARC) classified glyphosate as "probably carcinogenic to humans" in 2015, the EPA has recently affirmed their position that glyphosate is not likely to be carcinogenic to humans. Some studies have shown that glyphosate can have mutagenic effects.
- Glyphosate Aminomethylphosphonic acid (AMPA) degradate; Most information about the health effects of AMPA comes from studies with laboratory animals. Studies have shown that AMPA can affect the gastrointestinal tract and the urinary tract, including bladder, and cause liver injury in animals given very large amounts of AMPA. Decreased fetal body weight was also observed in animals given larger amounts of AMPA during gestation.
- Sulfentrazone; Most information about the health effects of sulfentrazone comes from studies with laboratory animals. Animals that ate large amounts of sulfentrazone for long periods of time experienced developmental and reproductive toxicity. When pregnant animals were fed sulfentrazone for a long period of time, decrease in body weight and disruption in male reproductive system happened to the fetuses (unborn babies) at levels that did not cause effects in the mother. In some studies, similar reproductive toxic effects were mainly observed in the second-generation pups of the sulfentrazone-fed animals. In developmental studies in rats, increased number of stillborn fetuses and delayed bone formation was observed in pups (teratogenic effects).

Benefits: Bacteria Proposed amendments to ch. NR 140, Wis. Adm. Code, add new groundwater quality standards for *Escherichia coli* (*E. coli*) bacteria. *E. coli* bacteria is a type of coliform bacteria used as an indicator of fecal contamination in groundwater.

Human health impacts potentially avoided include:

- Bacteria (*E. coli*); *E. coli* bacteria is a type of coliform bacteria used to evaluate the potential for microbial pathogens, associated with fecal contamination, to be present in groundwater. Microbial pathogens in water can cause a variety of illnesses. Most common illnesses are acute (short-term) gastrointestinal illnesses causing diarrhea, abdominal discomfort, nausea, and vomiting. Less common illnesses are chronic (long-term) and include kidney failure, hepatitis, and bloody diarrhea. Infants and young children, the elderly, and people with compromised immune systems are at the highest risk for illness from pathogens in water.

16. Long Range Implications of Implementing the Rule

The department does not expect that there will be significant long-range negative state fiscal impacts associated with establishing new and revised groundwater quality standards in ch. NR 140, Wis. Adm. Code. While there may be additional costs in some regulatory programs that refer to ch. NR 140 groundwater standards, there will also be savings for existing standards that are being amended to a less stringent standard. In addition, the department's Remediation and Redevelopment program will be able to approve natural attenuation site closures even if ch. NR 140 enforcement standards are being attained or exceeded. This regulatory option allows the department to make site-specific decisions to allow case closure, thus saving regulated entities and developers money.

Regulated facilities, practices, and activities that are sources of the new and revised proposed groundwater standards are likely sources of substances for which other groundwater standards already exist. Consequently, the department anticipates limited cases where proposed standards will be exceeded where existing standards are not currently being exceeded. However, 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 to exceed new or revised state groundwater 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.

Agricultural Chemicals

In accordance with ch. 160, Wis. Stat., DATCP conducts annual sampling for 150 to 500 private wells statewide for pesticides. In the event that groundwater standards are exceeded at private wells, DATCP conducts a groundwater investigation to evaluate pesticide use and impacts to other nearby private wells and to determine the source of the impacts. Where a spill is reported and/or a DATCP investigation finds that a spill or other point source is the reason for a pesticide impact at a private well, DATCP may require the responsible party to perform a cleanup response under ch. 292, Wis. Stat., and chs. ATCP 35 and NR 700, Wis. Adm. Code. Where a DATCP investigation finds that a pesticide impact to a private well is the result of normal agricultural use or other non-point use of a pesticide, the DATCP response actions are limited under chs. ATCP 30 and 31, Wis. Adm. Code.

Where a groundwater investigation identifies that normal agricultural use has caused an enforcement standard exceedance for a pesticide in a private drinking water well, DATCP is compelled by rule to take action. Outreach to educate growers about a groundwater concern would be the foremost approach and could result in voluntary changes in use practices and improvements in an area. Under ch. ATCP 31, Wis. Adm. Code - Groundwater Protection Program, DATCP can set pesticide use restrictions on a regional or statewide basis through the use of special orders (requires consent) or by changing administrative rules (likely ch. ATCP 30, Wis. Adm. Code). In practice, the agency has utilized special orders on a short-term basis until an administrative rule can be developed and promulgated as a long-term control measure.

Once the department promulgates the current ch. NR 140 proposed groundwater standards, DATCP may begin rulemaking to propose administrative controls on the use of any pesticide that is found to exceed its enforcement standard at a point of standards application. On the list of agricultural chemicals for which new groundwater quality standards are proposed, the insecticide imidacloprid is the only chemical that has been detected in groundwater and is likely to require some form of short-term or long-term control measure.

17. Compare With Approaches Being Used by Federal Government

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.

Federal drinking water MCLs have been established for: glyphosate (700 ug/L), *Escherichia coli* (*E. coli*) bacteria (0 bacteria present), trichloroethylene (TCE) (5 ug/L) and tetrachloroethylene (PCE) (5 ug/L). EPA cancer slope factors have been established that can be used to determine 1 in 1,000,000 drinking water cancer risk levels. EPA cancer slope factors have been established for: hexavalent chromium [EPA OPP = 0.791 $(mg/kg\text{-}day)^{-1}$, EPA IRIS draft = 0.5 $(mg/kg\text{-}day)^{-1}$], isoxaflutole [0.0114 $(mg/kg\text{-}day)^{-1}$], 1,2,3-trichloropropane (1,2,3-TCP) [30 $(mg/kg\text{-}d)^{-1}$] and 1,4-dioxane [0.01 $(mg/kg\text{-}d)^{-1}$]. US EPA LHAs have been established for: strontium (4,000 ug/L), the sum of Dacthal and its degradates

(MTP and TPA) (70 ug/L), perfluorooctanoic Acid (PFOA) (70 nanograms per liter or ng/L), perfluorooctane sulfonate (PFOS) (70 ng/L), boron (6,000 ug/L), molybdenum (40 ug/L), and 1,4-dioxane (200 ug/L). RfDs have been established by EPA for: hexavalent chromium (0.003 mg/kg/day), thiamethoxam (0.012 mg/kg/day), imidacloprid (0.057 mg/kg/day), clothianidin (0.098 mg/kg/day), isoxaflutole (0.02 mg/kg/day), thiencarbazone-methyl (1.17 mg/kg/day), sulfentrazone (0.14 mg/kg/day), 1,2,3-trichloropropane (1,2,3-TCP) (0.004 mg/kg/day), and 1,4-dioxane (0.03 mg/kg/day).

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

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 strontium used by the states surrounding Wisconsin varies by state. The level established in Minnesota is 3,000 micrograms per liter (ug/L), the level established in Michigan is 4,600 ug/L, Illinois has not established a strontium groundwater protection level, and Iowa uses the federal lifetime health advisory level of 4,000 ug/L as its strontium groundwater protection level.

Minnesota The state of Minnesota has established state groundwater protection "Health Risk Limits" (HRLs) under Minnesota Statutes Section 103H.201. The state of Minnesota has established HRLs for: hexavalent chromium (100 ug/L), thiamethoxam (200 ug/L), clothianidin (200 ug/L), PFOA (35 nanograms per liter or ng/L), TCE (0.4 ug/L), PCE (5 ug/L), 1,2,3-TCP (7 ug/L), and 1,4-dioxane (100 ug/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. Minnesota has established HBVs for: imidacloprid (3 ug/L), glyphosate (500 ug/L), glyphosate AMPA degradate (1,000 ug/L) and PFOS (20 ng/L). The Minnesota Department of Health also issues Risk Assessment Advice (RAA) levels for some groundwater contaminants. Minnesota Department of Health RAAs are advisory concentrations developed to assist Minnesota agencies in evaluating potential health risks to humans from exposures to a chemical. Generally, RAAs contain greater uncertainty than HRLs and HBVs because the information available to develop them is more limited. The state of Minnesota has established RAAs for: strontium (3,000 ug/L) and boron (500 ug/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). Michigan has established a Drinking Water Criteria/RBSL for: hexavalent chromium (100 ug/L), strontium (4,600 ug/L), glyphosate (700 ug/L), PFOA + PFOS (70 ng/L), TCE (5 ug/L), PCE (5 ug/L), 1,2,3-TCP (42 ug/L), and 1,4-dioxane (7.2 ug/L).

Illinois The state of Illinois has established state groundwater quality standards for "potable resource groundwater." Illinois Groundwater Quality Standards are state groundwater protection standards promulgated in 35 Ill. Adm. Code

620, environmental protection regulations. Illinois state "Groundwater Quality Standards for Class I: Potable Resource Groundwater" have been established for: TCE (5 ug/L), PCE (5 ug/L), boron (2,000 ug/L), and 1,4-dioxane (7.7 ug/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 LHAs, "negligible risk levels" (NRLs) for carcinogens, the 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. As noted in section 17 above, federal LHAs have been established for: strontium (4,000 ug/L), the sum of Dacthal and its degradates (MTP and TPA) (70 ug/L), perfluorooctanoic Acid (PFOA) (70 ng/L), perfluorooctane sulfonate (PFOS) (70 ng/L), boron (6,000 ug/L), molybdenum (40 ug/L), and 1,4-dioxane (200 ug/L). EPA cancer slope factors have been established that can be used to determine NRLs for carcinogens. EPA cancer slope factors have been established for: hexavalent chromium [EPA OPP = 0.791 (mg/kg-day)-1, EPA IRIS draft = 0.5 (mg/kg-day)-1], isoxaflutole [0.0114 (mg/kg-day)-1], 1,2,3-trichloropropane (1,2,3-TCP) [30 (mg/kg-d)-1], and 1,4-dioxane [0.01 (mg/kg-d)-1]. Federal drinking water MCLs have been established for: glyphosate (700 ug/L), *Escherichia coli* (*E. coli*) bacteria (0 bacteria present), trichloroethylene (TCE) (5 ug/L), and tetrachloroethylene (PCE) (5 ug/L).

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DEPARTMENT OF ADMINISTRATION
DOA-2049 (R09/2016)

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ADMINISTRATIVE RULES
Fiscal Estimate & Economic Impact Analysis

ATTACHMENT A

1. Summary of Rule's Economic and Fiscal Impact on Small Businesses (Separately for each Small Business Sector, Include Implementation and Compliance Costs Expected to be Incurred)

The regulatory programs in state regulatory agencies that use ch. NR 140, Wis. Adm. Code groundwater standards may impact small business, particularly groundwater quality standards for VOCs including TCE and PCE. Revisions to these standards may impact small businesses such as dry cleaners whose properties are the sites of spills or releases of these substances and have contaminated groundwater. Revised standards may necessitate additional site monitoring and investigation, and potentially additional compliance response actions. It should be noted that while the proposed standards for TCE are lower than current standards, the proposed PCE standards are higher than the current standards. Therefore, while site investigation and compliance action costs may increase in some cases, they may decrease in others, depending on the contaminant of concern at a specific regulated site.

For entities impacted by ch. NR 140, Wis. Adm. Code groundwater standards, the department assumed the following are small business based on available data and the agency's expertise:
Approximately 30% of the entities impacted by revisions to 1,4 Dioxane and TCE standards are small businesses. As a result, the department assumes small businesses will incur 30% of the average annual compliance cost for revisions to 1,4 Dioxane and TCE standards ($209,208 per year).
Approximately 30% of biosolids management source identification and reduction cost over a 5-year permitting cycle ($346,800) is anticipated to be a small business compliance cost.
Based on these assumptions, the department estimates $556,008 per year of compliance costs to small businesses.

A detailed assessment of potential compliance cost and benefits are presented in question #14 and #15 of DOA 2049 form attached.

2. Summary of the data sources used to measure the Rule's impact on Small Businesses

In its determination of the effect of this proposed rule on small businesses, the department used analysis and supporting information from a combination of data sources. These include: Wastewater Applications, Monitoring, and Permits (SWAMP) database, annual biosolids reports, EPA biosolids sampling documents, Bureau for Remediation and Redevelopment Tracking System (BRRTS) database, data from environmental consultants, DNR Remediation and Redevelopment Program staff expertise, DNR Program wastewater and biosolids staff expertise.

3. Did the agency consider the following methods to reduce the impact of the Rule on Small Businesses?

☐ Less Stringent Compliance or Reporting Requirements
☐ Less Stringent Schedules or Deadlines for Compliance or Reporting
☐ Consolidation or Simplification of Reporting Requirements
☐ Establishment of performance standards in lieu of Design or Operational Standards
☐ Exemption of Small Businesses from some or all requirements
☒ Other, describe:

This rule revision proposes new and revised state groundwater quality standards. The state regulatory agencies enforce groundwater quality standards through their groundwater protection programs. In exercising their statutory authority and duties, state regulatory agencies establish groundwater protection rules and regulations that assure that regulated facilities and activities will not cause state groundwater quality standards to be exceeded. State statutes require that groundwater quality standards apply to all regulated facilities, practices, and activities that may impact groundwater

quality. State statutes do not allow the department to establish different groundwater quality standards based on the size of a business. Groundwater quality standards apply to all regulated businesses regardless of size.

4. Describe the methods incorporated into the Rule that will reduce its impact on Small Businesses

State statutes do not allow the department to establish different groundwater quality standards based on the size of a business. Groundwater quality standards apply to all regulated businesses regardless of size.

5. Describe the Rule's Enforcement Provisions

Ch. NR 140, Wis. Adm. Code groundwater standards are not independently enforceable and are not self-implementing. State regulatory agencies enforce groundwater quality standards through their groundwater protection programs. In exercising their statutory authorities and duties, state regulatory agencies establish groundwater protection rules that assure regulated facilities and activities will not cause state groundwater quality standards to be exceeded. A state regulatory agency may 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 state groundwater quality standards at an applicable "point of standards application" location.

6. Did the Agency prepare a Cost Benefit Analysis (if Yes, attach to form)
☐ Yes ☒ No

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ADMINISTRATIVE RULES
Fiscal Estimate & Economic Impact Analysis

Attachment B: List of Stakeholders Contacted

Businesses
Toymotive LLC

Consultants
AECom
Anchor QEA
Antea Group
Barr Engineering
Benchmark Environmental Services
Brice Engineering
Brown and Caldwell
Burns and McDonnell
Cardno
Davy Inc
Deigan and Associates
EA engineering
Eaton company
Emerson
Environmental Audits
Environmental solutions and innovation Inc.
Environmental, Energy and Industrial Services
Essity
Eurofin USA
Fehr Graham
GAI consultants
Gannett Fleming
General Engineering
Geosyntec - consultants
Giles Engineering
GLEC Wastewater
GZA
Ingrahm Technical Services
Integral corporation
Kapur Inc - consultant
Martenson and Eisele
Mead and Hunt
MSA
NextEra Energy
RA Smith
Ramaker Associates
Ramboll

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ADMINISTRATIVE RULES
Fiscal Estimate & Economic Impact Analysis

Robert E Lee Associates
RPS Group
Ruekert - Mielke
SCS Engineers
SEH
Shannon and Wilson
Sigma Group
SolvePFAS
Stantec
Strand Associate
Styberg Engineering
Terracon
The OS Group LLC
The Sigma Group
Xcelenergy

Government
City of Appleton
City of Brown Deer
City of Elkhorn
City of Fond du Lac
City of Green Bay
City of Janesville
City of Juneau
City of Madison
City of Menasha
City of Milwaukee
City of Pleasant Prairie
City of Sheboygan
City of Two Rivers
Columbia County
Dane County
US EPA
Forest County
LaCrosse County
Milwaukee County
Outagamie County
Public Health Madison and Dane County
Rock County
WI State Lab of Hygiene

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ADMINISTRATIVE RULES
Fiscal Estimate & Economic Impact Analysis

Healthcare
Augusta Health and Rehab - healthcare

Laboratory Services
WI State Lab of Hygiene
Northern Lakes Service
Pace Labs
Stresau Laboratory, Inc.
Test America
Tetratech

Law Firms
Axley-Brynelson
Boardman Clark
Crowell and Moring LLC
Environmental Law and Policy center
Foley Lardner
Foth and Van Dyke
Mayer Brown
Murphy-Desmond
Winthrop and Weinstine

Legislator
State Senator Rob Cowles

Lobbying Firms
Capitol Strategies
Enhesa
Hamilton

Manufacturers
A.P. Nonweiler
Bayer Crop Science
Cedar Corp
Georgia Pacific
Headwaters
John Deere
Perimeter Solutions
Regalware
Regenesis Bioremediation Inc
Signicast Corp
Yamaha -Motor

Mining
Badger Mining Corp

Journalists

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ADMINISTRATIVE RULES
Fiscal Estimate & Economic Impact Analysis

Wispolitics

Nonprofits
American Chemistry Council
Bay-Lake Regional Planning commission
Clean Wisconsin
Cooperative Network
CouleeCap
Crossroads at Big Creek - nature center Heckrodt
Wetland Preserve
International Society of Arboriculture
League of Women Voters
Midwest Environmental Advocates
Minnesota Brownfields
Wisconsin Manufacturing and Commerce
Wisconsin Rural Water Resources
Wisconsin Wetlands
Environmental Law and Policy center

Recyclers
Dynamic Lifecycle Innovations
Lamp Recycling

Utilities
Alliant Energy
Dairyland Power
MGE
WeEnergies
Wood PLC

Attachment C:

Explanation and Assumptions for the Economic Impact Analysis for NR 140 Cycle 10 (Board Order DG-15-19)

Average annual cost over a 5-year permitting cycle: $3,284,171

Maximum 2-year cost: $9,537,243

The proposed rule establishes new and revised groundwater quality standards in ch. NR 140, Wis. Adm. Code. The proposed amendments to ch. NR 140, Wis. Adm. Code, add 13 new state groundwater quality standards and revise 9 existing standards. In accordance with s. 160.07, Wis. Stats., amendments to ch. NR 140, Wis. Adm. Code, groundwater quality standards for substances of public health concern are based on recommendations from the Wisconsin Department of Health Services (DHS).

The proposed rule for new and revised groundwater quality standards are grouped into five categories: Per- and Polyfluoroalkyl Substances (PFAS), Volatile Organic Compounds (VOCs), Metals/Metalloids, Agricultural Chemicals, and Bacteria. PFAS includes new public health related groundwater standards for perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). VOCs includes revised public health related groundwater standards for: trichloroethylene (TCE), tetrachloroethylene (PCE), 1,4-dioxane, and 1,2,3-trichloropropane (1,2,3-TCP). Metals/Metalloids includes new public health related groundwater standards for hexavalent chromium and strontium, and revised public health related groundwater standards for: aluminum, boron, molybdenum, and cobalt. Agricultural Chemicals includes new public health related groundwater standards for: thiamethoxam, imidacloprid, clothianidin, isoxaflutole plus isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, and sulfentrazone, and revised public health related groundwater standards for Dacthal that would include the Dacthal Tetrachloroterephthalic Acid (TPA) and Monomethyl tetrachloroterephthalic acid (MTP) degradates. Bacteria includes new public health related groundwater standards for *Escherichia coli* (*E. coli*) bacteria.

The department solicited information and advice from businesses, associations representing businesses, local governmental units, and individuals that may be economically affected by the regulatory programs that use groundwater standards included in this proposed rule. The department received a total of 8 letters with comments. Comments received pointed out specific requirements of ch. 227, Wis. Stat., that must be included in the rule economic impact analysis (EIA). Comments also suggested that:

- there is not a consistent opinion in the scientific community on the health impacts of PFAS, and that different standards for PFAS have been adopted in other places
- numerical PFAS standards could have net benefits that outweigh costs associated with compliance, as reducing exposure to PFAS compounds in drinking water could reduce potential health care treatment costs and associated losses of economic production and income of those impacted
- PFAS standards could have the benefit of reducing PFAS contaminated groundwater that might be used for livestock or irrigation, therefore reducing the likelihood of PFAS ending up in agricultural products and entering the food chain
- economic impacts of reducing the groundwater standard for TCE, including on additional investigation and remedial actions, need to be better defined, and that lowered TCE standards

could have significant economic impacts on small businesses already remediating TCE in groundwater
- economic impacts of reducing the groundwater standard for 1,4-dioxane, including on additional investigation and remedial actions, need to be better defined
- new groundwater standards for PFOS and PFOA could have significant economic effects on small business remediation and redevelopment sites, construction site dewatering activities, land application of wastewater biosolids and solid waste landfills, and that the economic impacts of proposed PFOS and PFOA groundwater standards need to be better defined
- proposed imidacloprid standards should be based on EPA's imidacloprid assessment and current registration review, and that proposed standards could significantly reduce the use of imidacloprid
- groundwater standards for pesticides could have the benefit of protecting Wisconsin pollinators, as pesticide contaminated irrigation water could adversely affect pollinators and non-target insects

In response to comments received, the department has further evaluated costs specifically associated with new and revised groundwater standards in the proposed rule. The department also reviewed its legal authority to address groundwater contamination at specific types of regulated sites. Additional information on the economic impacts of proposed PFOS and PFOA groundwater standards on the land application of wastewater, and wastewater related solids has been included in the rule EIA. Additional information on the economic impacts of proposed revised TCE and 1,4-dioxane groundwater standards has also been added.

1. Per- and Polyfluoroalkyl Substances (PFAS)

The proposed rule includes new public health-related groundwater standards for perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

1.1. RR regulated release/spill sites

Wisconsin's remediation and redevelopment (RR) 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 and PFOS. When remediating for hazardous substances in groundwater that do not have a ch. NR 140, Wis. Adm. Code standard, responsible parties must propose a site-specific standard, which is usually based on the DHS recommended levels (see s. NR 722.09(2)(b)2., Wis. Adm. Code). When PFOS and PFOA are added to the groundwater standards in ch. NR 140, Wis. Adm. Code, responsible parties will see no change in their cleanup responsibilities. Because the RR program is already regulating these compounds under existing authority as hazardous substances, adding PFOA and PFOS to NR 140 groundwater standards will not add implementation or compliance costs for remediation sites or responsible parties. It may decrease costs for responsible parties, as they will not be required to do additional steps to propose groundwater cleanup standards for PFOA and PFOS.

1.2. Landfills

The department has existing discretion 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. Thus, the

department's existing authority allows for testing of PFOA and PFOS, regardless of whether the substances are included in NR 140 groundwater standards.

1.3. Pit trench dewatering

Pit trench dewatering is discharged to surface water, not groundwater. Costs for dewatering discharges to surface waters are being considered as part of proposed rule WY-23-19, which adds PFOA and PFOS to Wisconsin's surface water quality standards. Adding PFOS and PFOA to groundwater standards is not expected to add costs for pit trench dewatering projects because, in the department's experience with dewatering projects in urban areas, construction site managers that need to dewater a large site tend to propose to pump large volumes groundwater out of the construction site area and then discharge it to a surface water either directly or through a storm sewer or sanitary sewer. Because the purpose of dewatering projects at construction sites in urban areas is to remove groundwater from an area, the department has not seen, and does not expect to see, a proposed dewatering project where large volumes of PFOS or PFOA contaminated ground water would be immediately discharged back to the groundwater. This would make dewatering ineffective. Small dewatering projects that are low volume that may be temporarily contained and possibly discharged to groundwater are not expected to impact groundwater standards, and the vast majority of dewatering projects small or large are not pumping water contaminated with PFOA or PFOS. The promulgation of a PFOA or PFOS groundwater standard is therefore not expected to have impacts.

1.4. WPDES permitted discharges

Facilities regulated by the department that discharge under a Wisconsin Pollutant Discharge Elimination System (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/application system is considered a potential discharge to groundwater, and therefore a potential discharge to waters of the state. Industrial and municipal wastewater land treatment/application 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 (ESs), and to prevent exceedance of ch. NR 140 groundwater quality preventive action limits (PALs) to the extent technically and economically feasible.

WPDES permits are reissued every 5 years. Generally, requirements related to sampling and reducing PFOA/PFOS 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 groundwater standards go into effect.

The department anticipates that some municipal and industrial wastewater treatment facilities may have PFOA/PFOS in the liquid wastewater and/or solids, or sludges, discharged under a WPDES permit to the land surface or groundwater through a land treatment/application system. The department has reviewed effluent sampling results in Wisconsin and information compiled by the State of Michigan, to evaluate the possibility that PFOS/PFOA in discharged liquid wastes or solids/sludges might result in the attainment or exceedance of proposed PFOS and PFOA groundwater quality standards. Based on this evaluation, the department has determined that certain categories of industrial facilities are likely to generate or handle liquid or solid/sludge waste that contains PFOS/PFOA, or are likely to be contributing PFOS/PFOA containing wastes to a publicly owned treatment works (POTW).

The department anticipates requiring PFOS/PFOA discharge sampling in WPDES permits for industrial facilities that are likely to generate or handle liquid or solid/sludge waste containing PFOS/PFOA and that discharge through a land treatment/application system or POTW. Although the department has existing authority under the WPDES rules to require, on a case-by-case basis, that a permittee sample for a pollutant that the department believes may be present in a discharge, the promulgation of a PFOA and PFOS groundwater standard may result in more regular monitoring of potential PFOA and PFOS wastewater sources to determine if land application/treatment activities would potentially exceed the PFOA and PFOS groundwater standards.

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

1.4.1. Industrial facilities that discharge liquid wastewater or biosolids through 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.[1] After a review of EGLE's Standard Industrial Classification (SIC) codes of industries with significant PFAS levels, the department identified 18 industrial facilities, from the department's data base of industrial facilities with an individual or general WPDES permit, as potential sources of PFOS/PFOA.

One facility on the list is a paper and packaging manufacturer that has land application outfalls in its WPDES permit, but review of the facility land application data shows that the facility has not land applied sludge for the past 10 years. Therefore, this facility is not expected to be affected by proposed PFOS/PFOA groundwater standards. Three of the facilities on the list primarily handle food processing waste, which the FDA has indicated are not likely sources of PFOA/PFOS. Eight facilities are "waste haulers" that accept municipal biosolids and land apply liquid and/or solid/sludge waste. The department has included these eight industrial facilities in section 1.4.3., which addresses municipal biosolids compliance costs.

Thus, the department anticipates that 6 of the 18 identified industrial facilities, including paper and packaging manufacturers and centralized waste treatment facilities, may be impacted by the proposed PFOA and PFOS standard as they are permitted to discharge liquid and/or solid waste, such as papermill sludge or industrial wastewater, that may contain PFOS/PFOA at levels that may attain or exceed proposed PFOS/PFOA groundwater standards.

As stated above, the department anticipates that approximately 20% of permitted facilities would be affected every year for the first 5 years after proposed PFOA/PFOS groundwater standards go into effect. The department anticipates that these facilities would be required to test for PFOA/PFOS in their effluent 4 times per year.

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[1] "*Identified Industrial Sources of PFOS to Municipal Wastewater Treatment Plants*" document, dated August 2020.

Unlike most surface water dischargers, land application or land treatment of wastewater is not a continuous discharge activity. The anticipated cost for PFOA/PFOS analysis for a wastewater sample is $600/sample. Source control/reduction measures may be required if sampling indicates that PFOA/PFOS levels are high enough to cause exceedances of groundwater standards.

1.4.1.1. Paper and packaging manufacturers that currently land apply biosolids (5 entities)

Five paper and packaging manufacturers have land application outfalls in their WPDES permits which they currently utilize. Because the land applied waste from these facilities may contain PFOS/PFOA at levels that may attain or exceed the proposed PFOS/PFOA groundwater standards, the department expects to require sampling of the land-applied sludge for PFOS and PFOA 4 times per year. The facility cost for this sampling is estimated to be $600/sample, for a total cost of $2,400 per year for each facility.

1.4.1.2. Centralized waste treatment facilities that discharge industrial liquid waste through an absorption/seepage pond land treatment system (1 entity)

This industrial facility discharges liquid waste to an absorption/seepage pond land treatment system. Because the discharged waste may contain PFOS/PFOA at levels that may attain or exceed proposed PFOS/PFOA groundwater standards, the department expects to require sampling of the liquid waste being discharged to the land treatment system for PFOS and PFOA 4 times per year. The cost to sample is estimated at $600/sample, for a total cost of $2,400 per year.

The department also anticipates requiring this facility to conduct quarterly sampling of groundwater monitoring wells (8 wells anticipated) at their land treatment system site. The cost to sample groundwater for PFOS and PFOA is expected to be $300/sample (current WI State Laboratory of Hygiene (SLH) cost to analyze a water sample for PFOS and PFOA). The total annual cost for quarterly groundwater sampling for PFOS and PFOA is therefore expected to be $9,600.

1.4.1.3. Implementation and compliance costs

Table 1 below summarizes the industrial facilities that the department anticipates will be impacted by the proposed PFOS/PFOA groundwater standards.

Table 1: Number of Industrial Facilities Impacted (that discharge liquid wastewater or solids/sludges through a land application/treatment system)

Industrial facilities that discharge liquid wastewater or solids/sludges through a land application/treatment system	
Paper and Packaging Manufacturers that currently land apply sludge	5
Centralized Waste Treatment Facility that discharges industrial liquid waste through an absorption/seepage pond land treatment system	1
Total	**6**

As discussed previously, the department anticipates that approximately 20% of these entities (1 to 2 entities out of 6) will have their WPDES discharge permit reissued each year. WPDES discharge permits for the impacted facilities that are reissued after the proposed PFOS/PFOA groundwater standards go into effect will require effluent sampling each year over a 5-year period to assess compliance with PFAS standards. Table 2 below presents the assumed permit schedule sequence used for the purpose of this EIA. It is based on the proportions of industry categories presented in Table 1 above.

Table 2: Permitting Schedule for Impacted Industrial Facilities (discharge liquid wastewater or solids/sludges through a land treatment system)

Industrial facilities that discharge liquid wastewater or solids/sludges through a land treatment system						
	Number of Entities	Year 1	Year 2	Year 3	Year 4	Year 5
Paper and Packaging Manufacturers that currently land apply sludge	5	1	1	1	1	1
Treatment Facility that discharges industrial liquid waste through an absorption/seepage pond land treatment system	1	1				
Total	**6**	**2**	**1**	**1**	**1**	**1**

1.4.1.3.1. Costs of Sampling

The sampling cost presented below in table 4 reflects the average sampling cost for each type of industrial facility and the number of entities assumed to be impacted each year in table 2 above. The sampling cost assumes that in any year all entities requiring permit review will sample effluent (and ground water if required). Note, for Paper and Packaging Manufacturers an additional facility would be permitted every year until all 5 are permitted and sampling, but only one treatment facility discharging through an absorption/seepage pond is expected to be required to sample. Therefore, in any year, sampling costs are expected to range between $14,400 and $24,000.

1.4.1.3.2. Costs of potential treatment, best management practices, and responses

In addition to sampling costs, the department must estimate the total number of WPDES permitted facilities that may potentially have levels of PFOA or PFOS in their land applied or land treated wastes that would result in additional facility costs for treatment, best management practices (BMPs), or alternative application methods. To account for the unknown of which type of entity may exceed the groundwater PFOA/PFOS standard in any given year, the department estimated the potential cost for a typical industry in each of the two categories of entities listed in table 1 above.

1.4.1.3.2.1. Potential Compliance Cost 1: Paper and packaging manufacturers that land apply biosolids and exceed groundwater PFOA/PFOS standards

Based on the department's experience, the costs for these facilities to reduce PFOA/PFOS land application loading rates to ensure that PFOA/PFOS groundwater standards are not exceeded includes:

a) Cost of mobilizing and transporting a portion of their sludge meant for their existing land spread area to other land areas to limit PFOA/PFOS loading on existing land. This additional cost is approximately $30,000 per year per entity impacted. This is a 12% - 20% increase in transportation/hauling cost per year.
b) Cost related to soliciting landowners who would be willing to take the sludge and potential costs of obtaining department approval for such new sites. This cost is estimated at approximately $25,000 per facility per year.
c) Cost for consultant, and for modelling of spreading sites, to determine acceptable spreading rates is estimated to be approximately $17,500 per entity per year.

For paper and packaging manufacturing entities that currently land apply sludge, the estimated compliance cost for existing facilities to take actions (reduce PFOA/PFOS land application loading rates by obtaining access to additional application sites/acreage) to comply with PFOA/PFOS groundwater standards is estimated to be $72,500 per entity per year.

1.4.1.3.2.2. Potential Compliance Cost 2: Centralized waste treatment facilities that discharge industrial liquid waste through an absorption/seepage pond land treatment system and exceed PFOA/PFOS groundwater standards

This category of industrial waste treatment facilities would have to install treatment to reduce PFOA/PFOS levels. The likely treatment option for these facilities would be granular activated carbon (GAC) systems. There is only one facility in this category in the state. Using the flow rate of the potential entity that may be impacted (20 gpm), the cost of treatment using a GAC system is presented in table 3 below.

Table 3: Treatment Cost for Centralized Waste Treatment Facility

Annual Treatment Cost for Industrial PFAS Source (20 gpm Facility)		
	1st Year of Operation	Per Year After 1st Year
One-Time Treatment System Installation Cost	$70,000	-
Annual Operational Costs for Installed Treatment (recurring)	$379,852	$379,852
Total	**$449,852**	**$379,852**

1.4.1.3.2.3. Total Cost Scenarios (impacted industrial facilities that discharge liquid wastewater or biosolids through a land application/treatment system)

The following compliance cost range assumes two possible scenarios:

Scenario A: All facilities that require reissuance of its WPDES permit each year do not exceed the PFOA/PFOS groundwater standard (Table 4 below). Sampling cost is the only compliance cost incurred.

Scenario B: At least one facility in each identified industrial category (paper and packaging manufacturers and treatment facilities that discharge through absorption/seepage pond) would be both sampling and

taking action/treatment to reduce PFOA/PFOS in their discharge to assure that proposed PFOA/PFOS groundwater standard are not attained or exceeded in any year.

Table 4 below shows Scenario A, which assumes that none of the potentially impacted facilities would likely exceed PFOA/PFOS groundwater standards, so only sampling would be required. In any year, the maximum and minimum compliance cost ranges between $14,400 - $24,000.

Table 4: Scenario A: Compliance cost of impacted industrial facilities that discharge liquid wastewater or solids/sludges through a land treatment system (sampling only - no likely exceedance of PFOA/PFOS)

Industrial facilities that discharge liquid wastewater or solids/sludges through a land treatment system						
	Maximum Number of Entities Per Year	Year 1	Year 2	Year 3	Year 4	Year 5
Paper and Packaging Manufacturers that currently land apply sludge ($600 * 4 times per year)	1	$2,400	$4,800	$7,200	$9,600	$12,000
Treatment Facility that discharges industrial liquid waste through an absorption/seepage pond land treatment system ($600 * 4 times per year)	1	$2,400	$2,400	$2,400	$2,400	$2,400
Treatment Facility that discharges industrial liquid waste through an absorption/seepage pond - groundwater monitoring 8 wells ($300 * 8 wells * 4 times per year)	1	$9,600	$9,600	$9,600	$9,600	$9,600
Total		**$14,400**	**$16,800**	**$19,200**	**$21,600**	**$24,000**

For Scenario B, it is assumed that two industrial facilities (at least one in each identified category, Paper and Packaging Manufacturers & Treatment Facilities that discharge through absorption/seepage pond) might exceed the PFOA/PFOS groundwater standard in any year. A combination of possible outcomes was compared to identify the minimum and maximum compliance costs in any year, over the first 5 years of the rule.

The combination that yielded the minimum compliance cost per year (sampling plus action/treatment costs in any of the first 5 years) was in the first year of the assumed 5 year permitting cycle (see Table 2). In this year it is assumed that one paper and packaging manufacturing facility and one treatment facility discharging through an absorption/seepage pond would be both sampling and taking action/installing treatment to reduce PFOA/PFOS in their discharge. The total costs then would be: sampling = $14,400 (per Table 4), the cost for a paper and packaging manufacturing facility to take action to reduce PFOA/PFOS land application loading = $72,500, the cost for treatment facility that discharges through an absorption/seepage pond to install and operate a treatment system = $449,852 (per Table 3). The total first year costs, that yielded the minimum compliance cost per year, was then = $536,752.

The combination that yielded the maximum compliance cost per year (treatment and sampling cost in any of the years in the first 5 years) was in the fifth year of the assumed 5 year permitting cycle (see Table 2). In this year it is assumed that five paper and packaging manufacturing facilities and one treatment facility discharging through an absorption/seepage pond would be both sampling and taking action/operating a treatment system to reduce PFOA/PFOS in their discharge. The total year five costs then would be: sampling = $24,000 (per Table 4), the cost for 5 paper and packaging manufacturing facilities to take action to reduce PFOA/PFOS land application loading = $362,500 (5*$72,500), the annual cost for

treatment facility that discharges through an absorption/seepage pond to operate a treatment system = $379,852 (per Table 3). The total fifth year costs, that yielded the maximum compliance cost per year, was then = $766,352.

Table 5: Comparison of estimated compliance cost for industrial facilities that discharge liquid wastewater or solids/sludges through a land treatment system under scenarios A and B

Comparison of Compliance Costs under Scenarios A and B		
	Maximum in any Year	Minimum in any Year
Scenario A: PFOA/PFOS Sampling Costs only	$24,000	$14,400
Scenario B: Total Costs related to PFOA/PFOS	$766,352 *	$536,752 *
Range of Potential Compliance Cost (Total Per Year)	**$14,400 - $766,352 per year**	

*includes sampling costs

1.4.2. Municipal wastewater treatment facilities that discharge treated wastewater through a land treatment/application system (7 facilities total)

The department evaluated municipal wastewater treatment facilities that discharge treated effluent to groundwater through a land treatment/application system. The department queried the internal System for Wastewater Applications, Monitoring, and Permits (SWAMP) for all publicly owned treatment works (POTW) that discharge effluent to groundwater. Based on the results of this query, the department identified 7 POTWs with at least one significant industrial user (SIU) contributing flow to their discharge. Without effluent data to the contrary, the department assumes that these facilities may be discharging wastewater that could potentially cause an exceedance of PFOA/PFOS groundwater standards, and therefore could potentially be impacted by the proposed rule. The department expects that POTWs without an SIU that discharge to groundwater will not be impacted by this rule because department sampling in 2021 of WPDES-permitted facilities found no (0 of 21) POTWs without an SIU had effluent with PFOA and PFOS concentrations exceeding the proposed groundwater enforcement standard of 20 ng/L.

In order to reasonably estimate the potential impacts for municipal wastewater facilities with SIUs, the department evaluated its data for POTWs with a surface water discharge that had at least one significant industrial user and did not have an industrial pretreatment program. Approximately 12% (4 of 33) of the POTWs in this category which were sampled by the department were discharging wastewater effluent above the proposed PFOA/PFOS groundwater enforcement standard. Assuming a similar percentage (12%) applies to the 7 municipal wastewater treatment facilities identified above, only 1 facility is anticipated to be discharging wastewater effluent above the proposed PFOA/PFOS groundwater enforcement standard.

The department anticipates requiring the 7 identified municipal wastewater treatment facilities to sample effluent for PFOS and PFOA for the first two years after their permit becomes effective in order to evaluate the exact concentrations of PFOS and PFOA in the effluent being discharged through the land treatment/application system. Of the 7 facilities, one facility has a surface water outfall as its primary discharge outfall (discharges to their seepage cell only during emergencies) and is therefore included in the surface water quality standard rule EIA and is not included in this EIA. Two facilities discharge at flows greater than 1 million gallons per day (MGD), and four discharge at flows less than 1 MGD. The department expects to require the two facilities with the greater flow to sample every other month

(6x/year), and to require the four facilities with the smaller flow to sample quarterly (4x/year).* The cost to sample wastewater effluent for PFOS and PFOA is estimated to be $600/sample, for a total facility cost of $2,400 - $3,600 per year for the first two years after permit reissuance.

The one facility assumed to be discharging wastewater effluent above the proposed PFOA/PFOS groundwater enforcement standard may be required to sample their land treatment/application system site groundwater monitoring wells for PFOS and PFOA to assess compliance with proposed PFOS/PFOA groundwater standards. The cost to sample groundwater for PFOS and PFOA is expected to be $300/sample (current State Lab of Hygiene cost to analyze a water sample for PFOS and PFOA). Assuming a municipal wastewater treatment facility discharging through a land treatment/application system will have at least 3 land treatment/application site monitoring wells, and be required to sample quarterly, the total annual facility cost for groundwater sampling for PFOS and PFOA is estimated to be $3,600.

The department anticipates that the impacted municipal wastewater treatment facility will identify the source of PFOA/PFOS in its incoming wastewater and require an identified PFOA/PFOS source facility to install treatment before accepting the waste. For the purpose of this EIA, the department assumes that a single industrial source has an average flow rate of 10 gpm (flow rate based on the department's data of potential industrial sources discharging to a POTW). Based on this assumed flow rate, the compliance cost of a granular activated carbon treatment system was estimated as part of the compliance cost for the industry identified as the source of PFOS/PFOA exceedance to the POTW.

Compliance Cost: The department estimates the total compliance cost for this category of entities ranges from $6,000 - $434,126 per year for the municipal waste facility and its industrial user. This compliance cost range takes into account both possibilities, that the potentially impacted facility does not discharge effluent that might potentially exceed the PFOA/PFOS groundwater enforcement standard, and that the entity does discharge effluent that might exceed the PFOA/PFOS groundwater enforcement standard.

If the potentially impacted facility does not discharge effluent with PFOA/PFOS levels that might potentially exceed the PFOA/PFOS groundwater enforcement standard, sampling cost would be the only compliance cost incurred. The department anticipates that wastewater effluent would be sampled 4 times per year for a cost per year of $2,400 (4 * $600/sample), and that groundwater sampling of 3 monitoring wells, 4 times per year would be required, for a cost per year of $3,600 (4 * 3 wells * $300/sample).

If the potentially impacted facility does discharge effluent with PFOA/PFOS levels that might potentially exceed the PFOA/PFOS groundwater enforcement standard, the department anticipates that in addition to sampling costs incurred by the treatment facility, an identified industrial PFOA/PFOS source would have to install treatment to reduce their PFOA/PFOS contribution to the treatment facility's wastewater influent. Those treatment costs are estimated to include a onetime cost of $70,000 to install the treatment system, and annual treatment system operating costs of $358,126 per year.

Tables 6a and 6b below summarize the anticipated compliance cost scenarios for municipal waste facilities and their industrial users.

Table 6a: Compliance Cost for Industrial PFOA/PFOS Source Treatment System (Granular Activated Carbon Treatment)

Annual Treatment System Cost for Industrial PFAS Source (10 gpm Facility)*		
	1st Year of Operation	Per Year After 1st Year
One-Time Treatment System Installation Cost	$70,000	-
Annual Operational Costs for Treatment System (recurring)	$358,126	$358,126
Total	**$428,126**	**$358,126**

*WDNR consulted a number of consultants on treatment cost

Table 6b: Compliance Cost of Municipal Wastewater Treatment Facilities that discharge treated wastewater through a land treatment/application system (includes industrial source treatment to reduce PFOA/PFOS)

Compliance Cost Scenarios		
	Year 1	Per Year After Year 1
Municipal Waste Facility Costs - effluent sampling	$2,400	$2,400
Industrial PFOA/PFOS Source Treatment System Costs	$428,126	$358,126
Groundwater Sampling Costs ($300 * 3 wells * 4 times/year)	$3,600	$3,600
Total Costs (if effluent PFOA/PFOS levels > groundwater standard)	$434,126	$364,126
Total Costs (if effluent PFOA/PFOS levels< groundwater standards)	$6,000	$6,000
Range of Potential Compliance Cost (Total Per Year)	**$6,000- $434,126 per year**	

*WDNR consulted a number of consultants on treatment cost

1.4.3. Municipal wastewater treatment facilities that land apply biosolids and waste haulers that accept municipal biosolids

The management and land application of biosolids is regulated through the WPDES permit program and this subsection of the EIA is based on costs that may be incurred through that permit program. With municipal wastewater treatment plants (publicly owned treatment works or "POTW"), PFOA/PFOS primarily comes into the treatment plant from industrial sources that send wastewater to the plant for treatment. When a POTW treats the wastewater from industries and residences through a mechanical treatment system, it produces both a liquid wastewater that may contain PFOS/PFOA and is subsequently discharged to surface waters, and it also produces a solid or semisolid or semi-liquid sludge referred to as biosolids that is either land applied (pollutants can reach groundwater) or it is sent to another contractor or facility for further treatment, land application, or disposal. The liquid wastewater that is discharged to surface water is addressed in the EIA for the proposed PFOA/PFOS water quality standard rule. This EIA covers costs associated with the recycling or land application of biosolids. The land application of biosolids requires WPDES permit coverage.

Biosolids facilities evaluated within this section of the EIA include the following:

- Publicly owned wastewater treatment works (POTWs) that land apply biosolids including Class B, non-EQ biosolids and provide distribution of EQ biosolids.
- POTWs that dispose of biosolids into a land licensed landfill
- POTWs that send biosolids to POTWs to be further treated
- POTWs that send biosolids to permitted WPDES contractors who mix biosolids with either other biosolids or with other wastes to create a mixture which is later land applied.
- Industrial wastewater treatment facilities that do not meet the biosolids exemption of s. NR 204.02(1)(b)5., Wis. Adm. Code
- WPDES permitted contractors that collect and mix (combine) biosolids with other biosolids and/or with other wastes.

A number of facilities were excluded from this analysis because they either meet exemptions under s. NR 204.02(1)(b)5., Wis. Adm. Code, incinerate their biosolids, or mix biosolids with other regulated wastes. The department does not anticipate these entities will be impacted by this rule because they are unlikely to generate biosolids that contains significant levels of PFOS or PFOA or there is no discharge to groundwater.

1.4.3.1. Permitting and initial detection

Reissued WPDES permits will focus on monitoring wastewater and, if necessary, require activities such as monitoring biosolids should wastewater show it is necessary. If a biosolid sample contains elevated concentrations of PFAS, then a permitted facility that generates or manages biosolids may need to take additional measures to reduce concentrations of PFOS and PFOA, including source identification/reduction, storing biosolids, applying sludge to more acreage, or in some limited situations, finding alternative methods of disposing of biosolids.

As stated above, WPDES permits have five year permit terms. The department reissues approximately 20% of the total number of individual WPDES permits in any given year. This section of the analysis is based on the staggered permit reissuance cycle, which results in staggered costs for permitted facilities throughout the state. The highest estimated costs for two consecutive years over the estimated WPDES permit reissuance schedule is $5,998,733. The average annual cost over the estimated WPDES permit reissuance schedule (9 years) is approximately $1,671,111 (see Table 3).

The department anticipates that municipal wastewater treatment facilities (WWTFs) that have potential industrial contributors of PFAS, or are near a contamination site, may need to sample for PFOA/PFOS in their incoming wastewater. If the incoming wastewater shows no signs of PFOA or PFOS, then treatment in the effluent prior to discharge would not be necessary, and no additional measures to prevent exceedances of a PFOS and PFOA groundwater standard would be needed with regard to the handling and application of biosolids generated at the wastewater treatment facility.

If the incoming sewage has detectable amounts of PFOA or PFOS, then the WWTF would need to assess the appropriate management options by determining if the effluent and biosolids also have detectable levels of PFOA and PFOS. It is likely that many facilities will continue to monitor wastewater and potentially biosolids if there is an indication of PFOS/PFOA impact to the biosolids.

Biosolids monitoring for PFOS/PFOA compounds is necessary for those WWTFs with industrial wastewater contributors that are potential PFOA/PFOS sources and for WWTFs that are located near PFAS contaminated sites to determine potential impacts on biosolids management. Nearly 85 percent of biosolids generated in Wisconsin is beneficially used as a soil amendment and nutrient source through land application and distribution.

1.4.3.2. Assumptions and considerations

1.4.3.2.1. Reduction of PFAS through voluntary measures

The department is aware that source identification of PFAS in wastewater is currently underway at some WPDES permitted facilities and indirect dischargers (that send wastewater to a permitted WWTF) in Wisconsin. In many cases, source reduction measures are already being implemented by these facilities.

1.4.3.2.2. Interim recommendations for land application of biosolids containing PFAS

The department anticipates that the WPDES permit program that regulates the land application of biosolids may propose rules in the future to implement the PFOA and PFOS groundwater standards, as required by s. 160.19, Wis. Stat. For purposes of completing this EIA, the department will evaluate permitted facilities with potential PFOA/PFOS sources that generate biosolids on a case-by-case basis and will include permit terms using existing regulatory statutory authority and interim recommendations until future amendments to administrative rules are promulgated. Future rules are outside the scope and authority of this proposed rule.

The department anticipates it will primarily focus on:

- Sample and analyze biosolids suspected to contain PFAS prior to land application, pursuant to existing authority in s. NR 204.06(2)(b)9, Wis. Adm. Code.
- PFAS analytical results from biosolids sampling will dictate the level of source identification and reduction efforts. While PFAS sources are often associated with industrial manufacturing, other sources, including some commercial businesses have the potential to substantially contribute PFAS loading to WWTFs.
- Communicating PFAS concentrations in biosolids with the landowner and/or farmer receiving biosolids.

At the request of WWTFs in the state, the department is in the process of developing an interim recommendation to help WWTFs evaluate when their biosolids have concentrations of PFOA and PFOS at levels of public health concern. This will help WWTFs determine when it is appropriate to identify/reduce PFAS influent wastewater sources to the plant, and provide factors to consider when land application will not pose public health risks, and provide information for WWTFs to consider as to whether biosolids management procedures should be modified to protect public health (i.e. not cause exceedances of groundwater standards). Modified management procedures may include expanding land application acreage or disposing of biosolids in another manner or implementing additional treatment of biosolids.

1.4.3.2.3. Make-up of WWTFs

The department anticipates that smaller WWTFs that lack a robust pretreatment program may be more likely impacted (i.e. have higher concentrations of PFOA or PFOS in biosolids) from a single industrial or commercial source of PFOA and PFOS sending wastewater to the treatment system compared to larger

WWTFs. This is because larger WWTFs treat larger, more diverse wastewater streams and therefore, the larger WWTFs' higher volume of discharge dilutes the concentration of PFOA and PFOS. A smaller WWTF with a single PFOS or PFOA industrial contributor will discharge a higher concentration on PFOA or PFOS per gallon of wastewater. Also, larger WWTFs often will have economies of scale relating to costs, resulting in less cost per user.

1.4.3.2.4. Number of estimated WWTFs potentially impacted by PFOA and PFOS groundwater standards

In predicting the number of potentially impacted facilities, the department relied on best professional judgment based on information shared between Michigan and Wisconsin, information and samples collected by the department from Wisconsin's WPDES-permitted facilities that have known PFAS issues, and modeling for sites based on statewide application of various inputs related to land application.

1.4.3.3. Recommendations for PFOA and PFOS levels at landspreading sites

The department is developing recommendations for biosolids that contain PFOS and PFOA and are land applied. To determine whether a WWTF permitted facility that generates biosolids containing PFOA or PFOS may land apply the biosolids to a particular field without causing an exceedance of the proposed groundwater standards and posing a public health risk, the department has to model the fate and transport of PFOS and PFOA in biosolids through the soil to groundwater. The department is developing interim recommendations using the United States Environmental Protection Agency PRZM model. The goal of the modeling effort was to ensure that the recommended groundwater enforcement standard level of 20 nanograms per liter (ng/L), or parts per trillion (ppt), for combined PFOA and PFOS was not exceeded. The department's PRZM modelling effort considered PFOS/PFOA chemical soil transport parameters, soil properties, Wisconsin meteorological data, cropping/land use, surface runoff, depth to groundwater, and irrigation impacts.

In addition to the model, the interim recommendations use PFAS data collected by Michigan. In its current drafting stage, the interim recommendations use a screening approach for concentrations of PFOA and PFOS in biosolids that the department may consider on a case-by-case basis when determining whether additional terms and conditions are necessary in a particular permit to protect groundwater. These interim recommendations include a summary list of actions recommended for WWTFs and other biosolids generators for follow up:

- Concentrations of <u>≥150 ug/kg PFOA/PFOS combined</u>
    - Designate as industrially impacted biosolids
    - Ongoing sampling of effluent discharge and biosolids
    - Determine sources and implement PFOS/PFOA source reduction
    - Hold biosolids in storage
    - Arrange for alternative treatment or disposal of biosolids
- Concentrations of <u>>50 to <150 ug/kg PFOA/PFOS combined</u>
    - Ongoing sampling of effluent discharge and biosolids
    - Determine sources and implement PFOS/PFOA source reduction

  - Reduce land application rates to approximately 1.5 dry tons or less per acre or alternatively submit to the department for approval an alternative risk mitigation strategy in an updated biosolids management plan
  - Provide analytical PFOS/PFOA data to landowner and farmer
  - Track all land application of biosolids and corresponding concentrations and PFOS/PFOA loadings
  - Consider alternative treatment or disposal of biosolids
- Concentrations >20 to <50 ug/kg PFOA/PFOS combined
  - Sample effluent discharge and biosolids
  - Determine sources and implement PFOS/PFOA source reduction
  - In some cases, potentially reduce land application rates to 1.5 dry tons or less per acre or alternatively submit to the department for approval an alternative risk mitigation strategy in an updated biosolids management plan
  - Provide analytical PFOS/PFOA data to landowner and farmer
  - Track all land application of biosolids and corresponding concentrations and PFOS/PFOA loadings
- Concentrations <20 ug/kg PFOA/PFOS combined
  - Sample effluent discharge and biosolids for a period of time

On a case-by-case basis using existing statutory and regulatory authority, the department may impose additional conditions or restrictions on land application activities in permits for WWTF or contractors that land apply biosolids if there are elevated levels of PFOA/PFOS in the biosolids that are stored/land applied and it is determined necessary to prevent an exceedance of the PFOA/PFOS groundwater standard. The department, using the model, will take into account the variability of concentrations in the biosolids generated by the permitted facility, the type of soils on the fields used, depth to groundwater, location of nearby water supply sources, etc. when establishing terms and conditions. The department has existing regulatory authority to sample for PFOA/PFOS in chapter NR 204, Wis. Adm. Code, if the department believes it may be present in the biosolids.

1.4.3.4. Cost of implementation and compliance

Biosolids have historically been beneficially used as nutrient sources and as soil amendments. Historically, WWTFs have had to implement pre-treatment measures to ensure the biosolids (end product) are safe for bulk land application. Ensuring that PFOS and PFOA concentrations are minimal within biosolids will require WWTFs to build on their existing pretreatment programs independently and/or through assistance with the DNR.

The department anticipates that if PFOS/PFOA substances are found in their biosolids, WWTFs will demand that generators stop contaminating the WWTF's biosolids products. Many WWTFs are implementing PFAS sampling and source identification programs, as well as working with specific industries and individual generators to implement PFOS/PFOA reduction/elimination from wastewater being treated at the WWTF.

The following provides background information that is helpful to understanding the impact of PFOS/PFOA groundwater standards:

- Each WWTF collects wastewater from a wide variety of sources. While domestic wastewaters (e.g. sewage residences) in communities are somewhat similar from WWTF to WWTF, the industrial contribution to the wastewater collected significantly differs depending upon the characteristics of the industry and the pre-treatment program employed by that WWTF.
- While each WWFT uses similar processes such as preliminary treatment, primary treatment, secondary (biological) treatment, disinfection and some sort of biosolids treatment, WWTFs often have differing equipment and differing sets of circumstances at their location.
- The majority of WWTFs land apply their biosolids as non-EQ (non-exceptional quality) biosolids. Others employ more sophisticated treatment (Class A pathogen treatment) so that the biosolids (referred to as EQ product) can be distributed to the public by selling it as fertilizer (bagged products), selling to contractors and farmers in bulk, and through giveaway programs oftentimes located at their WWTF facilities.
- Farmers in many cases choose to use biosolids for the cost/benefits associated. Free or reduced cost nutrients, organic carbon for soil amendments, and sometimes liming potential, all contribute to a farmer's the acceptance of biosolids on fields. If PFOS/PFOA concentrations in biosolids become an issue for farmers in the future, this may result in fewer farmers accepting biosolids for land application. This may force WWTFs to locate application land further away (increasing transportation and application costs), lease additional land or, in some cases, purchase land. This may occur even if the groundwater standards are not promulgated.
- Predicting trends of PFOS/PFOA concentrations in wastewater, and corresponding trends of PFOS/PFOA concentrations in biosolids, is challenging given the number of wastewater and biosolid samples collected and analyzed to date.

In estimating the cost of PFOA and PFOS groundwater standards for WWTFs, it is important to note that certain assumptions must be made. Conclusions and further assumptions are made using best professional judgement. The purpose of this document is to present best available information at this time so that decision makers can utilize the information moving forward.

1.4.3.4.1. Assumptions and considerations

- PFOS and PFOA have been voluntarily removed from industrial use in the United States for several years, and therefore, significant PFOS and PFOA concentrations in wastewater is primarily a legacy issue and is not expected to be found in significant concentrations at most WWTFs. However, as seen at some Michigan industrial facilities, generators that once discharged wastewater at high levels of PFOS/PFOA continue to discharge wastewater with PFOS/PFOA even after the use of PFOS/PFOA were discontinued. While the discharge has lower concentrations of PFOS/PFOA, these generators are still contributing to PFOS/PFOA being received at WWTFs and potentially impacting biosolids.
- When PFOS/PFOA concentrations in wastewater are higher, it is expected that the biosolids will be impacted as well. Sampling is required to determine the impact PFOS/PFOA has on biosolids.
- The level of PFOS/PFOA concentrations in biosolids will determine if land application can proceed using current practices, or if the land application practices must be modified or if

biosolids need to be stored until additional treatment and/or disposal options are evaluated and implemented.

- It is expected that liquid biosolids impacted by high concentrations of PFOS/PFOA will, in some instances, require dewatering and potentially dedicated storage at the WWTF, or approved offsite storage. Further, it is expected that many options for disposing of biosolids with high concentrations of PFOS/PFOA may require dewatering as a prerequisite to long distance transportation and/or disposal.
- Disposal options could include landfilling or incineration.
- Land application of biosolids at most facilities will likely not require significant modifications if the wastewater and biosolids are shown to have low concentrations of PFOS/PFOA.
- Some facilities may address PFOS/PFOA issues as follows.
    - If farmers decide to no longer accept biosolids onto their lands, WWTFs may have to identify additional fields, contract for the use of these fields, and even purchase lands for land application activities.
    - Some WWTFs may consider abandoning their current land application program and:
        - Landfilling their biosolids;
        - Working with other facilities to incinerate their biosolids;
        - Further treating their biosolids to reduce storage, transportation, and application costs;
        - Require industrial PFAS contributors to pretreat or take source reduction actions, such as removing legacy PFAS contamination (by replacing pipes, treatment systems, etc.) or changing products.
- Once significantly impacted PFOS/PFOA biosolids are treated and/or applied, additional monitoring of wastewater and generated biosolids will be necessary at the WWTF. This continued monitoring is to ensure proper source reductions continue and that newly generated biosolids is not impacted by PFOS/PFOA.
- In some cases, it is expected that WWTFs may not be able to reduce PFOS/PFOA concentrations immediately and will continue to generate biosolids that has PFOS/PFOA concerns. Newly generated biosolids may need to continue to be handled and disposed as significantly impacted PFOS/PFOA biosolids in lieu of land application.
- Modeling assumptions were based on statewide conservative values. An individual WWTF with moderate concentrations may be able to modify the inputs into a modeling program such as PRZM to show that land application may continue unchanged or with slight modifications.
- Data provided to the department to date has shown that the large WWTFs, that generate large amounts of biosolids, appear to not have issues with PFOS/PFOA in their biosolids at this time.
- Mid-sized and smaller WWTFs appear most likely to generate biosolids that is moderately to significantly impacted by PFOS/PFOA. Industrial and commercial dischargers to these WWTFs can significantly impact biosolids concentrations.

1.4.3.4.2. Estimated number of wastewater treatment facilities with contaminated biosolids

According to 2019 department data collected from WWTFs annual reports:

- Approximately 240 WWTFs reported biosolids land application activities.
- Approximately 170 WWTFs reported their biosolids to be hauled to another facility for treatment.
- Approximately 15 WWTFs reported distributing EQ biosolids.
- One facility reported to incinerate biosolids.

Note that the mass of biosolids land applied from facilities can be variable and that not all WWTFs that land apply biosolids will land apply each year. Some WWTFs alternate land application each year. Some WWTFs intermittently land apply and dispose of biosolids based on the type of treatment at the WWTF, such as reed beds and lagoons.

The number of WWTFs that have impacted biosolids were estimated by department biosolids staff using best professional judgement after reviewing data from the department's database, including reviewing wastewater and biosolids data from individual WWTFs, along with extensive discussions with wastewater operators and other wastewater professionals including consultants and other state/federal regulators.

Known PFOA or PFOS contamination*:* To date, Wisconsin has had three WWTFs that have had moderately or more significantly impacted by PFOA or PFOS contamination in their biosolids. One wastewater sewage lagoon system was impacted with AFFF foam from a military installation and two WWTFs were impacted by industrial processes for generating AFFF foam and similar materials.

Last year, the department contacted WPDES permitted WWTFs potentially receiving PFOS/PFOA impacted wastewater and suggested screening of wastewater at the facilities to help identify potential issues and help limit the number of facilities having to deal with PFOS/PFOA impacted biosolids. The department estimates that approximately 14 additional WWTFs will possess biosolids with concentrations of PFOS/PFOA that are "significant" or "moderate", where extensive treatment or more costly disposal methods will be needed.

Potential economic impacts to mid-size and large wastewater treatment facilities*:* Data provided to the department to date shows that larger WWTFs have minimal PFOS/PFOA concentrations in their biosolids. The department anticipates that with robust pretreatment programs there will be few economic impacts to larger WWTFs.

Potential economic impacts to small wastewater treatment facilities*:* The department estimates that biosolids from smaller WWTFs that have an industrial source that has PFOA/PFOS will be impacted by elevated concentrations of PFOS/PFOA because these facilities often do not operate a pretreatment programs, and the size of the WWTF relative to the potential of having a PFOS/PFOA generator/user, makes it likely for additional actions to be required to reduce concentrations of PFOA/PFOS or modification in biosolid management activities. Therefore, the economic impact may be significantly higher for smaller WWTFs with PFOS/PFOA an industrial contributor.

1.4.3.4.3. Additional estimated number of wastewater treatment facilities with contaminated biosolids

***Significantly impacted facilities*:** Based on review of annual biosolids reports and department biosolids experts best professional judgement, the department estimates approximately 4 additional facilities will need to address significant biosolids issues related to PFOS/PFOA. These situations may require additional treatment to the biosolids and/or very specific or highly specialized disposal methods until the industrial contribution of PFOA/PFOS is better controlled or minimized. The department estimates that the WWTF size is limited to small (<100 dry tons per year) or medium sized (100 to <1000 dry tons per year) facilities. If the WWTF desires to land apply after significant source reduction, it is likely that additional sites will need to be secured.

***Moderately impacted facilities*:** Based on review of annual biosolids reports and department biosolids experts best professional judgement, the department estimates that 10 additional facilities will need to address moderate levels of PFOS/PFOA in their biosolids. This could include modifying processes within the WWTF to hold biosolids, blend biosolids, create more storage, acquire more acreage, etc. to provide more time for the WWTF to determine an appropriate treatment/disposal solution. The department estimates that the size of WWTFs with moderate PFOS/PFOA levels in their biosolids is limited to small (<100 dry tons per year) or medium sized (100 to <1000 dry tons per year) facilities. If land application continues from these facilities, additional sites will be required in addition to necessary source reduction measures.

***Low, but impacted facilities*:** Based on review of annual biosolids reports and department biosolids experts best professional judgement, the department estimates that 20 additional WWTF will be impacted with relatively low levels of PFOS/PFOA in their biosolids. Some of these facilities will likely require additional land application sites.

***Low impact*:** Based on review of annual biosolids reports and department biosolids experts best professional judgement, the department estimates that an additional 40 may require periodic wastewater monitoring and potentially need some source reduction.

Table 7 Anticipated Number of WWTFs Impacted

Entity Thresholds	PFOS/PFOA Concentration in Biosolids	Number of WWTFs
SIGNIFICANT	>150 ug/kg	4
MODERATE	150 to >50 ug/kg	10
LOW, BUT IMPACTED	50 to >20 ug/kg	20
LOW	≤20 ug/kg	40

1.4.3.4.4. Total estimated costs for wastewater treatment facilities with PFOA or PFOS contamination

When WWTFs determine through sampling that they have biosolids that contain PFOS/PFOA, each WWTF may be required, on a case-by-case basis, to:

- More frequently monitor biosolids for continued PFOS/PFOA impacts.
- Initiate source identification of PFOS/PFOA in the collection system
- Initiate source reduction and elimination of PFOS/PFOA in the collection system.
- Determine if land application of biosolids can be done in a manner that is cost effective and protective of public health, and if so, further determine the application rates. If application rates dictate, additional lands may need to be required for land application of biosolids.

The department predicts that there would be a greater number of smaller facilities economically impacted, therefore the estimated average costs per facility were adjusted to reflect the greater distribution of smaller WWTFs compared to larger WWTFs in Wisconsin.

Cost of monitor biosolids for PFOA and PFOS: Costs to monitor PFOS/PFOA in biosolids are not included in this EIA because, pursuant to s. NR 204.06(2)(b)9., Wis. Adm. Code, the department has existing authority to require a permittee test their biosolids for any pollutant that may endanger public health. Regardless of ch. NR 140, Wis. Adm. Code groundwater standards, the department may require PFOA and PFOS biosolids testing if a permitted WWTF's biosolids are believed to have high levels of PFOS/PFOA.

Source identification: Monitoring and investigative activities that will help identify PFOS/PFOA contributions from industrial dischargers to the WWTF are estimated to range from $25,000 for a very small facility to $250,000 or more for larger facilities.

Source reduction/elimination programs: In some instances, source reduction can be simply identifying the source and asking commercial and industrial facilities to review their inventory of chemicals and requesting changes. In much more complex situations such as a complex industrial process, a specific process or chemical may need to be modified for individual industrial facilities, or legacy PFAS contaminated piping or storage may need to be removed. Where WWTFs collect sewage from much larger areas, many more industries may be impacted. Estimated costs to reduce PFOS/PFOA is $5,000 to $500,000 over a 5-year permit period.

Facilities with low but impacted PFOA or PFOS biosolids: Many WWTFs may have low but impacted PFOS/PFOA concentrations of biosolids. The resulting impacts to the individual WWTF will only likely be limited to land application activities after source identification and limited source reduction measures are taken.

In these situations, WWTFs may need to identify additional land application acreage. In these circumstances it is estimated that 10 percent more acres may be needed. While these acres may not be purchased, but used with cooperation of the landowner, the estimated range of costs is $5,000 to $25,000 per WWTF per year.

Storage and alternative treatment and disposal: Costs for storing biosolids ranges from using existing onsite storage when unused capacity exists to locating offsite storage. Additionally, storage could consist of additional dewatering and storing cake storage. The department estimates storage and/or dewatering to cake biosolids for storage to be $5000 to $250,000 in the first year of storage with a reduction in the following year to a maximum of $100,000.

Costs relating to additional treatment and/or alternative disposal of biosolids, such as in a Type 3 landfill or through incineration, are estimated at between $25,000 to $1,250,000, depending upon the size of the

WWTF, the volume of biosolids impacted, the extent of impacted biosolids and how quickly industry and the WWTF are able to reduce continued PFOS/PFOA sources into the WWTF. Given the high costs of these alternative disposal methods, WWTFs will more likely find other options for management and treatment of PFOS/PFOA contaminated biosolids.

Tables 2 and 3 provide cost ranges and summaries with the following assumptions and determinations:

- The PFOS/PFOA groundwater standards are established relatively soon (months as opposed to years). WPDES permits in queue to be processed will include PFOS/PFOA compliance permit language. It is likely that 6-12 months may elapse between the groundwater standard being established and finally reissuing WPDES permits with terms and conditions to prevent exceedances of the PFOA/PFOS groundwater standards.
- Cumulative costs are provided in Table 8.
- Each year, approximately 1/5 of the total number of WWTF WPDES permits will be reissued. WPDES permits will be reissued based on expiration dates of current WPDES permits. As WPDES permits expire, the permits will then include the new PFAS related sludge requirements.
- POWT's biosolids WPDES permits may include additional PFAS related requirements (PFAS source identification/reduction, biosolids testing, storing and alternative treatment/disposal if PFAS concentration determined to be significant, communication with farmers/landowners, department notification and modification of biosolids management plan), including those permits that currently have limited requirements because the sludge is hauled to a different facility for additional biosolids treatment. The purpose of the additional requirements is to identify potential problems at, or very close to, the source of the PFAS issue.
- The interim recommendations for land application of biosolids containing PFAS will be finalized for WWTFs prior to the next spreading season (Spring/Fall) when biosolids testing dictates. WPDES permitted POTWs asked for these recommendations regardless of whether they will voluntarily used by a POTW, or if the groundwater standard is promulgated, they will be used by the department when considering terms and conditions to include in a WPDES permit on a case-by-case basis to prevent exceedances of the PFOA/PFOS groundwater standard from the land application of biosolids that contain elevated levels of PFOA/PFOS.
- Table 9 breaks estimated costs out over five years for each of the WPDES permit reissuances which are based on five year roll out of reissued permits. The two consecutive years that have the highest costs are predicted in year 5 ($2,951,267), and year 6 ($2,934,000). Estimated costs for two consecutive years is $5,885,267 total across years 5 and 6 (see Table 9).

Table 8. Estimated Cost of Compliance for Each Compliance Category

Compliance Categories	Anticipated Year in Permit cycle	est.* is estimated due to number of facilities that are smaller than larger calculated as: [(high-low)/4+low]			Number of Facilities			
					SIGNIFICANT >150 ug/kg	MODERATE 150 to >50 ug/kg	LOW, BUT IMPACTED 50 to >20 ug/kg	LOW ≤20 ug/kg
		RANGE			4	10	20	40
		low	est.*	high	est.*	est.*	est.*	est.*
Monitor Wastewater	Year 1	500.00	1,166.67	2,500.00	4,666.67	11,666.67	23,333.33	46,666.67
Source Identification	Year 2	2,500.00	85,000.00	250,000.00	340,000.00	850,000.00	1,700,000.00	
Source Reduction/Elimination	Year 3	5,000.00	170,000.00	500,000.00	680,000.00	1,700,000.00	3,400,000.00	
(note, Source Reduction/Elimination Includes capital and operating costs)								
Acquire More Sites	Year 2	5,000.00	11,666.67	25,000.00	46,666.67	116,666.67	233,333.33	
Store Biosolids (Temporary) – Year 3	Year 3	5,000.00	86,666.67	250,000.00	346,666.67	866,666.67		
Store Biosolids (Temporary) – Year 4	Year 4	2,500.00	35,000.00	100,000.00	140,000.00	350,000.00		
Treat/Alt Disposal (One Time)	Year 5	25,000.00	433,333.33	1,250,000.00	1,733,333.33	2,166,666.67		

Table 9: Costs Spaced Over 5 Year Rotating WPDES Permit Renewals w/Cumulative Expenses For Each Year

	COSTS SPACED OVER 5 YEAR ROTATING WPDES PERMIT RENEWALS W/CUMULATIVE EXP FOR EACH YEAR								
	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	YR 9
Monitor Wastewater	$17,267	$17,267	$17,267	$17,267	$17,267				
Source Identification		$578,000	$578,000	$578,000	$578,000	$578,000			
Source Reduction/Elimination			$1,156,000	$1,156,000	$1,156,000	$1,156,000	$1,156,000		
Acquire More Sites		$79,333	$79,333	$79,333	$79,333	$79,333			
Store Biosolids (Temporary) Year 3			$242,667	$242,667	$242,667	$242,667	$242,667		
Store Biosolids (Temporary) Year 4				$98,000	$98,000	$98,000	$98,000	$98,000	
Treat/Alt Disposal (One Time)					$780,000	$780,000	$780,000	$780,000	$780,000
Total Cost	$17,267	$674,600	$2,073,267	$2,171,267	$2,951,267	$2,934,000	$2,276,667	$878,000	$780,000

2. VOCs

Proposed amendments to ch. NR 140, Wis. Adm. Code, would add revised groundwater quality standards for: trichloroethylene (TCE), tetrachloroethylene (PCE), 1,4-dioxane and 1,2,3-trichloropropane (1,2,3-TCP).

2.1. Trichloroethylene (TCE)

At all remedial action sites where TCE is present, tetrachloroethylene (PCE) is also present. TCE and PCE are already included in ch. NR 140 Adm. Code standards. The Cycle 10 DHS recommendations and the proposed rule decrease the existing TCE standard and increase the existing PCE standard. Generally, the cost of remediation at a remediation and redevelopment (RR) site is determined more from the cost of

PCE remediation than of TCE remediation. The proposed PCE groundwater standards will yield a cost savings for responsible parties at sites where TCE and PCE are present. However, the department anticipates certain specific TCE related costs at remedial action sites.

2.1.1. Open RR sites

2.1.1.1. Site investigation costs

The department evaluated potential additional site investigation costs associated with the proposed TCE groundwater standards for open, active RR sites where TCE is a contaminant of concern. There are 517 open, active RR sites with TCE tracked as a contaminant of concern. Depending on the site conditions, a responsible party is tasked with defining the degree and extent of contamination. In a minority of RR sites with larger amounts of TCE in the groundwater, additional wells may be necessary to define the degree and extent of contamination.

The department is using a conservative estimate that 25% of the 517 active open TCE sites (129 sites) will need additional monitoring wells and monitoring to complete a site investigation. Assuming an additional 3 monitoring wells at 20-foot depth are necessary at each site, at $4,000 per monitoring well for installation, with 8 rounds of sampling efforts and labor amounting to $4,800 per well, the total cost per site would be $26,400. For the estimated 129 sites, the total cost is $3,405,600. Assuming the average RR site takes 15 years to complete cleanup, the average per year cost is $227,040.

2.1.1.2. Remedial action costs

The most common actions to address TCE contamination include installation of a vapor mitigation system and in situ remediation at the source. Regarding vapor mitigation systems, there will be no added costs per year because entities are already installing these systems where required. Regarding the in-situ source reduction, some sites will incur more upfront costs for treatment chemicals to implement the remedy over a longer period.

The department is using a conservative estimate that 25% of the 517 active open TCE sites (129 sites) will need additional source reduction or in-situ remediation. An average cost for a TCE remedy is approximately $200,000 (using data from the Dry Cleaning Environmental Fund grant program sites). Assuming conservatively that the lower TCE groundwater standard increases the costs of in-situ remediation by 15% at the 129 TCE sites, the cost is approximately $3,870,000. Assuming the average remedial action cleanup takes 15 years, the average per year cost of these additional remedial action costs is $258,000.

2.1.2. Closed RR sites

2.1.2.1. Number of sites that would be reopened

The department evaluated the potential costs associated with reopening closed sites. Section NR 727.13(1), Wis. Adm. Code allows the department to require additional response actions, including monitoring, for any case which has previously been closed by the department if information regarding site or facility conditions indicates that contamination on, or from, the site or facility poses a threat to public health, safety, or welfare, or the environment. If new information like groundwater sampling results are shared with the department, it may consider reopener criteria and exercise discretion to re-open or not re-open a case.

Of the 27,863 closed sites tracked by the RR database, only 132 sites (0.47%) have been reopened in the history of the program. And of the 27,863 closed sites, 754 had TCE. Only10 sites (0.034%) in the history

of the program have been reopened due to the presence of TCE. Of the 754 TCE closed sites, approximately 4 RR sites would be reopened using the general reopener rate (.0047 reopener rate x 754 closed sites), or approximately 0 RR sites would be reopened if we use the TCE rate (.000359 reopener rate x 754).

2.1.2.2. Cost for reopened sites

Assuming the conservative estimate of 4 reopened RR sites, all 4 would require additional site investigation work. The department assumes that only 1 of the 4 (25%) would need additional source reduction or remedial action work. The estimated costs for 4 reopened sites is $ 135,600 ((4 sites x $26,400 additional investigation cost/site) + (1 site x $30,000 additional source reduction/remedial action costs/site)). Additional site investigation and additional source reduction/remedial action would not be expected to all be implemented in the same year. Assuming the average remedial action cleanup takes 15 years, the maximum per year cost of additional site investigation and additional source reduction/remedial action work is $9,040.

2.1.3. New RR sites

Because TCE is already included in the NR 140 groundwater standards, the department does not anticipate more new sites because of the proposed lower TCE groundwater standards, beyond the number RR sites estimated to be opened under the existing standards. The department anticipates that the lower TCE groundwater standards will not require additional site investigation because new RR sites may use existing techniques to monitor for the lower level of TCE over the same area.

As stated above, the department estimates source reduction or remedial action to cost an additional $30,000 for in-situ remedies. The department averages 165 new sites per year based on a five-year average. Assuming conservatively that 20% of the 165 new sites have TCE, there will be 33 new RR sites with TCE, with a total cost of $990,000 attributable to the lower TCE groundwater standard. Assuming a 15 year average to close an RR site, the cost will be $66,000 per year.

Table 10: Summary of TCE Compliance Cost

Cost Category	Number of Sites	Total Cost Over 15 Years	Average Cost Total Cost Per Year
Estimated re-opened R&R TCE sites that will require additional site investigation (Conservatively assumed 100% of RR Reopen rate)	4	$105,600.00	$ 7,040.00
Estimated re-opened R&R TCE sites that may require additional source reduction or remedial action (Conservatively assumed 25% of RR Reopen rate)	1	$ 30,000.00	$ 2,000.00
Estimated opened R&R TCE sites that require additional site investigation (Conservatively assumed 25%)	129	$ 3,405,600.00	$ 227,040.00
Estimated opened R&R TCE Sites that may require additional source reduction or remedial action (Conservatively assumed 25%)	129	$ 3,870,000.00	$ 258,000.00
Estimated additional cost to future R&R TCE Sites (Potential Increase in Source Control Cost)	33	$ 990,000.00	$ 66,000.00
Total		**$ 8,401,200**	**$ 560,080**

2.2. 1,4-Dioxane

2.2.1. Open RR sites

There are 627 open RR sites associated with chlorinated solvents and TCE. In a 2012 United States Air Force study evaluating associations of contamination with chlorinated solvents, 17% of all remedial

action sites associated with TCE and chlorinated solvents were associated with 1,4-Dioxane. This percentage is a conservative value for remedial action sites in Wisconsin. Based on this study, the department estimates that approximately 107 open RR sites involve 1,4-Dioxane.

2.2.1.1. Site investigation costs

For site investigations, most responsible parties can determine the degree and extent of contamination for 1,4-Dioxane without increasing the number of monitoring wells already necessary for a particular RR site. The department conservatively estimates 25% of open RR sites (26 sites) with 1,4-Dioxane will need additional wells and monitoring to complete a site investigation. An additional 3 monitoring wells at 20-foot depth will cost $4,000 per monitoring well for installation, with 8 rounds of sampling and labor, totaling $4,800 per well. Three monitoring wells at 26 sites will cost approximately $686,400. The average RR site cleanup takes 15 years, so the average per year cost of the additional site investigation costs is $45,750.

2.2.1.2. Remedial action costs

The department expects the most common remedy for a 1,4-Dioxane remediation to be in-situ or ex-situ chemical oxidation. Some sites will incur additional treatment costs related to increased volume of chemical oxidation materials and costs related to additional applications necessary to achieve the lower clean up levels. Using an estimate of 25% of the active open 1,4-Dioxane RR sites, 26 sites will need additional remediation. Assuming an average cost for a 1,4-Dioxane remedy is approximately $200,000 and that the new 1,4-Dioxane groundwater standards increase the costs of remediation by 15% at these 26 RR sites, the added cost is approximately $780,000. Assuming the average RR site cleanup takes 15 years, the average per year cost is $52,000.

2.2.2. Closed RR sites

2.2.2.1. Number of reopened RR sites

The department evaluated the potential costs associated with reopening closed sites. Section NR 727.13(1), Wis. Adm. Code allows the department to require additional response actions, including monitoring, for any case which has previously been closed by the department if information regarding site or facility conditions indicates that contamination on, or from, the site or facility poses a threat to public health, safety, or welfare, or the environment. If new information like groundwater sampling results are shared with the department, it may consider reopener criteria and exercise discretion to re-open or not re-open a case.

Of the 27,863 closed RR sites tracked by the RR database, only 132 sites (0.47%) have been reopened in the history of the program. There are 0 sites in the history of the program have been reopened due to the presence of 1,4-Dioxane.

Based on the 2012 United States Air Force study evaluating associations of contamination with chlorinated solvents, 17% of all remedial action sites associated with TCE and chlorinated solvents are assumed associated with 1,4-Dioxane. This percentage is a conservative value for remedial action sites in Wisconsin. Of the 27,863 closed RR sites, the department estimates that 2,679 are associated with TCE and chlorinated solvents, therefore 455 closed case are estimated to be associated with 1,4-Dioxane (2,679 sites x 17%). Applying the 0.47% reopener rate described above to these 455 closed RR sites, 2 sites would be reopened due to the lower 1,4-Dioxane groundwater standard.

2.2.2.2. Cost of reopened RR sites

Assuming that the 2 RR sites that will be reopened will both require additional site investigation work but that only 1 of the 2 (50%) would need additional source reduction or remedial action work, the estimated costs for 2 reopened RR sites is $82,800 ((2 sites x $26,400 additional investigation cost/site) + (1 site x $30,000 additional source reduction/remedial action costs/site)). Additional site investigation and additional source reduction/remedial action would not be expected to all be implemented in the same year. Assuming the average remedial action cleanup takes 15 years, the maximum per year cost of additional site investigation and additional source reduction/remedial action work is $5,520.

2.2.3. New RR sites

Because 1,4-Dioxane is already included in the NR 140 groundwater standards, the department does not anticipate more new sites because of the proposed lower TCE groundwater standards, beyond the number RR sites estimated to be opened under the existing standards.

The department anticipates that the lower 1,4-Dioxane groundwater standards will not require additional site investigation because new RR sites may use existing techniques to monitor for the lower level of TCE over the same area.

As stated above, the department estimates source reduction or remedial action to cost an additional $30,000 for in-situ remedies. The department averages 165 new sites per year based on a five years of data. Assuming conservatively that 10% of the 165 new sites have 1,4-Dioxane, there will be 17 new RR sites with 1,4-Dioxane, with a total cost of $510,000 attributable to the lower 1,4-Dioxane groundwater standard. Assuming a 15 year average to close an RR site, the cost will be $34,000 per year.

Table 11: Summary of 1,4-Dioxane Compliance Cost

Cost Category	Number of Sites	Total Cost Over 15 Years	Average Cost Total Cost Per Year
Estimated re-opened R&R 1,4-Dioxane Sites that may Require Additional Site Investigation (Conservatively assumed 100% of RR Reopen rate)	2	$ 52,800.00	$ 3,520.00
Estimated Re-Opened R&R 1,4-Dioxane Sites that may Require Additional Source Reduction or Remedial Action (Conservatively assumed 50% of RR Reopen rate)	1	$ 30,000.00	$ 2,000.00
Estimated Opened R&R 1,4-Dioxane Sites that may Require Additional Site Investigation (Conservatively assumed 25%)	26	$ 686,400.00	$ 45,760.00
Estimated Opened R&R 1,4-Dioxane Sites that may Require Additional Source Reduction or Remedial Action (Conservatively assumed 25%)	26	$ 780,000.00	$ 52,000.00
Estimated Additional Cost to Future R&R 1,4-Dioxane Sites (Potential Increase in Source Control Cost)	17	$ 510,000.00	$ 34,000.00
Total		**$2,059,200.00**	**$137,280.00**

3. Metals/Metaliods

Proposed amendments to ch. NR 140, Wis. Adm. Code, would add new groundwater quality standards for: hexavalent chromium and strontium, and revised groundwater quality standards for: aluminum, boron, molybdenum, and cobalt.

3.1. Hexavalent chromium

Wisconsin's RR 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. According to s. NR 722.09(2)(b)2, Wis. Adm. Code, for evaluating groundwater for hazardous substances at a remedial action cleanup, responsible parties may utilize a recommended ch. 140 standard from Wisconsin DHS if no ch. NR 140 standard exists.

The RR program is already regulating hexavalent chromium as a hazardous substance and responsible parties are currently able to cleanup to these recommended values. Therefore, adding hexavalent chromium to NR 140 groundwater standards will not create implementation or compliance costs for remediation sites or responsible parties.

3.2. Aluminum boron, molybdenum, and cobalt

Review of existing groundwater standards for the metals/metalloids aluminum, boron, molybdenum, cobalt, and barium was requested because these inorganic substances are associated with coal combustion residuals (CCR). Revised groundwater quality standards were recommended by DHS for aluminum, boron, molybdenum, and cobalt. The department does not expect significant economic impact related to revised groundwater standards for these substances.

Required sampling parameters and frequency under ch. NR 507, Wis. Adm. Code, for CCR landfills will not change as a result of revised groundwater standards for aluminum, boron, molybdenum, and cobalt, as the department will not require additional sampling for these substances. The department does not expect required site remediation costs to change significantly, as remediation costs for sites are based on a number of factors in addition to groundwater quality standards.

4. Agricultural Chemicals

Proposed amendments to ch. NR 140, Wis. Adm. Code, would add new groundwater quality standards for the agricultural pesticides and pesticide degradation products: thiamethoxam, imidacloprid, clothianidin, isoxaflutole, isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, Dacthal TPA and MTP degradates, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, and sulfentrazone.

The creation of a groundwater standard under ch. NR 140, Wis. Adm. Code, does not compel any end user of a pesticide to change their existing use patterns or application rates. Based on this information, it is difficult for the department to determine the economic impact of these rule changes on agricultural and commercial/residential users of pesticides. Uses and application rates for pesticides are determined by the U.S. Environmental Protection Agency (EPA) and the pesticide registrant through the EPA's Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 3 labeling process.

The creation of groundwater standards under ch. NR 140, Wis. Adm. Code, does not affect labels for any pesticides included in this proposed rule. Consequently, any changes in use patterns that might result from promulgation of the proposed groundwater standards would only occur through voluntary changes in use. It is difficult to estimate how many end users of these pesticides might change their use patterns, but it is likely that some end users may voluntarily do so out of concern for water quality.

The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) samples for agricultural pesticides in groundwater in field edge monitoring wells and in private water supply wells. DATCP has detected most of the agricultural chemicals for which new groundwater quality standards

are proposed in field edge monitoring wells and, to a much lesser extent, in private water supply wells. Except for imidacloprid, all detected concentrations for the pesticide compounds in this rule have been less than their DHS recommended Preventive Action Limits (PALs).

DATCP sampling programs collect and analyze samples from private wells statewide on an annual basis to meet the requirements of ch. 160, Wis. Stat. DATCP anticipates an increase in the number of private drinking well samples it will collect in response to the proposed rule. Under its sampling programs, whenever a sample from a private well exceeds an Enforcement Standard (ES) for a pesticide, DATCP returns to collect a verification sample. Once the ES exceedance has been verified, DATCP collects additional samples from homes near the impacted well to assess the extent of the impact and to evaluate a response action and any administrative controls that may be necessary to regain compliance with the ES in the area effected. DATCP estimates collection and analyses of an additional 10 samples annually for the compound imidacloprid following promulgation of the proposed rule, at a cost to the state of $2,660 per year. DATCP assumptions related to this cost estimate are: 2 hours of staff time per sample, at $52 per hour labor with fringe (2h)($52)(10s/yr) = $1,040/yr; travel and equipment expenses of $12 per sample ($12)(10s/y) = $120/yr; DATCP Bureau of Laboratory Services (BLS) cost of $150 per sample ($150)(10s/y) = $1,500/yr.

DATCP BLS currently analyzes water samples for the agricultural chemicals for which new groundwater quality standards are proposed and would not need to develop new test methods. BLS does not provide public testing services. DATCP intends to absorb the anticipated increase in cost within its existing segregated fund spending authority. This will be accomplished through a realignment of other sampling work.

5. Bacteria

Proposed amendments to ch. NR 140, Wis. Adm. Code, add new groundwater quality standards for *Escherichia coli* (*E. coli*) bacteria. *E. coli* bacteria is a type of coliform bacteria used as an indicator of fecal contamination in groundwater. Groundwater quality standards currently exist in ch. NR 140 for total coliform bacteria. The department does not anticipate significant economic impacts related to establishing groundwater quality standards for *E. coli* bacteria. Any exceedance of standards for *E. coli* bacteria would already be an exceedance of existing total coliform bacteria standards.

2/7/2022

The statement of scope for this rule, SS 090-19, was approved by the Governor on August 27, 2019, published in Register No. 765A1 on September 3, 2019, and approved by the Natural Resources Board on January 22, 2020. This rule was approved by the Governor on date.

ORDER OF THE STATE OF WISCONSIN NATURAL RESOURCES BOARD
AMENDING RULES

The Wisconsin Natural Resources Board adopts an order to **amend** NR 140.10 Table 1, 140.20 Table 3 and Appendix I to Table 1 relating to setting numerical standards to minimize the concentration of polluting substances in groundwater and affecting small business.

DG-15-19

Analysis Prepared by the Department of Natural Resources

1. Statute Interpreted:
Chapter 160, Wis. Stat., including sections 160.001, 160.07, 160.11, 160.13, 160.15, 160.19, Wis. Stat., and 281.15, 281.19(1), and 299.11, Wis. Stats., authorize the department to modify and create rules relating to development of numerical groundwater quality standards.

2. Statutory Authority:
Sections 160.07(5), 160.15(1), 160.19, 281.15, 281.19(1), and 299.11, Wis. Stats.

3. Explanation of Agency Authority:
Chapter 160, Wis. Stats., establishes an administrative process for developing numerical state groundwater quality standards to be used as criteria for the protection of public health and welfare by all state groundwater regulatory programs. Chapter 160, Wis. Stats., directs the department to use this administrative process to establish numeric groundwater quality standards for substances of public health or welfare concern, found in, or having a reasonable probability of being detected in, the groundwater resources of the state. The department is required to engage in rulemaking for all substances of public health concern for which the Wisconsin Department of Health Services (DHS) develops enforcement standard recommendations. S. 160.07(5), Wis. Stat. The department is also required to establish by rule preventative action limits for all substances with enforcement standards. S. 160.15(1), Wis. Stat.

Section 281.15, Wis. Stat., states that the department shall promulgate rules setting standards of water quality, applicable to the waters of the state, that protect the public interest, including the protection of public health and welfare, and the present and prospective future use of such waters for public and private water systems. Section 281.19(1), Wis. Stat., grants the department the authority to issue general orders and adopt rules applicable throughout the state for the construction, installation, use and operation of practicable and available systems, methods and means for preventing and abating pollution of the waters of the state.

In accordance with ch. 160, Wis. Stat., the reliability of sampling data is to be considered when determining the range of responses that a regulatory agency may take, or require, to address attainment or exceedance of a state groundwater quality standard at an applicable "point of standards application." Section 299.11, Wis. Stat., authorizes the department, in conjunction with the Department of Agriculture Trade and Consumer Protection (DATCP), to establish uniform minimum criteria for laboratories certified to conduct water analysis testing, and to establish accepted methodologies to be followed in conducting tests and sampling protocols and documentation procedures to be followed when collecting water samples for testing.

4. Related Statutes or Rules:
Section 281.12(1), Wis. Stats., grants the department general authority to carry out planning, management and regulatory programs necessary to protect, maintain and improve the quality and management of the waters of the state, ground and surface, public and private.

Chapter 280, Wis. Stats., authorizes the department to prescribe, publish and enforce minimum standards and rules to be pursued in the obtaining of pure drinking water for human consumption. Chapter NR 809, Wis. Adm. Code, establishes minimum state drinking water standards for the protection of public health, safety and welfare. This administrative code contains numeric water quality protection standards applicable to public water supply systems in Wisconsin.

Wisconsin state drinking water standards, applicable to public drinking water systems, have not yet been established for: hexavalent chromium, strontium, thiamethoxam, imidacloprid, clothianidin, isoxaflutole, isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, Dacthal TPA and MTP degradates, glyphosate aminomethylphosphonic acid (AMPA) degradate, sulfentrazone, perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), 1,2,3-trichloropropane (1,2,3-TCP), 1,4-dioxane, boron, molybdenum or cobalt.

Wisconsin state drinking water maximum contaminant levels (MCLs) have been established, in ch. NR 809, Wis. Adm. Code, for: glyphosate, at 700 micrograms per liter (ug/L), *Escherichia coli* (*E. coli*) bacteria, at 0 bacteria present in a drinking water sample, trichloroethylene (TCE), at 5 ug/L, and tetrachloroethylene (PCE), at 5 ug/L. Secondary Standards, established for aesthetic quality, have been promulgated in ch. NR 809, Wis. Adm. Code, for aluminum at 50 to 200 ug/L. Note that concentration in ug/L is equivalent to parts per billion (ppb).

5. Plain Language Analysis:
Chapter 160, Wis. Stat., is Wisconsin's Groundwater Standards Protection law. This chapter requires the department to develop numerical groundwater quality standards, consisting of enforcement standards and preventive action limits. Chapter NR 140, Wis. Adm. Code, establishes groundwater standards. These proposed amendments to ch. NR 140, Wis. Adm. Code, would add new state groundwater quality standards for 17 substances and revise existing standards for another 8 substances. In accordance with s. 160.07, Wis. Stat., amendments to ch. NR 140, Wis. Adm. Code, groundwater quality standards for substances of public health concern are based on recommendations from DHS. DHS's recommendations are available at: https://www.dhs.wisconsin.gov/water/gws-cycle10.htm. The technical analysis supporting each of the recommendations can be found by clicking on the substance.

The proposed rule for new and revised groundwater quality standards are grouped into five categories: Per- and Polyfluoroalkyl Substances (PFAS), Volatile Organic Compounds (VOCs), Metals/Metalloids, Agricultural Chemicals, and Bacteria. PFAS includes new public health related groundwater standards for perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). VOCs includes revised public health related groundwater standards for: trichloroethylene (TCE), tetrachloroethylene (PCE), 1,4-dioxane, and 1,2,3-trichloropropane (1,2,3-TCP). Metals/Metalloids includes new public health related groundwater standards for hexavalent chromium and strontium, and revised public health related groundwater standards for: aluminum, boron, molybdenum, and cobalt. Agricultural Chemicals includes new public health related groundwater standards for: thiamethoxam, imidacloprid, clothianidin, isoxaflutole plus isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, and sulfentrazone, and revised public health related groundwater standards for Dacthal that would include the Dacthal

Tetrachloroterephthalic Acid (TPA) and Monomethyl tetrachloroterephthalic acid (MTP) degradates. Bacteria includes new public health related groundwater standards for *Escherichia coli* (*E. coli*) bacteria.

Minor revisions, to clarify rule language and update rule reference information, are also proposed to ch. NR 140. These revisions include:

- Revising order of Antimony and Anthracene in s. NR 140.10, Table 1 to correct their alphabetical order in the table.
- Removing, in s. NR 140.20, Table 3, the indicator parameter for ammonia nitrogen. Health standards were established for ammonia (as N), in s. NR 140.10, Table 1, as part of the "Cycle 9" revisions to ch. NR 140.
- Making needed additions and revisions to ch. NR 140 Appendix I to Table 1 substance names, Chemical Abstracts Service (CAS) registry numbers, and common synonyms.

6. Summary of, and Comparison with, Existing or Proposed Federal Statutes and Regulations:
The U.S. Environmental Protection Agency (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.

The proposed amendments to ch. NR 140, Wis. Adm. Code, adds new or revised state numeric groundwater quality standards for: PFAS including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA); VOCs including trichloroethylene (TCE), tetrachloroethylene (PCE), 1,4-dioxane, and 1,2,3-trichloropropane (1,2,3-TCP); metals/metalloids including hexavalent chromium, strontium, aluminum, boron, molybdenum, and cobalt; agricultural chemicals including thiamethoxam, imidacloprid, clothianidin, isoxaflutole plus isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, sulfentrazone, Dacthal including the Dacthal Tetrachloroterephthalic Acid (TPA) and Monomethyl tetrachloroterephthalic acid (MTP) degradates; and bacteria including *Escherichia coli* (*E. coli*) bacteria.

Federal drinking water MCLs have been established for: glyphosate (700 ug/L), *Escherichia coli* (*E. coli*) bacteria (0 bacteria present), trichloroethylene (TCE) (5 ug/L) and tetrachloroethylene (PCE) (5 ug/L). EPA cancer slope factors have been established that can be used to determine 1 in 1,000,000 drinking water cancer risk levels. EPA cancer slope factors have been established for: hexavalent chromium [EPA OPP = 0.791 (mg/kg-day)-1, EPA IRIS draft = 0.5 (mg/kg-day)-1], isoxaflutole [0.0114 (mg/kg-day)-1], 1,2,3-trichloropropane (1,2,3-TCP) [30 (mg/kg-d)-1] and 1,4-dioxane [0.01 (mg/kg-d)-1]. EPA LHAs have been established for: strontium (4,000 ug/L), the sum of Dacthal and its degradates (MTP and TPA) (70 ug/L), perfluorooctanoic acid (PFOA) (70 ng/L), perfluorooctane sulfonate (PFOS) (70 ng/L), boron (6,000 ug/L), molybdenum (40 ug/L) and 1,4-dioxane (200 ug/L).

RfDs have been established by EPA for: hexavalent chromium (0.003 mg/kg/day), thiamethoxam (0.012 mg/kg/day), imidacloprid (0.057 mg/kg/day), clothianidin (0.098 mg/kg/day), isoxaflutole (0.02 mg/kg/day), thiencarbazone-methyl (1.17 mg/kg/day), sulfentrazone (0.14 mg/kg/day), 1,2,3-trichloropropane (1,2,3-TCP) (0.004 mg/kg/day) and 1,4-dioxane (0.03 mg/kg/day).

In October 2021, EPA issued a strategic roadmap for PFAS. EPA describes PFAS as an urgent public health and environmental issue that requires increased and sustained action by every level of government

– federal, Tribal, state, and local. EPA's roadmap describes actions EPA plans to take to reduce PFAS in the environment. However, these actions do not include establishing numeric standards for PFAS in groundwater, which is exclusively a state responsibility in Wisconsin.

7. If Held, Summary of Comments Received During Preliminary Comment Period and at Public Hearing on the Statement of Scope:
A preliminary public hearing on Statement of Scope SS 090-19, related to revisions to ch. NR 140, was held on Nov. 12, 2019. Comments on the proposed scope were accepted through Nov. 19, 2019. A significant number of comments were received in support of the proposed scope for ch. NR 140 rulemaking. Comments were also received expressing concerns that the proposed scope did not list the specific substances that would be included in the proposed ch. NR 140 rulemaking effort and was therefore too broad. Those comments suggested that the list of the specific substances for which DHS provided groundwater standard recommendations should be added to the rulemaking scope.

Comments received in support of the proposed scope statement for ch. NR 140 rulemaking primarily focused on potential state groundwater quality standards for PFAS. Comments noted that there are health effects associated with exposure to PFAS compounds and that rules and standards were needed to protect Wisconsin water resources and drinking water supplies. Comments suggested that established groundwater standards for PFAS would provide regulatory certainty to responsible parties for cleanup and remediation at contamination sites. Comments were also received suggesting that, as PFAS are often detected in the environment as a complex mixture of different PFAS compounds, they should be regulated as a "class," or group of chemicals with a similar chemical composition and mechanism of toxicity.

The department provided the DHS with a list of substances, designated the "Cycle 10" list, and requested that DHS review toxicologic information on these substances and, if appropriate, provide recommendations for health-based groundwater quality standards for the substances. Comments on the scope pointed out that the specific substances on the "Cycle 10" list, that DHS provided groundwater standard recommendations for were not listed by name in the scope statement. Comments suggested that this lack of specificity and detail made the scope too broad and potentially noncompliant with state law, and that therefore, the scope should be rejected by the Natural Resources Board and sent back to the department to have the list of the specific substances, for which DHS provided recommendations, added to it. Comments were also received related to the specific scientific studies and methods used by DHS to develop their health-based groundwater standard recommendations.

8. Comparison with Similar Rules in Adjacent States:
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 strontium used by the states surrounding Wisconsin varies by state. The level established in Minnesota is 3,000 micrograms per liter (ug/L), the level established in Michigan is 4,600 ug/L, Illinois has not established a strontium groundwater

protection level, and Iowa uses the federal lifetime health advisory level of 4,000 ug/L as its strontium groundwater protection level.

The state of Minnesota has established state groundwater protection "Health Risk Limits" (HRLs) under Minnesota Statutes Section 103H.201. The state of Minnesota has established HRLs for: hexavalent chromium (100 ug/L), thiamethoxam (200 ug/L), clothianidin (200 ug/L), PFOA (35 nanograms per liter or ng/L), TCE (0.4 ug/L), PCE (5 ug/L), 1,2,3-TCP (7 ug/L) and 1,4-dioxane (100 ug/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. Minnesota has established HBVs for: imidacloprid (3 ug/L), glyphosate (500 ug/L), glyphosate AMPA (1,000 ug/L) degradate and PFOS (20 ng/L). The Minnesota Department of Health also issues Risk Assessment Advice (RAA) levels for some groundwater contaminants. Minnesota Department of Health RAAs are advisory concentrations developed to assist Minnesota agencies in evaluating potential health risks to humans from exposures to a chemical. Generally, RAAs contain greater uncertainty than HRLs and HBVs because the information available to develop them is more limited. The state of Minnesota has established RAAs for: strontium (3,000 ug/L) and boron (500 ug/L).

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). Michigan has established a Drinking Water Criteria/RBSL for: hexavalent chromium (100 ug/L), strontium (4,600 ug/L), glyphosate (700 ug/L), PFOA + PFOS (70 ng/L), TCE (5 ug/L), PCE (5 ug/L), 1,2,3-TCP (42 ug/L) and 1,4-dioxane (7.2 ug/L).

The state of Illinois has established state groundwater quality standards for "potable resource groundwater." Illinois Groundwater Quality Standards are state groundwater protection standards promulgated in 35 Ill. Adm. Code 620, environmental protection regulations. Illinois state "Groundwater Quality Standards for Class I: Potable Resource Groundwater" have been established for: TCE (5 ug/L), PCE (5 ug/L), boron (2,000 ug/L) and 1,4-dioxane (7.7 ug/L).

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, the estimate of one additional cancer case per million people over a lifetime of exposure, and federal drinking water maximum contaminant levels (MCLs) as "Action Levels" in their regulation of practices and activities that may adversely impact groundwater quality. Federal lifetime health advisory levels have been established for: strontium (4,000 ug/L), the sum of Dacthal and its degradates (MTP and TPA) (70 ug/L), perfluorooctanoic acid (PFOA) (70 ng/L), perfluorooctane sulfonate (PFOS) (70 ng/L), boron (6,000 ug/L), molybdenum (40 ug/L) and 1,4-dioxane (200 ug/L). EPA cancer slope factors have been established that can be used to determine NRLs for carcinogens. EPA cancer slope factors have been established for: hexavalent chromium [EPA OPP = 0.791 (mg/kg-day)-1, EPA IRIS draft = 0.5 (mg/kg-day)-1], isoxaflutole [0.0114 (mg/kg-day)-1], 1,2,3-trichloropropane (1,2,3-TCP) [30 (mg/kg-d)-1] and 1,4-dioxane [0.01 (mg/kg-d)-1]. Federal drinking water MCLs have been established for: glyphosate (700 ug/L), *Escherichia coli* (*E. coli*) bacteria (0 bacteria present), trichloroethylene (TCE) (5 ug/L) and tetrachloroethylene (PCE) (5 ug/L).

9. Summary of Factual Data and Analytical Methodologies Used and How Any Related Findings Support the Regulatory Approach Chosen:

In accordance with s. 160.07, Wis. Stat., the department is required, for substances of public health

concern, to propose rules establishing recommendations from DHS as state groundwater quality enforcement standards. In accordance with s. 160.15, Wis. Stat., the department is required to establish by rule a preventive action limit for each substance for which an enforcement standard is established.

To develop proposed groundwater standards, DHS follows the process described in ss. 160.09 to 160.17, Wis. Stat. This includes a review of federal numbers, state drinking water standards, and acceptable daily intake values from the EPA, research studies and a search of peer-reviewed scientific research. DHS then develops a scientific support document describing the findings of their review and basis for the recommended proposed groundwater standards. At the conclusion of its review, DHS provided the department, in a document titled, Recommended Public Health Groundwater Quality Standards, Scientific Support Documents for "Cycle 10" Substances, June 2019, its recommendations for groundwater quality standards for the protection of public health.

DHS recommended new standards for 17 substances: perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), hexavalent chromium, strontium, thiamethoxam, imidacloprid, clothianidin, isoxaflutole, isoxaflutole DKN degradate, isoxaflutole BA degradate, thiencarbazone-methyl, Dacthal TPA and MTP degradates, glyphosate, glyphosate aminomethylphosphonic acid (AMPA) degradate, sulfentrazone, and *Escherichia coli* (*E. coli*) bacteria.

DHS also provided recommendations for revisions to existing public health related state groundwater quality standards for 8 additional substances: trichloroethylene (TCE), tetrachloroethylene (PCE), 1,2,3-trichloropropane (1,2,3-TCP), 1,4-dioxane, aluminum, boron, molybdenum and cobalt.

In response to public comments, DHS revised its groundwater standard recommendation for molybdenum and thiamethoxam. DHS reviewed the 2020 Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profile for molybdenum and additional information provided by the International Molybdenum Association (IMOA). Based on this review, DHS revised its molybdenum recommended enforcement standard to 60 micrograms per liter (µg/L), and its preventive action limit to 6 µg/L (10% of the enforcement standard recommendation).

Public comments on the proposed thiamethoxam groundwater standards suggested that DHS had made a calculation error in its initial recommendation. DHS reviewed its calculations and EPA's 2017 human health risk assessment for the neonicotinoid insecticides, clothianidin, thiamethoxam and dinotefuran. Based on this review, DHS revised its thiamethoxam recommended enforcement standard to 120 µg/L, and its preventive action limit to 12 µg/L (10% of the enforcement standard recommendation).

A public comment was received suggesting that current and proposed groundwater standards for bacteria are not consistent with the public water supply Revised Total Coliform Rule (RTCR). The comment noted that under the RTCR, a public drinking water maximum contaminant level (MCL) has been established for *E. coli* bacteria, but that there is no longer an MCL for total coliform bacteria. The comment suggested creating an indicator parameter for total coliform bacteria, rather than an enforcement standard and preventive action limit, which would be more consistent with the RTCR regulation of bacteria in drinking water. Indicator parameter is more appropriate for total coliform bacteria because it includes bacteria that naturally occur in the environment, are not generally harmful to humans, and the rule proposes groundwater quality standards for *E. coli* bacteria, which is a more specific bacterial indicator of contamination. In light of this comment, the department revised the proposed rule to remove the total coliform bacteria from s. NR 140.10 Table 1, Wis. Adm. Code. The department intends to promulgate in a future rule, indicator parameter groundwater standards for total coliform bacteria pursuant to Wis. Stat. s. 160.15(3).

10. Analysis and Supporting Documents Used to Determine the Effect on Small Business or in Preparation of an Economic Impact Report:
Chapter 160, Wis. Stat., and ch. NR 140, Wis. Adm. Code, do not create independent regulatory authority. The enforcement of state groundwater quality standards is done by state regulatory agencies through regulatory programs that incorporate groundwater protection. State regulatory agencies, in exercising their statutory authority and duties that are established elsewhere in the statutes and administrative rules, establish regulations that assure that regulated facilities and activities will not cause state groundwater quality standards to be exceeded.

After the department establishes groundwater standards in ch. NR 140, Wis. Adm. Code, each state regulatory agency is required to review its administrative rules and amend or create rules necessary to ensure that the activities, practices, and facilities regulated by the regulatory agency complies with the new standards. S. 160.19, Wis. Stat.

The department anticipates that rulemaking activity in other regulatory programs may significantly decrease the cost of this groundwater standards rule. The department is in the process of promulgating a permanent rule adding numeric thresholds for PFOS and PFOA to the surface water quality standards. The surface water quality standards proposed rule includes WPDES permit implementation procedures for source reduction and treatment of PFOS and PFOA in wastewater discharges. Many of the industries and facilities governed by surface water quality standards would also be subject to the changes in this groundwater proposed rule. If the surface water quality rule is promulgated, the department anticipates the implementation and compliance cost of the proposed groundwater rule will substantially decrease. The WPDES permit program may also propose rules amending how the WPDES permit program regulates the land application of biosolids that contain PFOA and PFOS.

Any reasonable estimate of the implementation and compliance costs of this rule will be altered by the statutorily require review and ongoing promulgation of regulatory program rules outside the scope and authority of this rule. To comply with the directive in s. 227.137, Wis. Stat., the department analyzed and provided a detailed quantification of the estimated economic impact of the proposed 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 by the proposed rule, based on the current administrative and statutory authority in the regulatory programs that rely on groundwater standards.

The department economic impact assessment estimated the average annual costs incurred by other regulatory programs and rules is $3,284,171 in any year over a 5-year permitting cycle and $9,537,243 maximum over any two-year period. The table below summarizes the categories of costs incurred for compliance and implementation. The department does not anticipate costs to regulated entities from the addition of standards for metals/metaloids, agricultural chemicals, and bacteria (see sections 3, 4, and 5 of Attachment C to the EIA). A detailed assessment of the estimated compliance cost associated with this rule can be found in the EIA narrative document (Attachment C).

Estimated Average Compliance Cost Per Year

Categories	Average Annual Cost
PFAS	
Industrial and Municipals Wastewater and Industrial solids	$ 1,009,278
Municipal Biosolids	$ 1,577,533

VOC's	
TCE	$ 560,080
1,4 dioxane	$ 137,280
Total Annual cost (In Any Year Average Cost)	**$ 3,284,171**

11. Effect on Small Business (initial regulatory flexibility analysis):
The regulatory programs in state regulatory agencies that use ch. NR 140 groundwater standards may impact small business, particularly groundwater quality standards for VOCs including TCE and PCE. Revisions to these standards may impact small businesses such as dry cleaners whose properties are the sites of spills or releases of these substances and have contaminated groundwater. Revised standards may necessitate additional site monitoring and investigation, and potentially additional compliance response actions. It should be noted that while the proposed standards for TCE are lower than current standards, the proposed PCE standards are higher than the current standards. Therefore, while site investigation and compliance action costs may increase in some cases, they may decrease in others, depending on the contaminant of concern at a specific regulated site. The department estimates $556,008 per year of compliance costs to small businesses.

12. Agency Contact Person:
Gail Good, Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707; gail.good@wisconsin.gov; (608) 219-2690

13. Place where comments are to be submitted and deadline for submission:
A public comment period was held from December 6, 2021 to January 11, 2022. A public hearing was held on January 6, 2022.

RULE TEXT

SECTION 1. NR 140.10 Table 1 is amended to read:

NR 140.10 Table 1

Table 1
Public Health Groundwater Quality Standards

Substance[1]	Enforcement Standard (micrograms per liter - except as noted)	Preventive Action Limit (micrograms per liter - except as noted)
Acetochlor	7	0.7
Acetochlor ethane sulfonic acid + oxanilic acid (Acetochlor - ESA + OXA)	230	46
Acetone	9 milligrams/liter (mg/1)	1.8 mg/1
Alachlor	2	0.2
Alachlor ethane sulfonic acid (Alachlor - ESA)	20	4
Aldicarb	10	2
Aluminum	200	~~40~~ 20
Ammonia (as N)	9.7 mg/l	0.97 mg/l
~~Antimony~~	~~6~~	~~1.2~~
Anthracene	3000	600
Antimony	6	1.2

Arsenic	10	1
Asbestos	7 million fibers per liter (MFL)	0.7 MFL
Atrazine, total chlorinated residues	3[2]	0.3[2]
Bacteria, *E. coli*	0	0
~~Bacteria, Total Coliform~~	~~0[3]~~	~~0[3]~~
Barium	2 ~~milligrams/liter (~~mg/l~~)~~	0.4 mg/l
Bentazon	300	60
Benzene	5	0.5
Benzo(b)fluoranthene	0.2	0.02
Benzo(a)pyrene	0.2	0.02
Beryllium	4	0.4
Boron	~~1000~~ 2000	~~200~~ 400
Bromodichloromethane	0.6	0.06
Bromoform	4.4	0.44
Bromomethane	10	1
Butylate	400	80
Cadmium	5	0.5
Carbaryl	40	4
Carbofuran	40	8
Carbon disulfide	1000	200
Carbon tetrachloride	5	0.5
Chloramben	150	30
Chlordane	2	0.2
Chlorodifluoromethane	7 mg/l	0.7 mg/l
Chloroethane	400	80
Chloroform	6	0.6
Chlorpyrifos	2	0.4
Chloromethane	30	3
Chromium, Hexavalent	70 nanograms/liter (ng/l)	7 ng/l
Chromium (total)	100	10
Chrysene	0.2	0.02
Clothianidin	1000	200
Cobalt	40	~~8~~ 4
Copper	1300	130
Cyanazine	1	0.1
Cyanide, free[4]	200	40
~~Dacthal~~ DCPA (dacthal) + MTP and TPA degradates[5]	70	~~14~~ 7
1,2-Dibromoethane (EDB)	0.05	0.005
Dibromochloromethane	60	6
1,2-Dibromo-3-chloropropane (DBCP)	0.2	0.02
Dibutyl phthalate	1000	100
Dicamba	300	60
1,2-Dichlorobenzene	600	60
1,3-Dichlorobenzene	600	120
1,4-Dichlorobenzene	75	15
Dichlorodifluoromethane	1000	200
1,1-Dichloroethane	850	85
1,2-Dichloroethane	5	0.5
1,1-Dichloroethylene	7	0.7
1,2-Dichloroethylene (cis)	70	7
1,2-Dichloroethylene (trans)	100	20
2,4-Dichlorophenoxyacetic Acid (2,4-D)	70	7
1,2-Dichloropropane	5	0.5

1,3-Dichloropropene (cis/trans)	0.4	0.04
Di (2-ethylhexyl) phthalate	6	0.6
Dimethenamid/Dimethenamid-P	50	5
Dimethoate	2	0.4
2,4-Dinitrotoluene	0.05	0.005
2,6-Dinitrotoluene	0.05	0.005
Dinitrotoluene, Total Residues[5]	0.05	0.005
Dinoseb	7	1.4
1,4-Dioxane	~~3~~ 0.35	~~0.3~~ 0.035
Dioxin (2, 3, 7, 8-TCDD)	0.00003	0.000003
Endrin	2	0.4
EPTC	250	50
Ethylbenzene	700	140
Ethyl ether	1000	100
Ethylene glycol	14 mg/l	2.8 mg/l
Fluoranthene	400	80
Fluorene	400	80
Fluoride	4 mg/l	0.8 mg/l
Fluorotrichloromethane	3490	698
Formaldehyde	1000	100
Glyphosate	10 mg/l	1 mg/l
Glyphosate aminomethylphosphonic acid (AMPA) degradate	10 mg/l	2 mg/l
Heptachlor	0.4	0.04
Heptachlor epoxide	0.2	0.02
Hexachlorobenzene	1	0.1
N-Hexane	600	120
Hydrogen sulfide	30	6
Imidacloprid	0.2	0.02
Isoxaflutole + Isoxaflutole diketonitrile (DKN) degradate	3	0.3
Isoxaflutole benzoic acid (BA) degradate	800	160
Lead	15	1.5
Lindane	0.2	0.02
Manganese	300	60
Mercury	2	0.2
Methanol	5000	1000
Methoxychlor	40	4
Methylene chloride	5	0.5
Methyl ethyl ketone (MEK)	4 mg/l	0.8 mg/l
Methyl isobutyl ketone (MIBK)	500	50
Methyl tert-butyl ether (MTBE)	60	12
Metolachlor/s-Metolachlor	100	10
Metolachlor ethane sulfonic acid + oxanilic acid (Metolachlor - ESA + OXA)	1.3 mg/l	0.26 mg/l
Metribuzin	70	14
Molybdenum	~~40~~ 60	~~8~~ 6
Monochlorobenzene	100	20
Naphthalene	100	10
Nickel	100	20
Nitrate (as N)	10 mg/l	2 mg/l
Nitrate + Nitrite (as N)	10 mg/l	2 mg/l
Nitrite (as N)	1 mg/l	0.2 mg/l
N-Nitrosodiphenylamine	7	0.7

Pentachlorophenol (PCP)	1	0.1
Perchlorate	1	0.1
Perfluorooctanoic acid (PFOA) + Perfluorooctane sulfonate (PFOS)	20 ng/l	2 ng/l
Phenol	2 mg/l	0.4 mg/l
Picloram	500	100
Polychlorinated biphenyls (PCBs)	0.03	0.003
Prometon	100	20
Propazine	10	2
Pyrene	250	50
Pyridine	10	2
Selenium	50	10
Silver	50	10
Simazine	4	0.4
Strontium	1500	150
Styrene	100	10
Sulfentrazone	1000	100
Tertiary Butyl Alcohol (TBA)	12	1.2
1,1,1,2-Tetrachloroethane	70	7
1,1,2,2-Tetrachloroethane	0.2	0.02
Tetrachloroethylene (PCE)	~~5~~ 20	~~0.5~~ 2
Tetrahydrofuran	50	10
Thallium	2	0.4
Thiamethoxam	120	12
Thiencarbazone-methyl	10 mg/l	2 mg/l
Toluene	800	160
Toxaphene	3	0.3
1,2,4-Trichlorobenzene	70	14
1,1,1-Trichloroethane	200	40
1,1,2-Trichloroethane	5	0.5
Trichloroethylene (TCE)	~~5~~ 0.5	~~0.5~~ 0.05
2,4,5-Trichlorophenoxy-propionic acid (2,4,5-TP)	50	5
1,2,3-Trichloropropane	~~60~~ 0.3 ng/l	~~12~~ 0.03 ng/l
Trifluralin	7.5	0.75
Trimethylbenzenes (1,2,4- and 1,3,5- combined)	480	96
Vanadium	30	6
Vinyl chloride	0.2	0.02
Xylene[6]	2 mg/l	0.4 mg/l

[1] Appendix I contains Chemical Abstract Service (CAS) registry numbers, common synonyms and trade names for most substances listed in Table 1.

[2] Total chlorinated atrazine residues includes parent compound and the following metabolites of health concern: 2-chloro-4-amino-6-isopropylamino-s-triazine (formerly deethylatrazine), 2-chloro-4-amino-6-ethylamino-s-triazine (formerly deisopropylatrazine) and 2-chloro-4,6-diamino-s-triazine (formerly diaminoatrazine).

~~[3] Total coliform bacteria may not be present in any 100 ml sample using either the membrane filter (MF) technique, the presence-absence (P-A) coliform test, the minimal medium ONPG-MUG (MMO-MUG) test or not present in any 10 ml portion of the 10-tube multiple tube fermentation (MTF) technique~~.

[4] [3] "Cyanide, free" refers to the simple cyanides (HCN, CN^-) and /or readily dissociable metal-cyanide complexes. Free cyanide is regulatorily equivalent to cyanide quantified by approved analytical methods for "amenable cyanide" or "available cyanide".

[4] DCPA (dacthal) + MTP and TPA degradates includes DCPA (dacthal) + the monomethyl tetrachloroterephthalic acid (MTP) breakdown product (degradate) + the tetrachloroterephthalic acid (TPA) breakdown product (degradate).

[5] Dinitrotoluene, Total Residues includes the dinitrotoluene (DNT) isomers: 2,3-DNT, 2,4-DNT, 2,5-DNT, 2,6-DNT, 3,4-DNT and 3,5-DNT.

[6] Xylene includes meta-, ortho-, and para-xylene combined.

SECTION 2. NR 140.20 Table 3 is amended to read:

NR 140.20 Table 3

Table 3
Methodology for Establishing Preventive Action Limit for Indicator Parameters

Parameter	*Minimum Increase (mg/l)*
Alkalinity	100
Biochemical oxygen demand (BOD_5)	25
Calcium	25
Chemical oxygen demand (COD)	25
Magnesium	25
Nitrogen series	
~~Ammonia nitrogen~~	~~2~~
Organic nitrogen	2
Total nitrogen	5
Potassium	5
Sodium	10
Field specific conductance	200 microSiemens/cm
Total dissolved solids (TDS)	200
Total hardness	100
Total organic carbon (TOC)	1
Total organic halogen (TOX)	0.25

SECTION 3. NR 140 Appendix I to Table 1 is amended to read:

NR 140 Appendix I to Table 1

CHAPTER NR 140

APPENDIX I TO TABLE 1

PUBLIC HEALTH GROUNDWATER QUALITY STANDARDS

Substance	**CAS RN**[1]	**Common synonyms**~~/ *Tradename*~~[2]
Acetochlor	34256−82−1	~~*Cadence, Degree, Harness, Keystone, Over-time, Volley*~~
Acetochlor ethane sulfonic acid + oxanilic acid	187022−11−3 (ESA) 1~~8~~9~~4~~4992−44−4 (OXA)	Acetochlor − ESA + OXA
Acetone	67−64−1	*Propanone*
Alachlor	15972−60−8	~~*Lasso*~~
Alachlor ethane sulfonic acid	142363−53−9	Alachlor−ESA, Alachlor Ethane Sulfonate, MON 5775
Aldicarb	116−06−3	~~*Temik*~~
Aluminum	7429−90−5	
Ammonia	7664−41−7	
Anthracene	120−12−7	Para−naphthalene

Asbestos	1332−21−4	
Bentazon	25057−89−0	~~*Basagran*~~
Benzene	71−43−2	
Benzo(b)fluoranthene	205−99−2	B(b)F,3,4−Benzofluoranthene
Benzo(a)pyrene	50−32−8	BaP, B(a)P
Boron	7440−42−8	
Bromodichloromethane	75−27−4	Dichlorobromomethane, BDCM
Bromoform	75−25−2	Tribromomethane
Bromomethane	74−83−9	Methyl bromide
Butylate	2008−41−5	S−ethyl di−isobutylthiocarbamate~~, *Sutan+*~~
Carbaryl	63−25−2	~~*Sevin*~~
Carbofuran	1563−66−2	~~*Furadan*~~
Carbon disulfide	75−15−0	Carbon bisulfide
Carbon tetrachloride	56−23−5	Tetrachloromethane, Perchloroethane
Chloramben	133−90−4	
Chlordane	57−74−9	
Chlorodifluoromethane	75−45−6	HCFC−22, ~~Freon 22~~
Chloroethane	75−00−3	Ethyl chloride, Monochloroethane
Chloroform	67−66−3	Trichloromethane
Chlorpyrifos	2921−88−2	~~*Dursban, Lorsban, Warhawk, Hatchet, Yuma, Whirlwind, Eraser*~~
Chloromethane	74−87−3	Methyl chloride
Chromium, Hexavalent	18540-29-9	Hexavalent chromium, Chromium 6+, Chromium (VI), Chromium hexavalent ion, Cr6, Cr^{6+}
Chromium (total)	7440−47−3	
Chrysene	218−01−9	1,2−Benzphenanthrene
Clothianidin	210880-92-5	
Cobalt	7440−48−4	
Cyanazine	21725−46−2	~~*Bladex* ,~~ 2−chloro−4−ethylamino−6−nitriloisopropylamino−s−triazine
Cyanide, free	57−12−5	
~~Dacthal~~ DCPA (dacthal) + MTP and TPA degradates	1861−32−1 887-54-7 (MTP) 2136-79-0 (TPA)	~~DPCA~~ Dimethyl tetrachloroterephthalate (DCPA), Chlorthal-dimethyl, Chlorothal, ~~*Dacthalor*,~~ 1,4−benzene- dicarboxylic acid, monomethyl tetrachloroterephthalate acid (MTP), tetrachloroterephthalic acid (TPA)
Dibromochloromethane	124−48−1	Chlorodibromomethane, DBCM
1,2−Dibromo−3−chloropropane	96−12−8	DBCP, Dibromochloropropane
1,2−Dibromoethane	106−93−4	EDB, Ethylene dibromide, Dibromoethane
Dibutyl phthalate	84−74−2	DP, Di−*n*−butyl phthalate, *n*−Butyl phthalate
Dicamba	1918−00−9	~~*Banvel*~~
1,2−Dichlorobenzene	95−50−1	o−Dichlorobenzene, o−DCB
1,3−Dichlorobenzene	541−73−1	m−Dichlorobenzene, m−DCB

1,4−Dichlorobenzene	106−46−7	p−Dichlorobenzene, p−DCB
Dichlorodifluoromethane	75−71−8	~~*Freon 12*~~
1,1,−Dichloroethane	75−34−3	Ethylidine chloride
1,2−Dichloroethane	107−06−2	1,2−DCA, Ethylene dichloride
1,1−Dichloroethylene	75−35−4	1,1−DCE, 1,1−Dichloroethene, Vinylidene chloride
1,2−Dichloroethylene (cis)	156−59−2	cis−Dichloroethylene, 1,2−Dichloroethene (cis)
1,2−Dichloroethylene (trans)	156−60−5	trans−1,2−Dichloroethylene
2,4−Dichlorophenoxyacetic acid	94−75−7	2,4−D
1,2−Dichloropropane	78−87−5	Propylene dichloride
1,3−Dichloropropene (cis/trans)[3]	542−75−6	~~*Telone,*~~ DCP, Dichloropropylene
Di(2−ethylhexyl) phthalate	117−81−7	DEHP, Bis(2−ethylhexyl) phthalate, 1,2−Benzenedicarboxylic acid, Bis (2−ethyl-hexyl)ester
Dimethenamid/Dimethinamid−P	87674−68−8 163515−14−8 (−P)	~~*Frontier, Outlook, Propel, Establish, Sortie, Tower*~~
Dimethoate	60−51−5	
2,4−Dinitrotoluene	121−14−2	2,4−DNT, 1−methyl−2,4−dinitrobenzene
2,6−Dinitrotoluene	606−20−2	2,6−DNT, 2−methyl−1,3−dinitrobenzene
Dinitrotoluene, Total Residues	25321−14−6	Dinitrotoluene, DNT
Dinoseb	88−85−7	2−(1−methylpropyl)−4,6−dinitrophenol
1,4−Dioxane	123−91−1	*p*−Dioxane
Dioxin	1746−01−6	2,3,7,8−TCDD,2,3,7,8−Tetrachlorodibenzo−p−dioxin
Endrin	72−20−8	
EPTC	759−94−4	~~*Eptam, Eradicane*~~
Ethylbenzene	100−41−4	Phenylethane, EB
Ethyl ether	60−29−7	Diethyl Ether
Ethylene glycol	107−21−1	
Fluoranthene	206−44−0	Benzo(jk)fluorene
Fluorene	86−73−7	2,3−Benzidine, Diphenylenemethane
Fluoride	7681−49−4	
Fluorotrichloromethane	75−69−4	~~*Freon11*~~, Trichlorofluoromethane
Formaldehyde	50−00−0	
Glyphosate	1071-83-6	
Glyphosate aminomethyl-phosphonic acid (AMPA) degradate	1066-51-9	aminomethyl-phosphonic acid (AMPA)
Heptachlor	76−44−8	~~*Velsicol*~~
Heptachlor epoxide	1024−57−3	
Hexachlorobenzene	118−74−1	Perchlorobenzene~~, *Granox*~~
N−Hexane	110−54−3	Hexane, Skellysolve B
Hydrogen sulfide	7783−06−4	Dihydrogen sulfide

Imidacloprid	138261-41-3	
Isoxaflutole + Isoxaflutole diketonitrile (DKN) degradate	141112-29-0 143701-75-1 (DKN)	
Isoxaflutole benzoic acid (BA) degradate	142994-06-7	
Lindane	58−89−9	
Manganese	7439−96−5	
Mercury	7439−97−6	
Methanol	67−56−1	Methyl alcohol, Wood alcohol
Methoxychlor	72−43−5	
Methylene chloride	75−09−2	Dichloromethane, Methylene dichloride
Methyl ethyl ketone	78−93−3	MEK, 2−Butanone
Methyl isobutyl ketone	108−10−1	MIBK, 4−Methyl−2−pentanone, Isopropylacetone, ~~*Hexone*~~ Hexone
Methyl tert−butyl ether	1634−04−4	MTBE, 2−Methoxy−2−methyl−propane, tert−Butyl methyl ether
Metolachlor/s−Metolachlor	51218−45−2 87392−12−9 (s−)	~~*Dual, Bicep, Milocep, Stalwart, Parallel, Prefix, Charger, Brawl, Cinch, Dual Magnum, Boundary*~~
Metolachlor ethane sulfonic acid + oxanilic acid	171118−09−5 (ESA) 152019−73−3 (OXA)	Metolachlor − ESA + OXA
Metribuzin	21087−64−9	~~Sencor, Lexone~~
Molybdenum	7439−98−7	
Monochlorobenzene	108−90−7	Chlorobenzene
Naphthalene	91−20−3	
N−Nitrosodiphenylamine	86−30−6	NDPA
Pentachlorophenol	87−86−5	PCP, Pentachlorohydroxybenzene
Perchlorate	14797−73−0	Perchlorate and perchlorate salts, Perchlorate ion
Perfluorooctanoic acid (PFOA) + Perfluorooctane sulfonate (PFOS)	335-67-1 (PFOA) 1763−23−1 (PFOS)	
Phenol	108−95−2	
Picloram	1918−02−1	~~*Tordon,*~~ 4−amino−3,5,6−trichloropicolinic acid
Polychlorinated biphenyls[4]		PCBs
Prometon	1610−18−0	~~*Pramitol, Prometone*~~
Pyrene	129−00−0	Benzo(def)phenanthrene
Pyridine	110−86−1	Azabenzene
Simazine	122−34−9	~~*Princep*~~, 2−chloro−4,6−diethylamino−s−tri- azine
Strontium	7440-24-6	elemental strontium, Sr
Styrene	100−42−5	Ethenylbenzene, Vinylbenzene
Sulfentrazone	122836-35-5	
Tertiary Butyl Alcohol	75−65−0	TBA
1,1,1,2−Tetrachlorethane	630−20−6	1,1,1,2−TCA, 1,1,1,2−PCA

1,1,2,2,−Tetrachloroethane	79−34−5	1,1,2,2−TCA, 1,1,2,2−PCA
Tetrachloroethylene (PCE)	127−18−4	Perchloroethylene, PERC, Tetrachloroethene
Tetrahydrofuran	109−99−9	THF
Thiamethoxam	153719-23-4	
Thiencarbazone-methyl	317815-83-1	
Toluene	108−88−3	Methylbenzene
Toxaphene	8001−35−2	
1,2,4−Trichlorobenzene	120−82−1	
1,1,1−Trichloroethane	71−55−6	Methyl chloroform, 1,1,1−TCA
1,1,2−Trichloroethane	79−00−5	1,1,2−TCA, Vinyl trichloride
Trichloroethylene	79−01−6	TCE, Chloroethene
2,4,5−Trichlorophenoxy−propionic acid	93−72−1	2,4,5−TP~~, *Silvex*~~
1,2,3−Trichloropropane	96−18−4	1,2,3−TCP, Glycerol trichlorohyrin
Trifluralin	1582−09−8	~~*Treflan*~~
1,2,4−Trimethylbenzene	95−63−6	
1,3,5−Trimethylbenzene	108−67−8	
Vanadium	7440−62−2	
Vinyl chloride	75−01−4	VC, Chloroethene
Xylene[5]		

[1]Chemical Abstracts Service (CAS) registry numbers are unique numbers assigned to a chemical substance. The CAS registry numbers were published by the U.S. Environmental Protection Agency in 40 CFR Part 264, Appendix IV

[2]Common synonyms include those widely used in government regulations, scientific publications, commerce and the general public. ~~A trade name, also known as the proprietary name, is the specific, registered name given by a manufacturer to a product. Trade names are listed in *italics*.~~ Common synonyms ~~and trade names~~ should be cross-referenced with CAS registry number to ensure the correct substance is identified. Table 1 contains groundwater quality standards for pesticide active ingredients and their degradation breakdown products. Active ingredients are the chemicals in a pesticide product that kill, control, or repel pests. Pesticide products are given proprietary "trade names" by the pesticide product manufacturer. A database of pesticide products approved for use in Wisconsin is accessible through the Department of Agriculture, Trade and Consumer Protection (DATCP) home web page (search for "pesticide database"). The U.S. Environmental Protection Agency (EPA) also maintains a database of registered pesticide products, called the Pesticide Product and Label System (PPLS), on its website. These pesticide product databases can be searched by active ingredient to find the pesticide products, and their trade names, that contain a specific pesticide active ingredient.

[3]This is a combined chemical substance which includes cis 1,3-Dichloropropene (CAS RN 10061-01-5) and trans 1,3-Dichloropropene (CAS RN 10061-02-6).

[4]Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals (same molecular composition, different molecular structure and formula), including constituents of Aroclor-1016 (CAS RN12674-11-2), Aroclor-1221 (CAS RN 11104-28-2), Aroclor-1232 (CAS RN 11141-16-5), Aroclor-1242 (CAS RN 53469-21-9), Aroclor-1248 (CAS RN 12672-29-6), Aroclor-1254 (CAS RN 11097-69-1), and Aroclor-1260 (CAS RN 11096-82-5).

[5]Xylene (CAS RN 1330-20-7) refers to a mixture of three isomers, meta-xylene (CAS RN 108-38-3), ortho-xylene (CAS RN 95-47-6), and para-xylene (CAS RN 106-42-3)

SECTION 4. EFFECTIVE DATE. This rule takes effect on the first day of the month following publication in the Wisconsin Register, as provided in s. 227.22 (2) (intro.), Wis. Stat.

SECTION 5. BOARD ADOPTION. This rule was approved and adopted by the State of Wisconsin Natural Resources Board on [DATE].

Dated at Madison, Wisconsin _____.

STATE OF WISCONSIN

DEPARTMENT OF NATURAL RESOURCES

BY _____

For Preston D. Cole, Secretary

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