CLEAN WATER ORGANIZATIONS'

Comments on the Proposed 2025 SDS General Permit and 2026 NPDES General Permit For Concentrated Animal Feeding Operations

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Submitted by

Minnesota Center for Environmental Advocacy

CURE

Environmental Working Group

Friends of the Mississippi River

Food & Water Watch

Minnesota Division, Izaak Walton League of America

Will Dilg Chapter, Izaak Walton League of America

Minnesota Trout Unlimited

Hiawatha Trout Unlimited

Minnesota Well Owners Organization

Northern Waters Land Trust

Roots Return Heritage Farm LLC

Winona Clean Water Coalition

Joined by undersigned individual supporters

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INTRODUCTION

The undersigned Clean Water Organizations, along with the undersigned individual supporters, appreciate the opportunity to submit these comments on the Proposed 2025 State Disposal System ("SDS") General Permit and the Proposed 2026 National Pollutant Discharge Elimination System ("NPDES") General Permit for Concentrated Animal Feeding Operations ("Proposed Permits"). These permits regulate the largest feedlots in Minnesota, which account for approximately one-third of the manure produced in the state each year. This manure, when stored in massive lagoons or spread on fields as fertilizer, runs off into surface waters, leaches into groundwater, and volatilizes into the air, ultimately polluting Minnesota's waters with dangerous bacterial coliforms and nutrients, particularly nitrate. Largely because of pollution from cropland sources, Minnesota faces a nitrate pollution crisis. The drinking water of hundreds of thousands of Minnesotans has elevated levels of nitrate, which is linked not only to blue baby syndrome, but also to other serious health risks including cancers, pregnancy problems, and birth defects.

Minnesota law contains strict protections for its surface waters and particularly for its groundwater, which provides 75% of Minnesota's drinking water. But for decades, instead of implementing regulations that will ensure the state's waters are protected, Minnesota agencies have taken a largely voluntary approach to reducing nitrate pollution. This approach has proven to be woefully insufficient. Nitrate contamination has persisted and even increased in areas around the state, putting the health of people, animals, and aquatic ecosystems at risk. Even the Minnesota Pollution Control Agency ("MPCA") has recognized that the current approach is not enough to address the problem. Last year, the U.S. Environmental Protection Agency ("EPA") instructed MPCA to use all available tools to address the drinking water contamination crisis, including revisions to the NPDES permits for feedlots to reduce nitrate pollution over the long term.

In this context, MPCA has published the Proposed Permits, which include some important and common-sense steps toward addressing the nitrate pollution crisis in our state, particularly in the vulnerable groundwater areas like the karst region in southeastern Minnesota and the Central Sands region that have the greatest sensitivity to pollution. To protect Minnesota's health and environment, MPCA must implement all of its proposed revisions, including requiring additional restrictions on fall and winter manure spreading in vulnerable groundwater areas, incorporating manure within the 100-year floodplain, requiring manure recipients to abide by the provisions of the permittee's Manure Management Plan, requiring visual inspections of land application areas, and requiring sampling of discharges.

However, these steps are only incremental and are insufficient to fully address the problem. The Proposed Permits still allow practices that will cause nitrate pollution, and they fail to implement sufficient monitoring measures to ensure that the feedlots are eliminating discharges. To comply with the law and ensure permittees are not polluting, the Clean Water Organizations submit that MPCA must take the following additional steps to reverse the trends of increasing nitrate pollution around the state:

- Remove language stating that fall manure spreading Best Management Practices ("BMPs") in vulnerable groundwater areas are not required until 2028 and require these BMPs to be followed statewide.
- Require restrictions on winter spreading of solid manure in December, January, and February to be applied statewide.
- For land application areas, require (a) a visual monitoring plan that identifies locations where monitoring will occur, (b) monitoring of drain tile outlets, and (c) motion detecting cameras for downgradient field edges and sinkholes.
- For land application areas, require groundwater monitoring for fields within vulnerable groundwater areas.
- For production areas, require daily visual inspections of identified points where surface discharges are likely to occur and daily visual inspections of Liquid Manure Storage Areas ("LMSAs").
- For production areas, add a site-specific groundwater monitoring plan or a Subsurface Discharge Monitoring Plan.

- For land application areas and production areas, require permittees to identify sampling points with specificity and create regular plans for sampling, add further details about sampling protocols, and add sampling requirements for drain tile outlets.
- Require annual soil nitrate tests in accordance with University of Minnesota Extension Service ("Extension Service") guidelines for fall tests in western Minnesota and spring tests in south-central, southeastern, and east-central Minnesota.
- Require digestate from an anaerobic digester to be analyzed for nutrient content before application.
- Require permittees to follow the Runoff Risk Advisory Forecast recommendations before spreading manure.
- Require additional BMPs for emergency manure applications and define "unusual weather conditions" to include only extraordinary rain events.

With all of these changes, MPCA and the permitted feedlots would take an important and necessary step toward addressing the nitrate pollution crisis in our state.

I. Minnesota must take action to address its dangerous levels of nitrate pollution

A. Nitrate pollution is dangerous to people and aquatic life

The danger of nitrate pollution to human health has been recognized for decades. Some health effects from ingesting excess nitrate can occur within hours or days of short-term exposure. In 1962, a federal regulatory standard of 10 mg/L nitrate in drinking water[1] was set to address the problem of methemoglobinemia, also known as blue-baby syndrome. Blue-baby syndrome occurs when excess nitrate limits the ability of blood to carry oxygen, potentially leading to severe injury or death.[2] Infants and pregnant people are particularly at risk for this condition.[3]

Recent research, however, has demonstrated that long-term exposure to nitrate levels well below the 10 mg/L limit is also linked to serious health risks. Peer-reviewed medical research

[1] In 1991, this limit was also established as the Maximum Contaminant Level for nitrate under the Safe Drinking Water Act for public water systems, defined as systems that have at least 15 connections or serve at least 25 people for 60 days of the year. EPA, National Primary Drinking Water Regulations, https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations.
[2] MPCA, Statement of Need and Reasonableness, Proposed Feedlot Rules, at 13-14 (Dec. 1999) ("1999 Feedlot SONAR") (Ex. 1).
[3] *Id.*

demonstrates that exposure to nitrate at or above 3 mg/L—less than one-third of the health risk limit—is linked to a variety of cancers, birth defects, and pregnancy complications. Numerous human-based epidemiological studies now show that exposure to nitrate at levels below the health limit and as low as 3 to 5 mg/L leads to a statistically significant increase in the risk for colorectal cancer,[4] thyroid cancer,[5] ovarian cancer,[6] and pregnancy/birth complications.[7] In 2023, the EPA Integrated Risk Information System restarted a human health assessment of nitrate to determine if a lower federal maximum contaminant level for nitrate-N is needed based on other potential health effects, including cancers.[8] In a public comment submitted to the EPA to inform its human health assessment, a former EPA toxicologist raised alarms that the scientific basis for the 10 mg/L standard is deeply flawed and that it should be reduced to 2 to 5 mg/L to accurately capture exposure levels that present a risk to human health.[9]

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[4] Nadia Espejo-Herrera et al., *Colorectal cancer risk and nitrate exposure through drinking water and diet*, 139 Intl. J. of Cancer 334-346 (2016) (Ex. 2); Jorg Schullehner et al., *Nitrate in drinking water and colorectal cancer risk: A nationwide population-based cohort study*, 143 Intl. J. of Cancer, 73-79 (2018) (Ex. 3).

[5] Mary H. Ward et al., *Drinking Water Nitrate and Human Health: An Updated Review*, Intl. J. Envtl. Research and Public Health (2018) (Ex. 4).

[6] Maki Inoue-Choi et al., *Nitrate and nitrite ingestion and risk of ovarian cancer among postmenopausal women in Iowa*, 137 Intl. J. of Cancer, 173-182 (2015) (Ex. 5).

[7] Ward, *Drinking Water Nitrate and Human Health* (Ex. 4). MPCA recognized these dangers a decade ago in its Nitrogen in Minnesota Surface Waters report, where it acknowledged that "[s]tudies have suggested association with nitrate exposure and adverse reproductive outcomes, thyroid disruption, and cancer." MPCA, *Nitrogen in Minnesota Surface Waters: Conditions, trends, sources, and reduction*, page A2-7 (2013) ("Nitrogen in Surface Waters") (Ex. 6). The Minnesota Department of Agriculture ("MDA") also acknowledged these dangers when it proposed the Groundwater Protection Rule, stating: "Various epidemiological and animal studies have reported a wide range of negative health effects attributable to consumption of water with elevated nitrate-nitrogen including birth-defects, miscarriages, hypertension, stomach and gastro-intestinal cancer, and non-Hodgkin's lymphoma." MDA, Statement of Need and Reasonableness, Proposed Groundwater Protection Rules, at 63 (2018) ("2018 Groundwater Protection SONAR") (Ex. 7).

[8] David A. Belluck, Letter to EPA, Re: Response to US EPA on RFD Announcement, Docket Number: EPA-HQ-ORD-2017-0496 for nitrate/nitrite (Dec. 18, 2023) (Ex. 8).

[9] *Id.*

In addition to endangering humans, excessive nitrate levels are dangerous to aquatic life and animals that drink polluted water. Spontaneous abortions, stillbirths, and gastrointestinal disorders have occurred in livestock that consumed large quantities of nitrate-contaminated water.[10] Elevated nitrate levels in Minnesota's waterways also are devastating to aquatic habitats. High nitrate levels contribute to eutrophication, which stimulates excessive plant growth and depletes oxygen levels in the water, harming or killing fish and other aquatic life.[11]

Nitrate and ammonia, another form of nitrogen found in manure and fertilizer, also are directly toxic to fish and other aquatic life at high levels.[12] Invertebrates that form a critical part of the aquatic food chain are particularly vulnerable to nitrate and ammonia, and among vertebrates, the important game fish lake trout and rainbow trout are notably sensitive.[13] While Minnesota does not have a nitrate water quality standard for aquatic life (Class 2 waters), an analysis by MPCA proposed a chronic nitrate criterion of 5 mg/L for cold waters and 8 mg/L for other waters, as well as an acute standard of 60 mg/L for all Class 2 waters.[14] For ammonia, Minnesota has set an aquatic life water quality standard of 4.1 mg/L for cold waters and 10.1 mg/L for other waters, but MPCA has recommended adopting EPA's even stricter, temperature-dependent standards for total ammonia nitrogen.[15] Levels higher than these are established to be unsafe for aquatic life.

Exposure to nitrate and ammonia at toxic levels can lead to massive fish population die-offs, called "fish kills." In heavily agricultural areas, fish kill events have increased in intensity

[10] 1999 Feedlot SONAR, at 14 (Ex. 1).
[11] Nitrogen in Surface Waters, at 43 (Ex. 6).
[12] *Id.*
[13] MPCA, *Aquatic Life Water Quality Standards, Draft Technical Support Document for Nitrate,* at 5 (Oct. 2022), (Ex. 9); MPCA, *Aquatic Life Water Quality Standards Technical Support Document for Ammonia*, at 19 (July 2022) (Ex. 10).
[14] Aquatic Life Nitrate Standards, at 5 (Ex. 9).
[15] Aquatic Life Ammonia Standards, at 19 (Ex. 10).

and frequency: the Rush Creek fish kill in July 2022, where MPCA concluded contaminated runoff killed more than 2,500 fish, was the fourth major fish kill in the Winona County area since 2015.[16] Furthermore, fish are less sensitive to nitrate and ammonia than other aquatic life, which means that by the time a fish kill is discovered, numerous amphibians and invertebrates almost certainly have died already.

Unfortunately, the effects of nitrate pollution do not stop in Minnesota. Nitrate from Minnesota, which washes into the Mississippi River, is in part to blame for the hypoxic "dead zone" that forms every year in the Gulf of Mexico.[17] One study estimates that the 158 million pounds of nitrate that leave Minnesota annually via the Mississippi have caused nearly $2.4 billion in annual damages to fish stocks and habitat for more than 30 years.[18]

B. Minnesota's waters are already polluted with nitrates, and the pollution is worsening

The contamination of Minnesota's groundwater and surface waters with nitrate and other contaminants related to feedlot operations is a pervasive problem that has been well-documented for decades. Regular sampling of wells to detect nitrate began over 30 years ago, and the contamination trends have remained persistent or increased. Levels of ambient groundwater data from over 300 shallow wells in urban, agricultural, and undeveloped areas across the state sampled from 2013 to 2017 revealed that 49% of wells in agricultural areas exceeded the Maximum Contaminant Limit ("MCL") for nitrate.[19] In contrast, less than 1% of wells sampled in urban areas exceeded 10 mg/L of nitrate, and the highest nitrate level detected in undeveloped areas was under

[16] MPCA, *Rush Creek fish kill response – Winona County,* at 2, 4 (April 2023) (Ex. 50).
[17] Nitrogen in Surface Waters, at 36, 46 (Ex. 6).
[18] *Id.* at 43.
[19] MPCA, *The Condition of Minnesota's Groundwater Quality: 2013-2017*, at 15 (July 2019) (Ex. 11).

3 mg/L.[20] An analysis of 117 wells in shallow aquifers monitored from 2005 – 2017 showed that 16% had significant increases in nitrate.[21] Furthermore, in surface waters, nitrate concentrations have increased between 20 and 60% in most major rivers in the state over the past 20 years.[22] More recent nitrate concentration trend data from 2010 to 2020 shows that nitrate levels in rivers across Minnesota either increased or showed no clear trend—none of the 38 sites studied by MPCA showed nitrate decreases in that time period.[23]

Between 1994 and 2016, 56 community water systems in Minnesota added nitrate removal systems, sealed a well, or removed a well from use to deal with increasing nitrate contamination in their drinking water sources, according to the Minnesota Department of Health ("MDH").[24] These public water system improvements are expensive and the costs are hard to bear for smaller rural cities and townships. For example, the city of Hastings had to spend $3.5 million on a new water treatment plant to lower nitrate levels.[25] The expenses to private well owners, who do not have the same regulatory protections as those on public water systems, are also extensive. Based on MDH estimates, installation and maintenance of a reverse osmosis treatment system costs approximately $2,600, while construction of a new well costs around $30,000.[26] Because of the

[20] *Id.* Nitrate-N levels above 3 mg/L are considered to be caused by human activity rather than natural background levels. 2018 Groundwater Protection SONAR, at 20 (Ex. 7).
[21] MPCA, *Five-Year Progress Report on Minnesota's Nutrient Reduction Strategy,* at 31 (Aug. 2020) ("Five Year Progress Report") (Ex. 12).
[22] *Id.* at 25.
[23] *Id.* at 20.
[24] 2018 Groundwater Protection SONAR at 70 (Ex. 7).
[25] Envtl. Working Grp., *In Minnesota's Farm Country, Nitrate Pollution of Drinking Water Is Getting Worse* (March 2020) (Ex. 13).
[26] MDH, *Public Health Work Plan and Budget Overview: Nitrate in Southeast Minnesota Private Wells*, at 7 (Jan. 22, 2024) (Ex. 14).

difficulty and expense of remediating nitrate pollution in groundwater, preventing the pollution from entering water in the first place is critical.[27]

C. Certain areas of the state are particularly vulnerable to nitrate pollution

Although the overall trends across the state show persistent or increasing nitrate contamination, certain areas of the state are far more vulnerable to nitrate pollution than others. Soil and geologic conditions in portions of Minnesota provide easy pathways for pollution to make its way underground, making the aquifers that provide drinking water particularly vulnerable to pollution. Landscapes with coarse-textured soils, shallow depth to bedrock, or karst geology are defined by the MDA as vulnerable groundwater areas, because in those regions nitrate from the surface can easily and quickly move through the soil and into groundwater.[28]

In karst geology, a shallow layer of soil overlays fractured limestone carbonate bedrock, which allows water and contaminants from the surface to move rapidly into groundwater aquifers.[29] Water can move as much as miles per day and contaminants are not readily filtered out.[30] Minnesota officials have been aware of the karst region's vulnerability to groundwater contamination for decades, and as early as 1982, shallow wells in southeastern Minnesota were known to contain high nitrate levels.[31] In coarse textured (or sandy) soils and soils with a shallow depth to bedrock (within 5 feet), contaminants applied at the land surface also flush quickly

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[27] MPCA et al., M*innesota Nutrient Reduction Strategy,* at 37 (Sept. 2014) (Ex. 15).
[28] MDA, Vul*nerable Groundwater Area Map*, https://www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/nitrogenplan/mitigation/wrpr/wrprpart1/vulnerableareamap. State agencies also have documented these vulnerabilities in resources like DNR's Pollution Sensitivity of Near-Surface Materials, https://files.dnr.state.mn.us/waters/groundwater_section/mapping/mha/hg02_report.pdf and Minnesota Regions Prone to Surface Karst Feature Development, https://files.dnr.state.mn.us/waters/groundwater_section/mapping/gw/gw01_report.pdf.
[29] Jeffrey St. Ores et al., *Groundwater Pollution Prevention in Southeast Minnesota's Karst Region*, 465 Univ. of Minn. Extension Bulletin, at 6 (1982) (Ex. 16).
[30] *Id.*
[31] Ores, *Groundwater Pollution Prevention*, at 3 (Ex. 16).

through the soil profile and into groundwater aquifers. Much of the vulnerable groundwater areas are located in southeastern Minnesota, where the landscape is largely karst geography, in the Central Sands region, which has coarse-textured soils.[32]

In vulnerable groundwater areas, state data demonstrate that residents on both public water systems and private wells have an increased risk of exposure to elevated nitrates and other agricultural pollutants that pose a human health risk. From 1995 to 2018, 115 community water systems had at least one nitrate test at or above 3 mg/L.[33] Furthermore, 72 of these community systems saw nitrate levels in their water supply increase in that time period, with an average of a 61% increase.[34] The community water systems with at least one test at or above 10 mg/L were concentrated in southeastern Minnesota, the Central Sands, and southwestern Minnesota, which has a large concentration of Concentrated Animal Feeding Operations ("CAFOs") and limited groundwater.[35] 1

Private well data in these vulnerable areas demonstrate this same pattern. From 2013 to 2019, the MDA Township Testing Program sampled approximately 32,000 private wells in 344 vulnerable townships[36] across 50 counties in Minnesota. Of those 344 townships, 143 had 10% or more of their wells test above the 10 mg/L nitrate standard, concentrated in southeastern, central, and southwestern Minnesota.[37] Statewide, 9.1% of the sampled wells in vulnerable townships exceeded the federal standard for nitrate.[38] In southeastern Minnesota the percentage was even

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[32] MDA, *Vulnerable Groundwater Area Map,* https://www.mda.state.mn.us/chemicals/fertilizers/nutrient-mgmt/nitrogenplan/mitigation/wrpr/wrprpart1/vulnerableareamap.
[33] Envtl. Working Grp., *Nitrate Pollution of Drinking Water Is Getting Worse* (Ex. 13).
[34] *Id.*
[35] *Id.*
[36] Townships were selected based on factors including soil types and geology as well as significant row crop production. MDA, *Township Testing Program Update* (May 2022) (Ex. 17).
[37] *Id.*
[38] *Id.*

higher: 12.1% of the wells tested exceeded the standard, which the EPA estimated meant that 9,218 residents with private wells in the karst region "were or still are at risk of consuming water at or above the maximum contaminant level (MCL) for nitrate."[39] In some townships within vulnerable counties in southeastern Minnesota, over 40% of the tested wells exceeded 10 mg/L nitrate.[40] A separate Volunteer Nitrate Monitoring Network in southeastern Minnesota reported that in 2022, nearly 70% of the 376 sampled wells had nitrate levels above 3 mg/L, and 8.2% were above 10 mg/L.[41]

D. Most of Minnesota's nitrate problem is caused by agriculture and, particularly, pollution from manure

That these highly polluted areas are largely rural and heavily farmed is no coincidence. Nitrogen is a nutrient that is critical for plant growth—when applied at reasonable rates. However, when operators apply nitrogen from either commercial fertilizer or manure used as fertilizer in amounts that exceed crop needs, at times when there are no crops to use it, or using risky application methods, it leads to water pollution. The nitrogen, if not used by plants, leaches into the groundwater in a water-soluble form (nitrate), runs off overland into surface waters, and volatizes and is released as atmospheric nitrogen and often re-deposited within the same watershed. Corn—which is the most widely grown crop in Minnesota in terms of total acreage—is a particularly "leaky" crop. Studies in Minnesota have shown that even when corn receives "near-optimum" rates of nitrogen fertilizer, it can still leach 15 to 40 pounds of nitrate per acre

[39] EPA, Letter to Minnesota State Agencies Regarding Southeast Minnesota Petition, at 2 (Nov. 2023) (Ex. 18).
[40] MDA, *Winona County: Final Overview of Nitrate Levels in Private Wells (2016-2017)* at 2 (Updated Sept. 2019) (Ex. 19).
[41] MDA, *Southeast Minnesota Volunteer Monitoring Network* (Ex. 20).

each year.[42] When fertilizer is *applied* at higher rates or at inopportune times, losses are likely far greater.

Minnesota's state agencies acknowledge that row crop agriculture is the largest source of nitrogen pollution over time in Minnesota.[43] More than 70% of the nitrogen in Minnesota surface waters (measured as nitrate + nitrite) comes from cropland sources such as groundwater leachate below crop fields, tile drainage, and cropland runoff.[44] In intensively agricultural areas of the state, the nitrogen loads from cropland sources are even higher; such sources produce an estimated 89 – 95% of the load in the Minnesota, Missouri, and Cedar river watersheds, and the Lower Mississippi River basin.[45] Even as phosphorus pollution has decreased, nitrate concentrations have persisted and in some places increased across Minnesota during the past two decades.[46]

This nitrogen comes from both commercial fertilizer, which in 2013 accounted for approximately 75% of the nitrogen applied to fields in the state, and manure, which accounted for about 25%.[47] These two sources together account for 1.8 *billion* pounds of the nitrogen added to land in Minnesota in 2013, compared to 12 million pounds for lawn fertilizer and 9 million pounds for septic system drain fields.[48] And the amount of nitrogen applied to Minnesota lands has unquestionably grown in the last decade, as the number of animals on feedlots, corn acreage, and the amount of fertilizer sold continue to grow. Since 1991, the number of large feedlot operations in Minnesota has tripled, and fertilizer sales have increased by more than one-third.[49]

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[42] Univ. of Minn. Extension Service, *Nitrates in Minnesota Drainage Water* (Ex. 21).
[43] Five Year Progress Report, at 21 (Ex. 12).
[44] Nitrogen in Surface Waters, at 9 (Ex. 6).
[45] MPCA, *Water Pollutant: Nitrogen* (Ex. 22).
[46] Five Year Progress Report, at 21-22 (Ex. 12).
[47] Nitrogen in Surface Waters, at D1-5 (Ex. 6).
[48] *Id.*
[49] Envtl. Working Grp., *Nitrate Pollution Is Getting Worse* (Ex. 13).

The use of manure as fertilizer is particularly problematic for nitrate pollution because producers often overapply manure. This overapplication is a problem because applying nitrogen at rates higher than what crops need exponentially increases losses to the environment and is one of the most significant contributors to nitrate pollution statewide. Residual soil nitrate content spikes dramatically when nitrogen is applied at rates above the maximum return to nitrogen ("MRTN").[50] If Minnesota producers followed the MRTN on all applicable row crop areas (over 6 million acres statewide), statewide nitrate-N losses could be reduced by approximately 16%.[51] Several factors combine to make manure a contributor to overapplication.

First, manure is often treated as a waste product, applied not so much for its nutrients, but simply to dispose of it. As explained by the Extension Service, manure application timing may not be driven by crop needs but by instead storage limitations or the need to work around wet weather or other production processes.[52] Manure also may be overapplied at fields nearest the livestock operation to free up capacity in the manure pit without incurring the time and cost of transporting it further away.[53] Either of these practices likely will lead to higher nitrate loss than if the manure were applied at the times and in the places where it was needed for optimal crop growth.

Second, unlike commercial fertilizer, manure is uncertain and variable in its nutrient content, and the nitrogen in manure is not immediately available for plants to use for growth. In addition, much of the nitrogen content of manure may be lost during storage and application. This

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[50] MDA*, Root River Field to Stream Partnership* (Ex. 23). Even though the MRTN is intended to maximize producers' economic returns and not to minimize nitrate pollution, applying at this rate is still better than higher rates often applied by producers.
[51] Gary W. Feyereisen, et al., *Frontier: Eating the Metaphorical Elephant: Meeting Nitrogen Reduction Goals in the Upper Mississippi River Basin States*, 65(3) J. of Am. Society of Ag. & Biological Engineers 621-631, 623 (2022) (Ex. 51).
[52] Chryseis Modderman, *Manure is complicated: 5 reasons you need a manure management plan,* Minnesota Crop News (June 26, 2023) (Ex. 48).
[53] *Id.*

uncertainty about how much nitrogen is actually available after manure is applied encourages producers to apply at higher rates as insurance that they are meeting crop needs. In fact, the Extension Service recommends applying *more* nitrogen per acre when manure is used, as compared to commercial fertilizer, because the additional nitrogen is viewed as being needed to maximize crop yields. [54]

Finally, when producers apply both manure and commercial fertilizer to their crops, they often fail to adequately credit manure sources of nitrogen in their calculations, leading to overapplication of nitrogen.[55] Based on farmer interviews, the most common reason for the over-application of nitrogen is the combination of manure and commercial fertilizer and the failure to adequately account for nitrogen already in the soil.[56] In 2021, soil tests showed that more than 70% of tested fields should have taken a nitrate credit—including 28% that should have taken a credit of 155 pounds per acre, the full amount that the Extension Service recommends applying in some circumstances.[57] Confirming this propensity, MPCA has found that the average application rate of nitrogen is higher when manure is applied in combination with commercial fertilizer than when only non-manure sources alone are used.[58]

For all these reasons, nitrogen application rates often exceed crop needs when manure is used as a nitrogen source. This is supported by surveys of producers themselves. USDA survey

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[54] *Compare* Univ. of Minn. Extension Service, *Guidelines for manure application rates* (Ex. 24) (recommendation for corn after corn is a maximum of 195 pounds of plant available nitrogen per acre) to Univ. of Minn. Extension Service, *Fertilizing Corn in Minn.* (Ex. 25) (recommendation for corn after corn is a MRTN of 175 pounds of nitrogen per acre when the ratio of the nitrogen price to crop value is .10).
[55] 2018 Groundwater Protection SONAR, at 51 (Ex. 7).
[56] 1999 Feedlot SONAR, at 205 (Ex. 1).
[57] Brad Carlson, *Taking soil samples for nitrogen analysis could pay big this year*, Minnesota Crop News (March 30, 2022) (Ex 26).
[58] Five Year Progress Report, at 78 (Ex. 12).

data from 2012, for example, showed that nearly half of all surveyed producers who applied both manure and commercial fertilizer applied at rates of 200 pounds of nitrogen per acre or greater, compared to the recommended Extension Service rate of 155 pounds per acre.[59] In 2020, an Environmental Working Group ("EWG") investigation found that in 69 of Minnesota's 72 agricultural counties, nitrogen from manure and commercial fertilizer sources exceeded the recommended application rates from the Extension Service. In thirteen counties across the state, many of which fall within vulnerable groundwater areas, the EWG study found that nitrogen inputs from manure and commercial fertilizer exceeded the recommended rates by more than half.[60] In just one county, Martin County, more than 28 million pounds of nitrogen were applied from these sources than were needed by crops.[61]

Accordingly, although manure accounts for a much smaller percentage of nitrogen applied to fields overall than commercial fertilizer, its application can lead to significant pollution risks. Any plan to decrease the nitrate contamination levels in Minnesota's waters must adequately address manure management. Simply focusing on commercial fertilizer alone cannot resolve this multi-faceted problem.

E. Unsafe manure management practices also lead to coliform impairments

Beyond the widely documented nitrate contamination trends in public and private water supplies, there are also other microbial contaminants associated with manure that impact public health—further emphasizing the need for responsible manure management. Coliforms are a standard indicator of drinking water quality associated with acute gastrointestinal illness, and the

[59] 2018 Groundwater Protection SONAR, at 55 (Ex. 7).
[60] Envtl. Working Grp., *Manure Overload: Manure Plus Fertilizer Overwhelms Minnesota's Land and Water* (May 28, 2020) (Ex. 27).
[61] *Id.*

MCL Goal under the Safe Drinking Water Act for these contaminants is set at zero.[62] Yet 243 Minnesota waters are listed as impaired for fecal coliform, and another 672 are listed as impaired for E. coli (one of the main fecal coliforms).[63]

One of the main sources of bacteria in surface waters—including coliforms—is runoff from feedlots and land application sites. MPCA has stated that one of the most effective ways to reduce coliforms in water is to ensure this runoff is controlled.[64] This is supported by a 2021 study in Northeastern Wisconsin that analyzed private well contamination data across a five-county region with vulnerable fractured bedrock and concentrated dairy CAFO production, similar to the karst region of Southeastern Minnesota. Of the 6,739 wells sampled for microbial contamination, 23% tested positive for total coliforms.[65] The primary risk factors for coliform detection were bedrock depth (which determines groundwater vulnerability) and distance to the nearest manure storage structure, with wells located within 48 meters of manure storage structures 87% more likely to have coliform detection than wells 4000 meters away.[66] The single risk factor most associated with an increase in coliform concentration levels was the distance to the nearest field with a nutrient management plan where commercial fertilizer and animal manure were land applied.[67] Practices that reduce manure runoff, accordingly, are critical to addressing not only nitrates but also dangerous bacteria.

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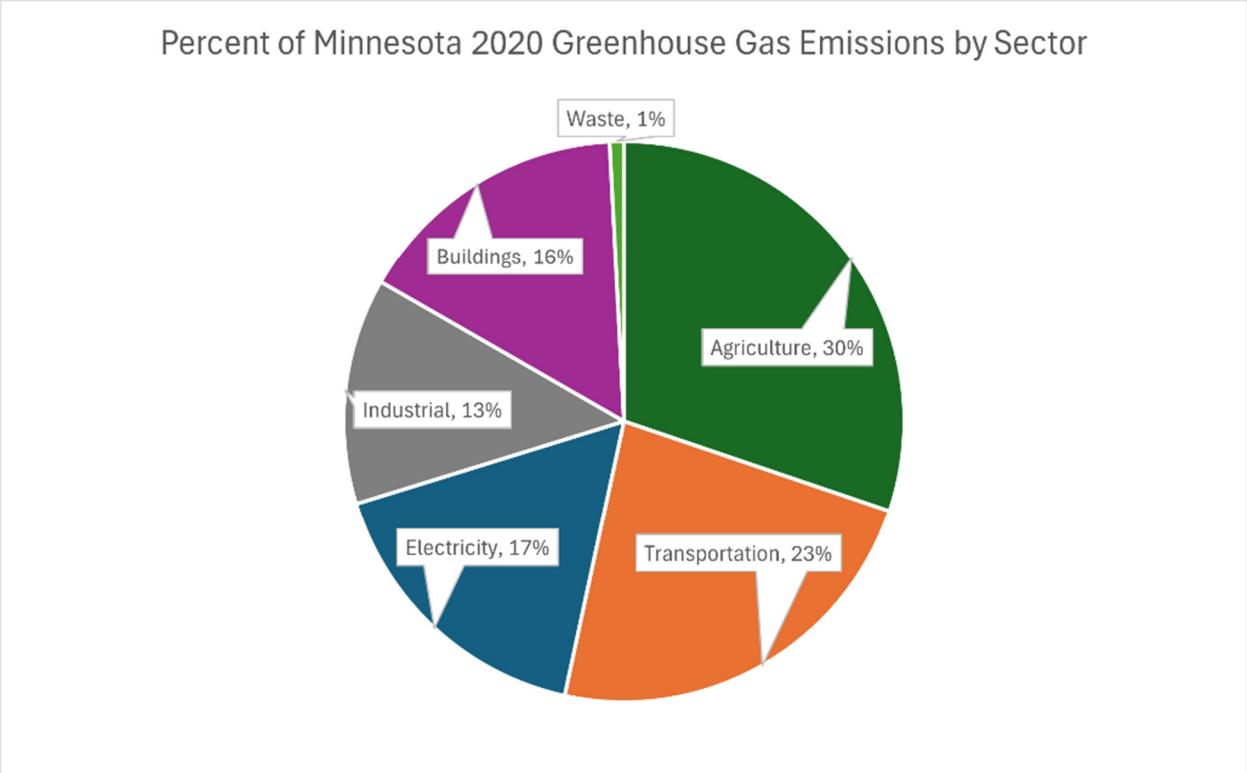
[62] EPA, *Revised Total Coliform Rule and Total Coliform Rule* (January 2017), https://19january2017snapshot.epa.gov/dwreginfo/revised-total-coliform-rule-and-total-coliform-rule_.html.
[63] MPCA, *2024 Impaired Waters List*, https://www.pca.state.mn.us/air-water-land-climate/minnesotas-impaired-waters-list.
[64] MPCA, *Water Pollutant: Bacteria* (Ex. 29).
[65] Mark A. Borchardt et al., *Sources and Risk Factor for Nitrate and Microbial Contamination of Private Household Wells in the Fractured Dolomite Aquifer of Northeastern Wisconsin*, Environmental Health Perspectives 129(6), at 3-4 (June 2021) (Ex. 28).
[66] *Id.* at 26.
[67] *Id.* at 23-24.

F. Manure management practices that pollute water also contribute to climate change

The same feedlot practices that lead to nitrate and coliform pollution of waters also contribute to climate change. Agriculture is the largest contributor to greenhouse gas emissions in the state. In 2020, this sector produced nearly 47 million tons of carbon-dioxide equivalent ("CO2e") greenhouse gas emissions, or 30% of the total 155 million tons of CO2e greenhouse emissions produced in Minnesota.[68]



[68] MPCA, *Greenhouse gas emissions data*, https://public.tableau.com/app/profile/mpca.data.services/viz/GHGemissioninventory/GHGsummarystory (last visited May 5, 2024). Note that this estimate excludes the -18 million tons of carbon sequestered by forest regrowth, which is usually subtracted from agriculture emissions in MPCA reporting.

Of these emissions, 57% come from crop agriculture, and 23% come from animal agriculture.[69] But because 67% of crops in the United States are grown for animal feed, these statistics undercount the emissions ultimately attributable to animal agriculture.[70]

Emissions from animal agriculture are from two primary greenhouse gases: Nitrous oxide and methane. These are potent greenhouse gases that heat the atmosphere up to 30 and 273 times more rapidly, respectively, than carbon dioxide over a 100-year time frame.[71] Methane is produced from animal agriculture through enteric fermentation (animal belching during the natural digestive process) and the decomposition of manure stored in uncovered lagoons. Nitrous oxide is a byproduct of animal excrement—both manure and urine—as well as a byproduct of commercial fertilizer use, much of which is used to grow animal feed. Excess nitrogen in soil and surface waters can lead to denitrification, another source of nitrous oxide emissions. Proper handling of manure and use of the same manure management practices that reduce water pollution will also, as an additional benefit, decrease these climate change causing emissions.

G. Minnesota's efforts to control nitrate pollution have not been successful

Despite the fact that the causes and dangers of nitrate pollution have long been known—along with the associated dangers of bacterial coliforms and greenhouse gas emissions—Minnesota state agencies have not taken effective steps to control this pollution. For thirty years, Minnesota has spent hundreds of millions of dollars to address nitrate pollution, but groundwater and surface waters across the state continue to show persistent levels of contamination and even increases in nitrate loads and concentrations.[72] The state's Clean Water Fund alone has directed at

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[69] *Id.*
[70] Vicky Bond, *The Animal Feed Industry's Impact on the Planet*, Independent Media Institute (Jan. 29, 2024) (Ex. 30).
[71] EPA, *Understanding Global Warming Potentials* (Jan. 12, 2016) (Ex. 31).
[72] Jeff Hargarten and Jennifer Bjorhus, *Nitrate contamination of Minnesota waters shows little sign of going away, despite years of effort*, Star Tribune (Nov. 28, 2023) (Ex. 32).

least $148 million to the nitrate problem since 2010, according to a Star Tribune analysis, and millions more in federal and state funding have paid for efforts that include nitrate research, programs and training to encourage farmers to make voluntary changes to practices, and nitrate filtration systems for several cities.[73] The response from state agencies has included a combination of regulatory and voluntary conservation programs, with an emphasis on voluntary incentives. These voluntary incentives, encouraged by technical and financial assistance from governmental programs, have not achieved the necessary reductions in nitrate pollution.[74] Despite the development of the updated Nitrogen Fertilizer Management Plan, the Groundwater Protection Rule, and the Nutrient Reduction Strategy over the past decade, there have not been significant decreases in nitrate levels in surface waters or groundwater.

MPCA has repeatedly acknowledged that its current regulations and voluntary BMPs are insufficient to protect groundwater from pollution.[75] MPCA's own progress report on nutrient management practices in 2020 admitted that none of the nutrient management practices adopted during the past decade were "expected to yield measurable nutrient reductions to surface waters at a large scale."[76] MPCA's website acknowledged that refinements in fertilizer rates and application timing could reduce nitrate loads by roughly 13% statewide, but "additional and more costly practices will be needed to make further reductions."[77] As the agency has stated, "statewide

[73] *Id.*
[74] Kurt Stephenson et. al, *Confronting our Agricultural Nonpoint Source Control Policy Problem*, Journal of the Am. Water Resources Assn. (June 2022) (Ex 33) (explaining that programs to reduce agricultural non-point source pollution that depend on voluntary adoption, with technical and financial assistance from federal and state programs, have not been successful in reducing pollution loads).
[75] MPCA, *Groundwater quality* (Ex. 34).
[76] Five Year Progress Report, at 53 (Ex. 12).
[77] MPCA, *Nitrogen* (Ex. 22).

reductions of more than 30% are not realistic with current practices."[78] Only with significant regulatory changes—and enforcement of those changes—will Minnesota make progress on the nitrate pollution problem.

H. EPA has instructed Minnesota to make changes to address nitrate pollution

Not only are changes to address Minnesota's nitrate pollution compelled by the facts—the federal EPA has instructed MPCA to take actions to address this problem. In April 2023, MCEA led a coalition of 11 national, regional, and local organizations in submitting a petition that asked the EPA to use its powers under the Safe Drinking Water Act to address the "imminent and substantial endangerment to human health" posed by groundwater nitrate contamination in Minnesota's karst region.[79]

On November 3, 2023, the EPA responded with a letter to the MPCA, MDA, and MDH regarding the state's nitrate pollution in the karst region, stating "there is an evident need for further actions to safeguard public health."[80] The EPA directed state agencies to take immediate action to safeguard public health in the region, and to "hold sources of nitrate accountable using all available tools to reduce the amount of nitrate they release to ground water."[81] Specifically, the EPA recognized that more protective NPDES and SDS permits for large feedlots in the state would be a "long-term solution to achieve reductions in nitrate concentrations in drinking water supplies."[82] EPA called for Minnesota to consider adopting monitoring requirements in its permits related to subsurface discharges from manure, litter, and process wastewater storage, as well as discharges from land application. It also encouraged the state to consider modifications to its nutrient

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[78] *Id.*
[79] MCEA et al., *Petition to EPA for Emergency Action Pursuant to the Safe Drinking Water Act*, (April 24, 2023) (Ex. 35).
[80] EPA, Letter to Minnesota State Agencies (Ex. 18).
[81] *Id.* at 4.
[82] *Id.*

management standards in karst areas with regard to land application of manure.[83] The agency stated that it would continue to closely monitor the situation and "consider exercising our independent emergency and enforcement authorities."[84] In response to EPA's letter, MPCA—which had previously stated it did not intend to make significant changes to the NPDES permit for feedlots—issued the Proposed Permits and requested comments.

II. MPCA has the authority and the duty to change the Proposed Permits to comply with state and federal law

MPCA has the authority and the duty under Minnesota and federal law to protect the state's groundwater and surface waters from manure-related pollution. Minnesota and federal statutes set up stringent protections for waters and significant requirements for permits that protect those waters. The current feedlot permits do not meet those requirements, as evidenced by the long-standing, wide-spread, and persistent nitrate pollution of surface waters and groundwater, shown by the state's own data. Accordingly, MPCA must revise the Proposed Permits to impose conditions that will address nitrate and other pollution both from feedlots and land application areas.

State and federal law contain critical and stringent protections for the state's surface waters and groundwater.[85] MPCA, as the agency designated under state law to implement and enforce protections for Minnesota's waters, has the duty to enforce these protections.[86] Under state law, MPCA must protect "waters of the state," which include both surface waters and groundwater.[87]

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[83] *Id.*
[84] *Id.* at 5.
[85] Minn. Stat. § 115.03, subd. 1(a)(1).
[86] As a delegated authority, MPCA acts for the EPA to implement the federal CWA permitting program in Minnesota. The MPCA was first delegated the authority to operate the NPDES program in lieu of the federal government in 1974. *See* 39 Fed. Reg. 2606 (July 16, 1974).
[87] Minn. Stat. § 115.01, subd. 22.

The agency's duties include adopting and enforcing rules, permits, and orders "in order to prevent, control or abate water pollution."[88] Specifically, MPCA must issue permits that:

- Require discontinuance of the discharge of wastes[89] into any waters of the state "resulting in pollution in excess of the applicable pollution standard."[90]
- Prohibit the discharge of any wastes into the waters of the state, or to deposit wastes "where the same is likely to get into any waters of the state" in violation of Minnesota's applicable laws, rules, or permits.[91]
- Require adoption of remedial measures "to prevent, control or abate any discharge or deposit of … wastes by any person."[92]
- Require establishment of systems of recordkeeping, sampling, monitoring, and reporting by dischargers for provision of information to the agency.[93]
- Include additional limits if technology-based standards are not adequate to maintain water quality standards, "notwithstanding any other provision of this chapter, and with respect to the pollution of waters of the state, chapter 116."[94]
- Establish standards, rules, and permit conditions consistent with and not less stringent than the requirements of the federal Clean Water Act and its implementing regulations.[95]

Pursuant to this authority, MPCA refined its water protection objectives and requirements for itself and dischargers through rules. For surface waters, Minnesota law requires MPCA to "protect and maintain surface waters in a condition which allows for the maintenance of all existing beneficial uses," such as drinking, recreating, or supporting aquatic life.[96] MPCA must ensure waters meet numeric standards for certain pollutants, but also "narrative" standards that ensure the

[88] Minn. Stat. § 115.03, subd. 1(a)(5).
[89] Although certain components of land-applied manure may be used by plants, where manure, nutrients, or other pollutants escape their intended use and are instead discharged into waters of the state those pollutants are properly characterized as "other wastes" which as defined includes "agricultural waste" and "biological materials." Minn. Stat. § 115.01, subd. 9.
[90] Minn. Stat. § 115.03, subd. 1(a)(5)(i).
[91] *Id.* subd. 1(a)(5)(ii).
[92] *Id.* subd. 1(a)(5)(iv).
[93] *Id.* subd. 1(a)(5)(vii).
[94] *Id.* subd. 1(a)(5)(viii).
[95] *Id.* subd. 5.
[96] Minn. R. 7050.0150, subp. 1.

designated uses of the water are maintained.[97] This includes narrative standards that prohibit the degradation or impairment of aquatic life in Class 2 waters, i.e., those protected for aquatic life and recreation (a classification that applies to nearly every waterbody in the state).[98] Even without a numeric standard for nitrate in surface waters,[99] therefore, MPCA must still ensure that nitrates do not reach levels in surface waters that would harm aquatic life or prevent the use of the waters for swimming, fishing, and boating. In addition, under MPCA's rules, permits must include conditions necessary to ensure against "nuisance conditions" from either point or nonpoint sources, including aquatic habitat degradation or excessive growth of aquatic plants.[100]

For groundwater, Minnesota law imposes an antidegradation standard—meaning that MPCA must ensure that wastes are controlled "to the maximum practicable extent" to ensure against degradation of the groundwater.[101] Pollutants may not be discharged to the unsaturated zone (the zone between the land surface and the water table) if they "may actually or potentially preclude or limit the use of the underground waters as a potable water supply."[102] Under this rule, land disposal of "acceptable organic wastes" or the use of "fertilizers for agricultural crops or products" is only allowed "provided that such practices do not pose a significant pollutant

[97] Minn. R. 7050.0150, subp. 1.
[98] Minn. R. 7050.150; 7050.0150, subp. 3; MPCA, *Class 2: Aquatic life and recreation beneficial uses*, https://www.pca.state.mn.us/business-with-us/class-2-aquatic-life-and-recreation-beneficial-uses.
[99] The Minnesota Legislature directed MPCA in 2010 to develop aquatic life standards for nitrogen and nitrate. Despite the production of technical support documents that support the imposition of a 5 mg/L standard for coldwater bodies of water and 8 mg/L for other waterbodies, MPCA has not yet implemented any numeric standard for nitrate. Aquatic Life Nitrate Standards, at 1, 7 (Ex. 9).
[100] Minn. R. 7053.0205, subp. 2.
[101] Minn. R. 7060.0500.
[102] Minn. R. 7060.0600, subp. 2.

hazard."[103] Accordingly, MPCA is required to ensure that *all* groundwater pollution—including nitrate pollution—is prevented as much as possible.

These requirements apply to the Proposed Permits. Accordingly, MPCA must ensure that the Proposed Permits (1) stop current discharges and prohibit new discharges of wastes that would violate pollution standards or other laws, (2) include limits needed to maintain water quality standards (even if this conflicts with other provisions of law), (3) include reporting and monitoring requirements needed to ensure permit conditions are being followed, (4) include provisions to prevent both production areas and land applied fields from causing nuisance conditions for aquatic life, and (5) include provisions to protect groundwater from any degradation and to prevent any discharges of wastes that might limit the use of groundwater for drinking water.

In addition to these general charges, MPCA has specific duties regarding the issuance of NPDES permits. Under federal law, MPCA must ensure that the Proposed NPDES Permit complies with the Clean Water Act ("CWA").[104] As a delegated authority, MPCA must establish permit conditions at least as stringent as the CWA, notwithstanding any provisions of state law to the contrary.[105] This means the Proposed NPDES Permit must contain requirements at least as stringent as the federal implementing regulations for NPDES permits for feedlots.[106] Minnesota law can and does impose requirements additional to and more stringent than the floor established in the CWA.[107]

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[103] *Id.,* subp. 5.
[104] *See* 39 Fed. Reg. 2606 (July 16, 1974).
[105] Minn. Stat. § 115.03, subd. 5.
[106] 33 U.S.C. § 1311(b)(1)(C); 33 U.S.C. § 1313(e)(3)(A); 40 C.F.R. § 123.25; *Am. Paper Inst. v. EPA*, 996 F.2d 346, 349 (D.C. Cir. 1993); Minn. R. 7020.0505, subp. 5 (feedlot permits required to include all applicable requirements of the Code of Federal Regulations, title 70, part 122).
[107] For example, Minnesota statutes define "waters of the state" much more broadly than the federal "waters of the United States," and Minnesota law prohibits point source discharge to this much

Under state law, NPDES permits must include all conditions necessary for the permittee to comply with all Minnesota and federal statutes and rules, including water quality standards.[108] The permits must contain "any conditions that the agency determines to be necessary to protect human health and the environment."[109] If numeric effluent limits are not feasible in a permit, MPCA must include BMPs as permit conditions to achieve compliance with state and federal laws and with effluent limitations, standards, and prohibitions.[110] NPDES permits must also include monitoring and reporting requirements "to ensure compliance with permit limitations."[111] The Proposed Permits, therefore, must comply with all of these requirements as well—ensuring compliance with laws and water quality standards through BMPs, and requiring monitoring and reporting to ensure permit limitations are being met.

MPCA is also obligated to include conditions in the Proposed Permits consistent with the state feedlot rules. With regard to land application of manure, the feedlot rules include provisions that (among other things):

- Prohibit the land application of manure in a manner that will "result in a discharge to the waters of the state during the application process."[112]
- Prohibit the land application of manure in a manner that will "cause pollution of waters of the state due to manure-contaminated runoff."[113]
- Require that land applied manure be limited so that available nitrogen sources do not exceed expected crop nitrogen needs.[114]

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larger group of water bodies without a NPDES permit. Minn. Stat. §115.01, subd. 22 (defining "waters of the state"); Minn. R. 7001.1030, subp. 1 (prohibiting point source discharge to any "water of the state" absent a NPDES permit).

[108] Minn. R. 7020.0505; Minn. R. 7001.0150, subp. 2; Minn. R. 7001.1080, subp. 1 and 2.

[109] Minn. R. 7001.0150, subp. 2.

[110] Minn. R. 7001.1080, subp. 3.

[111] Minn. R. 7001.1080, subp. 5.

[112] Minn. R. 7020.2225, subp. 1(A)(1).

[113] *Id.*, subp. 1(A)(2).

[114] *Id.*, subp. 3.

- Require that producers consider *all* sources of nitrogen—including commercial fertilizer, soil organic matter, irrigation water, legumes grown during previous years, biosolids, process wastewater, and manure applied for the current year and previous years—and take appropriate credits for how much they are adding to their fields.[115]

The Proposed Permits, therefore, must impose conditions and limitations on land application of manure that will ensure all of these provisions are met.

Overall, Minnesota and federal law provide MPCA with broad authority and tools to ensure that the Proposed Permits effectively address the nitrate pollution crisis in Minnesota. State and federal law not only mandate the protection of groundwater and surface waters, but also compel MPCA to issue permits that will prohibit discharges of waste, protect water quality, and place conditions on land application of manure to prevent pollution. MPCA also must impose monitoring and reporting requirements that will ensure the Proposed Permits are not merely meaningless paper promises, but actually fulfilled by permittees. MPCA is required to use its authority to implement NPDES and SDS feedlot permits that comply with these laws.

III. MPCA's Proposed Permits include important and necessary changes, but MPCA must make further changes to comply with state and federal law and address nitrate pollution

MPCA has now issued Proposed Permits that include important changes that would, if adopted and enforced, constitute a meaningful step toward addressing nitrate pollution.[116] The explicit direction of the EPA, Minnesota's laws protecting groundwater and surface waters, and MPCA's duties to issue permits that comply with Minnesota and federal law all compel MPCA to implement these changes as a first step. Each of these changes is supported by law and science, and each must be included in the Proposed Permits. These changes, however, do not go far enough

[115] *Id*., subp. 3(C).

[116] The Proposed NPDES Permit and the Proposed SDS Permit are very similar but not entirely identical. All references to section numbers in this comment are to sections in the Proposed NPDES Permit. The Clean Water Organizations intend that all of their proposed changes should be made to both Proposed Permits.

to address the widespread and persistent nitrate pollution crisis, particularly in vulnerable areas of the state. Accordingly, MPCA must make additional changes that will strengthen the Proposed Permits to comply with state and federal law and to effectively address nitrate pollution.

To bring the Proposed Permits into compliance with state and federal law, MPCA must do the following: (1) implement and strengthen the restrictions on fall and winter spreading in vulnerable groundwater areas; (2) implement the provision requiring incorporation of manure within the 100-year floodplain; (3) implement the provision requiring recipients of transferred manure to follow permit requirements; (4) at land application areas, strengthen visual inspection requirements and add groundwater monitoring requirements in vulnerable drinking water areas; (5) at production areas, strengthen visual inspection requirements and add groundwater monitoring requirements; (6) for both production areas and land application areas, impose further sampling requirements and provide additional information to permittees about how to conduct sampling; (7) require pre-plant soil testing for nitrate in accordance with Extension Service recommendations; (8) require nutrient testing before any application of digestate; (9) require producers to use the Runoff Risk Advisory Forecast; and (10) impose additional restrictions on emergency manure applications.

A. MPCA must add protections for vulnerable groundwater areas to the Proposed Permits

1. The Proposed Permits' restrictions on fall and winter spreading in vulnerable areas must be included in the permits

The Proposed Permits include several new requirements for land application in fields in "vulnerable groundwater areas," with coarse textured soils, shallow bedrock, or karst geology, or in highly vulnerable drinking water supply management areas. In such areas, permittees applying manure must:

- For October and November application, use additional BMPs for application, including applying to a growing perennial or row crop, planting a cover crop prior to or within 14 days of application, or rotating perennial crops at least 2 years during any 5-year period and the soil is below 50 degrees at the start of application (§13.6). These restrictions do not apply until 2028.

- For December, January, and February, do not apply solid manure if the ground is frozen or snow-covered (§§ 13.8, 13.9).

Notably, these changes constitute only an incremental addition to the previous NPDES permit's restrictions on fall and winter application—the previous permit already included statewide requirements for certain BMPs for application in early October, prohibited the spread of liquid manure in winter conditions in most months, and limited the spread of solid manure in winter conditions.

These changes, intended to target nitrate pollution where the problem is worst, are strongly supported by science. Applying manure in the fall greatly increases the risk of nitrogen loss—in fact, the Extension Service states that any nitrate left in the soil in the fall "is usually lost during the spring before the next year's crop can take it up."[117] For this reason, the Extension Service does not even recommend taking a nitrogen credit for late season nitrate; according to their recommendations, producers should simply assume that *all nitrate from the fall has been lost* over the winter and spring unless it has been a particularly dry year.[118] In vulnerable groundwater areas, fall application becomes even more risky, and BMPs to help address this problem are absolutely critical.

The new permit provisions will help address this problem. Cover crops, which take up leftover nitrogen in the soil at a time when fields are generally fallow, are a "well-established" way

[117] Carlson, *Taking soil samples for nitrogen analysis could pay big this year* (Ex 26).
[118] *Id.* This is contrary to the feedlot rules, which require producers to take credit for *all* sources of nitrogen, but the recommendation is nevertheless telling with regard to how much nitrogen the Extension Service expects to remain in the soil. *See* Minn. R. 7020.2225, subp. 3(A)(1).

to reduce nitrate loss.[119] Rotating annual crops with perennials decreases leaching losses because perennial grasses have greater root biomass that extends deeper into the soil, taking up nutrients from deeper within the soil.[120] One study on nitrate reduction strategies showed that planting cover crops such as rye can reduce nitrogen loads by approximately 40%, while diversified crop rotations can reduce nitrogen loads by approximately 50%.[121] A three-year study in Lamberton, Minnesota compared drain tile nitrate losses after conversion of alfalfa pasture to corn-soybean and continuous corn rotations and found that perennial pasture reduced nitrogen loads by 18 to 80%.[122] Another study from the University of Minnesota showed that one year of planting wheatgrass decreased soil nitrate-N concentrates by 77%.[123]

As for land application in winter conditions, when the ground is frozen or snow-covered, manure applied to the surface cannot seep into the ground, creating a significant risk of runoff and consequent loss of nitrate.[124] In an average year in Minnesota, nearly half of the total surface runoff volume occurs when the soil is frozen.[125] In addition, when the manure remains above the frozen ground, on the surface, there is a longer opportunity for volatilization—in which ammonium-nitrogen on the surface is turned into ammonia gas.[126] Ultimately, most of this gas turns back into

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[119] Univ. of Minn. Extension Service, *Cover Crops* (Ex. 36).
[120] Evelyn C. Reilly et al., *Reductions in soil water nitrate beneath a perennial grain crop compared to an annual crop rotation on sandy soil*, Frontiers in Sustainable Food Systems (Sept. 2022) (Ex. 37).
[121] Laura Christianson et al., *Financial comparison of seven nitrate reduction strategies for Midwestern agricultural drainage*, 2-3 Water Resources and Economics 30-56 (2013) (Ex. 38).
[122] David Huggins et al., *Subsurface drain losses of water and nitrate following conversion of perennials to row crops*, 93 Agronomy Journal 477-486 (May 2001) (Ex. 39).
[123] Reilly, *Reductions in soil nitrate* (Ex. 37).
[124] Melissa Wilson, *Manure applied on frozen soil or snow—what will happen to my nitrogen?* Minnesota Crop News, (Jan. 1, 2024) (Ex. 40).
[125] Five Year Progress Report (Ex. 12).
[126] Wilson, *Manure applied on frozen soil or snow* (Ex. 40). While freezing temperatures slow down volatilization, research suggests that the process does not stop entirely. In addition, freezing

ammonium and is redeposited on the ground, generally in the same watershed—meaning that it remains a local pollution hazard.[127] Because of the high likelihood of nitrogen loss, the Extension Service advises producers not to apply manure to frozen soils.[128]

Because of the effectiveness of these practices and the severity of the problem in the state's vulnerable areas, Minnesota law requires—at a minimum—that these incremental additions to manure application restrictions be added to the Proposed Permits. As shown by the data, nitrate pollution from agricultural sources in the karst and Central Sands areas has caused widespread violations of Minnesota's water quality standards. In addition, studies show that elevated levels of nitrate in groundwater and surface waters in these vulnerable areas increase risks to human health and hurt aquatic life and ecosystems, even where water quality standards may not be violated. MPCA, accordingly, must impose additional conditions, including BMPs, to ensure compliance with water quality standards and "to protect human health and the environment."[129] Moreover, the feedlot rules specifically prohibit the land application of manure in a manner that will cause pollution of the waters of the state due to manure-contaminated runoff, and applying manure in the fall without cover crops or in winter conditions greatly increases the likelihood of runoff.[130] These changes, accordingly, are both reasonable and necessary under Minnesota law, and they should be made to the Proposed Permits.

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and thawing cycles mean that there will be at least some time for volatilization to occur but make it difficult to determine how much nitrogen has been lost. *Id*.

[127] Christopher S. Jones et al., *Livestock manure driving stream nitrate*, 48 Ambio 1143, 1148 (Dec. 2018) (Ex. 41).

[128] Univ. of Minn. Extension Service, *Reducing Water Quality Issues from Manure* (2020) (Ex. 42).

[129] Minn. Stat. § 115.03, subds. 1(a)(5)(i), 1(a)(5)(ii); Minn. R. 7001.0150, subp. 2; Minn. R. 7020.0505.

[130] Minn. R. 7020.2225, subp. 1(A)(2).

2. The fall and winter restrictions should not be delayed and should be extended statewide

Because the changes are supported by science and the law, MPCA should do more than simply make these changes as proposed. First, there is no reason to postpone the October and November changes to 2028, which is nearly two years into the permit cycle. Nitrate pollution is a crisis *now*, and improvements in groundwater quality will not be immediate, even after changes are implemented. Because of that lag time, it is even more important to take action as quickly as possible. Producers still will have ample time to plan for these changes, which were announced in June 2024. The SDS Permit will not go into effect until May 2025 and the NPDES Permit will not go into effect until January 2026. In addition, because producers' permits expire five or ten years after they are obtained, some producers will not have to reapply for a new permit until well after the initial permit date. Producers know now—more than a year before October 2025, the very earliest anyone would have to comply with the new requirements—of these provisions and can make plans to comply with them.

Second, while it is most critical to apply these provisions in vulnerable groundwater areas, nitrate pollution is a statewide crisis, and applying these BMPs statewide would help reduce elevated nitrate levels across the state. In particular, spreading manure in winter conditions, on frozen ground or snow-covered soil, should be prohibited across the state. Applying manure to frozen or snow-covered ground, when there is assuredly no crop to use it, and when there is a significant risk that it will run off, should not be allowed anywhere in Minnesota. Accordingly, MPCA should not only make the changes included in the Proposed Permits but remove the delay for the fall application requirements and require both the new fall and winter application restrictions across the state.

B. MPCA must include the Proposed Permits' new provision requiring incorporation of manure within the 100-year floodplain in the final permits

The Proposed Permits also require manure to be injected or immediately incorporated if it is applied within the 100-year floodplain (§ 15.4). This is a reasonable requirement—applying manure within a floodplain is self-evidently riskier than applying it outside the floodplain. Not only does the floodplain flood more frequently, but even in ordinary conditions the lower, closer-to-water position of a floodplain means its soils are more likely to be saturated, and the surface is more likely to have water flowing over it. Injecting or incorporating manure into the soil of the floodplain will reduce this increased risk of runoff.[131] Again, Minnesota law requires the addition of this provision: MPCA is required to impose BMPs in the Proposed Permits to ensure compliance with water quality standards and to protect human health, and the feedlot rules prohibit applying manure in a manner that will create runoff that will pollute the waters of the state.[132] This reasonable provision must be included in the final permits.

C. MPCA must require recipients of transferred manure to follow all requirements of the Proposed Permits

The Proposed Permits also include new requirements for transferred manure, including that the permittee must not transfer manure to a recipient who will improperly apply manure during winter conditions (§ 9.3), the permittee must provide the transferee with a summary of requirements that the recipient must follow (§ 9.4), the recipient must comply with all requirements of the permittee's manure management plan ("MMP") (§ 10.2), and the recipient must provide information about its land application to the permittee, who must report this information annually (§§ 24.7, 25.2). In essence, these provisions level the playing field, ensuring that no matter who

[131] Univ. of Minn. Extension Service, *Reduce water quality issues from manure* (Ex. 42).
[132] Minn. Stat. § 115.03, subds. 1(a)(5)(i), 1(a)(5)(ii); Minn. R. 7001.0150, subp. 2; Minn. R. 7020.0505, Minn. R. 7020.2225, subp. 1(A)(2).

uses the manure from the permitted feedlot, that user must follow the requirements of the MMP relating to land application in order to protect water quality. These provisions are absolutely necessary to the Proposed Permits, as they fill a significant loophole. Requiring the permittee to follow carefully crafted provisions intended to prevent nitrate pollution but then not applying these same requirements to transferred manure would significantly undermine the effectiveness of the Proposed Permits and their impacts on pollution.

State and federal law compel the inclusion of these provisions in the Proposed Permits. Minnesota's feedlot rules explicitly require recipients of transferred manure to comply with the MMP of the seller.[133] But more than that: MPCA is required to include in every permit conditions that are needed to ensure compliance with state and federal laws and rules, and to include conditions the agency determines to be necessary to protect human health and the environment.[134] This includes—among others—conditions that will ensure water quality standards are met, including Minnesota's antidegradation standard for groundwater;[135] no wastes are being discharged into the waters of the state or deposited where they are likely to get into the waters of the state;[136] manure is not being applied in a way that would result in a discharge during the application process or that would cause pollution through manure contaminated runoff;[137] and manure application is limited to not exceed expected crop nitrogen needs.[138] The provisions of the Proposed Permits relating to the land application of manure and permittees' MMPs are crafted specifically to meet these requirements. As explained by MPCA when it adopted the feedlot rules:

[133] Minn. R. 7020.2225, subp. 1(D).
[134] Minn. R. 7001.0150, subp. 2; Minn. R. 7001.1080, subp. 1.
[135] Minn. R. 7060.0500.
[136] Minn. Stat. § 115.03, sub. 1(a)(5)(ii).
[137] Minn. R. 7020.2225, subp. 1(A)(1) and (2).
[138] *Id.*, subp. 3.

> Given the complexities associated with manure management, it is extremely difficult to apply manure in an environmentally and agronomically-sound manner without some forethought, calculations and planning prior to applying the manure. A manure management plan is a fundamental tool used by producers to provide assurance that manure is applied at proper rates, times and locations. Combined with accurate records, the manure management plan also provides additional assurance that a particular facility is impacting the environment.[139]

If following the provisions of the Proposed Permits and the MMP is necessary for permittees to comply with Minnesota law, it is also necessary for recipients of transferred manure. Manure applied in the winter, in vulnerable groundwater areas, or within a floodplain does not become less risky to water quality simply because it is sold to another user before it is applied.

Statements at public hearings on the Proposed Permits have indicated that some producers are concerned that they will not be able to sell their manure if recipients are required to follow the requirements of their MMPs. This does not, however, constitute a reason for MPCA to not follow the requirements of state and federal law, which compel MPCA to issue permits that will protect water quality. In any case, there is no evidence that this in fact will happen. Manure is considerably less expensive than commercial fertilizer, so there will continue to be a market for it. Nor will it be overly burdensome for recipients to comply with the incremental, common-sense protections for water quality that are included in the MMPs, particularly compared to the burdens imposed on communities and well owners whose drinking water is contaminated by nitrate pollution. MPCA has already posted tools for permittees who intend to sell manure explaining the requirements for permittees and recipients, which will make compliance easier. In order to make progress on the nitrate pollution crisis in Minnesota, MPCA must include these provisions in the final permits.

[139] 1999 Feedlot Rules SONAR, at 209 (Ex. 1).

D. MPCA must add further monitoring provisions to the Proposed Permits for both production areas and land application areas

Though the Proposed Permits' new provisions for visual inspections of land application areas and sampling of discharges are a welcome step forward, to ensure permittees are complying with permit provisions, MPCA must strengthen monitoring provisions both for land application areas and production areas.

Under both state and federal law, MPCA must include effective monitoring provisions in permits to ensure that permittees are complying with permit provisions and applicable laws. Under federal regulations, NPDES permits must include provisions that "assure compliance with [the] permit limitations" by specifying what monitoring is required, including monitoring of pollutants, volume of effluent, and other measurements.[140] Under Minnesota law, MPCA must include monitoring provisions in its permits that will generate data adequate to "ensure compliance with permit limitations."[141] If a discharge is occurring, the permit must specify the "[r]equired monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity."[142] A NPDES permit for a CAFO that does not include monitoring provisions sufficient to ensure compliance with its terms—particularly for the kinds of difficult-to-observe issues that contribute to water pollution—does not meet the requirements of

[140] 40 C.F.R. §§ 122.44(i)(1)(i)–(iii); 122.48(b).
[141] Minn. R. 7001.1080, subp. 5; *see also* Minn. Stat. § 115.03, subd. 1(a)(5)(i).
[142] 40 C.F.R. §§ 122.44(i)(1)(i)–(iii); 122.48(b).

the law.[143] Such a permit would be of little practical use, and as explained by multiple courts, the CWA "demands regulation in fact, not only in principle."[144]

Here, the Proposed Permits are considered "zero discharge" permits—they generally prohibit discharges of manure or contaminated water from the production areas to channels that convey fluids to groundwater (§ 26.2) or to surface waters except when an overflow discharge results from a 25-year, 24-hour rainfall event (§§ 26.4, 26.5). For land application areas, the Proposed Permits prohibit land applying manure in a way that will result in a discharge to waters of the state during the application process or "exceed the hydraulic loading capacity of the land application site based on soil conditions" (§ 11.4). The NPDES Permit also prohibits discharges from land application areas to waters of the United States, except where the discharge qualifies as an "agricultural stormwater discharge" (§ 26.3), and the SDS Permit prohibits discharging from land application areas to waters of the state unless the discharge is caused by a precipitation event and the facility otherwise complies with permit requirements (SDS Permit § 26.4). But these prohibitions are toothless without monitoring provisions. Someone, either visually or using technology, must be inspecting the production areas and land application areas to ensure that there are no discharges in violation of the permits.

However, the Proposed Permits require only limited monitoring. The Proposed Permits retain current requirements for occasional visual inspections of LMSAs (§§ 17.4, 21.2) and weekly visual inspections of production area components (§ 20.2), and they add new requirements for

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[143] *Food & Water Watch v. Env't Prot. Agency,* 20 F.4th 506, 515 (9th Cir. 2021) ("Our case law confirms that NPDES permits must contain monitoring provisions sufficient to ensure compliance with the terms of a permit."); *Nat. Res. Def. Council v. Env't Prot. Agency*, 808 F.3d 556, 565, 583 (2d Cir. 2015) ("Generally, an NPDES permit is unlawful if a permittee is not required to effectively monitor its permit compliance." (internal citation omitted)).

[144] *Food & Water Watch*, 20 F.4th at 515 (citing *Waterkeeper Alliance, Inc. v. Env't Prot. Agency*, 399 F.3d 486, 507 (2d Cir. 2005)).

visual inspections of the land application areas (§ 14.3) and sampling requirements for known discharges (§ 28.3). These provisions do not adequately ensure that permittees are not, in fact, discharging pollutants to surface waters and groundwater. MPCA must add more specificity to the proposed monitoring provisions and include additional monitoring provisions to ensure that sufficient data are collected to be representative of the monitored activity. In production areas, MPCA should require a regular and specific plan for sampling of discharges, daily visual inspections, and a groundwater monitoring plan. At land application sites, MPCA should add further requirements to strengthen the required visual inspections and groundwater monitoring requirements in vulnerable groundwater areas. Finally, for both production areas and land application areas, MPCA must add more specificity to the sampling provisions to ensure permittees have sufficient information about how to handle samples and that MPCA obtains sufficient information about whether permittees are causing violations of water quality standards.

1. The Proposed Permits' new land application monitoring requirements are a crucial step forward, but the additions do not go far enough

For land application areas, the Proposed Permits add helpful monitoring requirements, but these are not enough to ensure that permittees are truly complying with permit provisions. The permits are purportedly "zero discharge" permits, but it is well-established that most of the nitrate load to Minnesota's waters comes from cropland sources. Clearly, discharges are occurring from land application fields, and permittees must be required to take further action—including creating a comprehensive visual inspection plan and adding subsurface monitoring to high-risk fields—to ensure they are not violating the provisions of their permits and state and federal laws.

a. The new visual inspection provisions are a welcome step forward for the Proposed Permits

The Proposed Permits have added requirements for visual inspections of land application fields at all downgradient field edges; sensitive features including tile intakes, sinkholes, and wells;

ditches; and other features that could convey manure to waters (§ 14.3). These inspections must take place at least once on each day of manure application, at the end of each day of application, and after any significant rainfall within 14 days after application unless the manure is injected or incorporated (§ 14.3). Any discharge must be responded to and reported to the State Duty Officer and the MPCA (§§ 14.3, 27.2, 27.3). These requirements are not overly burdensome; they do not require investing in expensive equipment or even expending a significant amount of time. Instead, they are common-sense provisions that take the first, necessary step toward adding monitoring provisions that will ensure compliance with the Proposed Permit's prohibition on dry-weather discharges and Minnesota's rules protecting groundwater. Producers cannot know whether they are violating their permits if they do not—at an absolute minimum—look to see if manure is visibly running off of their fields during or immediately after application, or after a significant rainfall. State and federal law require MPCA to include *at least* these monitoring provisions in the Proposed Permits.

b. The new visual inspection provisions should be strengthened to improve their effectiveness

To make these visual inspections more effective and actually ensure compliance with the Proposed Permits, MPCA should require permittees to generate a detailed visual monitoring plan. The plan should identify all locations where monitoring will occur, including subsurface drain tile outlets if they exist, and all sensitive features that require buffers or setbacks as outlined in Section 15 of the Proposed Permit. These sensitive features should all be monitored to ensure that conservation practices such as buffers, setbacks, or compliance alternatives function as intended. Permittees should use the digital Nutrient Management Tool that MPCA plans to integrate into the final Permits to generate the visual monitoring plan, since that tool will locate sensitive features on all fields where manure is land applied. The monitoring plan should describe the methodology

that will be used to determine representative monitoring locations. It also should be integrated into the public notice for permit coverage, so it is available for public review and comment. In addition, those monitored points of discharge must include subsurface drain tile outlets in addition to tile intakes. This aligns with the EPA's recommendation that the Proposed NPDES Permit should require the identification of any subsurface drain tile on all land application fields as well as requiring "observation of subsurface drain tile outlets prior to, during, and following land application of manure or process wastewater for volume/rate of flow and color, turbidity, foam, and odor to identify any discharges that may violate effluent limitations.[145] Further, for the areas with the highest risk of discharges at the surface—downgradient edges of fields or sinkholes, for example—the monitoring plan could include cheap and durable motion sensor cameras that could to detect discharges during applications and for 14 days thereafter.

c. Groundwater monitoring provisions for land application fields in vulnerable groundwater areas must be added to the Proposed Permits

To ensure compliance with the Proposed Permits, in addition to visual inspections, MPCA should require groundwater monitoring on fields with the highest risk of nitrate loss to groundwater from overapplication of nitrogen sources.[146] Subsurface monitoring of this kind is the only way to ensure that unauthorized discharges to groundwater, which would not be discovered by a visual inspection, are not occurring in violation of the Proposed Permits.

MPCA has already determined that fields in the new vulnerable groundwater areas are those most at risk of discharging nitrate and other pollutants to groundwater because of their soil and geologic conditions. And state agency data and producer surveys demonstrate that producers

[145] EPA, Letter to MPCA re: Pre-Public Notice Draft Feedlot NPDES General Permit (MNG440000), Enclosure A p. 1 (May 9, 2024) (Ex. 43).
[146] For more details on effective monitoring tools for land application areas, see the comments of Food and Water Watch.

who land apply manure in addition to commercial fertilizer are likely to exceed recommended nitrogen application rates. Based on this combination of risk factors, land application fields that fall entirely within the mapped vulnerable groundwater areas should require subsurface monitoring in addition to visual inspections. To identify fields where there is a high risk of nitrate loss to groundwater and additional monitoring practices are required to comply with the Permit terms, MPCA should incorporate risk assessment tools like the USDA Web Soil Survey maps for coarse textured soils, shallow bedrock, and Manure and Food-Processing Waste limitations into the statewide definition of vulnerable groundwater areas, as well as the Minnesota Department of Natural Resources maps on Groundwater Sensitivity to Pollution.[147] MPCA should also incorporate these tools into the anticipated digital Nutrient Management Tool that feedlot operators will be required to use to generate MMPs under the Proposed Permit.

Along with a plan for visual inspections, permittees should be required create a plan for appropriate subsurface monitoring of their fields within their MMP, which would use soil probes, soil moisture probes, or lysimeters to monitor water quality within high-risk fields. These technologies would effectively monitor whether land application practices "exceed the hydraulic loading capacity of the land application site based on soil conditions," as required by the Proposed Permit and Minnesota feedlot rules (§ 11.4). Soil moisture probes and lysimeters require uniform installation across a field to generate representative data,[148] so a field-wide system must be used. Generally, one sample should be taken for every 20 acres, and the monitoring should occur during

[147] Both the USDA Web Soil Survey and the Minnesota DNR Groundwater Sensitivity maps are incorporated into the definition of vulnerable groundwater areas by the Minnesota Department of Agriculture under the Groundwater Protection Rule.
[148] Kevin Kuehner et al., *Examination of Soil Water Nitrate-N Concentrations from Common Land Covers and Cropping Systems in Southeast Minnesota Karst*, MDA (Oct. 2020) (Ex. 44).

land application or irrigation of fields where manure has been land applied.[149] If a discharge is discovered at a land application area and it is clear that there has not been an appropriate agronomic utilization of nutrients, the producer must be required to have a professional engineer or hydrogeologist review the MMP.[150] Results of the assessment would then be uploaded to the new digital Manure Management Tool and any deficiencies would have to be addressed by the permittee to ensure no additional discharges occurred. Subsurface monitoring at select fields in vulnerable groundwater areas would have the added benefit of generating representative data on the effectiveness of the newly required BMPs for these high-risk areas in the Proposed Permit. With this combination of comprehensive visual inspections and subsurface monitoring in the places where it is most needed, MPCA can ensure that permittees are actually following the requirements of the Proposed Permits and not discharging from land application areas.

2. The Proposed Permits fail to require sufficient monitoring of discharges from production areas

For production areas, the Proposed Permits only require occasional visual inspections, which are inherently unequipped to capture the myriad of ways in which CAFOs discharge from production areas. MPCA must alter the Proposed Permits to include monitoring requirements that capture these illegal discharges and other discharges that may violate the state's water quality standards. This includes requiring more frequent visual inspections and groundwater monitoring, potentially through a Subsurface Discharge Monitoring Plan.

a. MPCA must require more frequent visual monitoring to ensure production areas are not discharging to surface waters

Although the Proposed Permits generally prohibit discharges to surface waters, the monitoring provisions in the permits fail to impose a monitoring regime that is robust enough to

[149] *See* Food & Water Watch comment on the Proposed Permit, David J. Erickson expert report.
[150] EPA, *Proposed 2024 Permit for CAFOs in Idaho*, Section IV.E.1 (June 2024) (Ex. 45).

detect such discharges. The Proposed Permits do not contain adequate monitoring requirements to identify if, and when, a facility is discharging at times other than when it is conditionally authorized to do so during a 25-year, 24-hour rainfall event. Under the current permit terms, an unauthorized discharge could occur for days or weeks before even a visual inspection is required (§20.1-21.2). To promptly capture and report unauthorized discharges, daily visual inspections of production areas should be required.

Daily visual inspections are particularly important with regard to LMSAs. The Proposed Permits require visual inspections of the LMSAs and their components weekly or after a 25-year, 24-hour storm event (§ 21.2). However, the Proposed Permits also require that the permittee notify MPCA within 24 hours of encroachment of the liquid manure into the freeboard of the LMSA (§ 17.5). MPCA must alter the inspection schedule in section 21.2 to require a daily visual inspection of the liquid level and freeboard marker in each LMSA to ensure that adequate freeboard is maintained. In order for a permittee to notify the MPCA "within 24 hours of encroachment" and list "the date when the freeboard encroachment began" under section 17.5, MPCA must require permittees to conduct daily, not weekly, visual inspections of the liquid level and freeboard marker in each LMSA.

b. MPCA must add groundwater monitoring provisions to ensure compliance with water quality standards

i. Visual inspections are insufficient for production areas, particularly when the approved liners are designed to leak

The Proposed Permits also prohibit discharges to groundwater (§ 26.2) to comply with Minnesota's strict protections for groundwater.[151] However, the Proposed Permits not only fail to

[151] *See* Minn. Rs. 7060.0400-.0600. MPCA must also monitor discharges to groundwater that are the equivalent of a "functional discharge" to surface waters. Particularly in areas like the karst region, there is no question that the groundwater and surface waters are intimately connected and

require any groundwater monitoring whatsoever at the production area, they in fact *allow* discharges to groundwater at significant levels through the design standards for LMSAs. Despite this, the Proposed Permits contain no way to ensure that production areas comply with the permit's zero-discharge requirement.

MPCA cannot avoid the need for groundwater monitoring by asserting that the Proposed Permits will prevent any discharges to groundwater, as the permits allow significant discharges to groundwater through the allowable designs for LMSA and manure stockpile liners. The Proposed Permits require permittees to construct manure storage areas in compliance with Minnesota's feedlot rules (§ 4.4). Under the feedlot rules, LSMAs, if not concrete lined, may be designed and constructed to "achieve a maximum theoretical seepage rate of not more than 1/56 inch per day."[152] However, this design standard allows a discharge from the LMSA of approximately 500 gallons per acre per day.[153] MPCA did not calculate how many millions of gallons of discharge it was authorizing from the hundreds of CAFOs covered under the general permits. Similarly, the Proposed Permits require the liner of a permanent manure stockpile to be built in compliance with Minnesota's feedlot rules (§ 6.2). The rules require the stockpile site liner to be constructed of soils or other liner materials that achieve hydraulic conductivity of 1×10^{-7} cm/sec or less.[154] Again,

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that discharges to groundwater enter surface water. Nitrate has an extremely low partitioning coefficient, which enables nitrate to migrate quickly through groundwater and travel long distances that can and do reach surface water. Nitrate plumes in groundwater have a high likelihood of impacting surface water.

[152] Minn. R. 7020.2100, subp. 3(C)(1).

[153] Natural Resources Conservation Service, *Agricultural Waste Management Field Handbook, Agricultural Waste Management System Component Design*, Appendix D, 10D-3 (2009) ("Waste Management Field Handbook") (Ex. 46) ("If regulations or other considerations require that unit seepage be less than 500 gallons per acre per day (1/56 inch per day), synthetic liners such as high-density polyethylene (HDPE), linear low-density polyethylene (LLDPE), ethylene propylene diene monomer (EPDM), or geosynthetic clay liners (GCL), concrete liners, or aboveground storage tanks may be more feasible and economical and should be considered.").

[154] Minn. R. 7020.2125.

this design standard allows a discharge. National Resources Conservation Service's Animal Waste Management Handbook, Section 10D states that, under conservative estimates, a permeability of 1 x 10^{-6} cm/sec will seep 9,240 gallons per day.[155] Using the same calculations, if a liner has a permeability of 1 x 10^{-7} cm/sec, it will still leak 924 gallons of manure-laden water per day *by design*. MPCA failed to explain how these standards and leakage rates ensure compliance with the "no discharge" permitting requirements. And those are only the discharges that are expected when liners are performing as designed. Over time, liners may fail, with earthen liners particularly vulnerable to increased leakage rates that degrade water quality.[156] This makes groundwater monitoring particularly important.

Notably, visual inspection requirements of lagoons (§ 20.1-21.2) are ineffective in lieu of monitoring because an inspector cannot visually see a leak below the opaque, manure-laden process wastewater. As a result, these inspections cannot in most cases determine if a lagoon is leaking or seeping to a degree that exceeds the permits' effluent limitations. LMSAs operate dynamically, with differing inputs (e.g., manure, precipitation, process wastewater) and outputs (e.g., land application, manure transfer, evaporation) of varying quantities and timing throughout the crop year. Requiring permittees to monitor LMSAs through only visual inspections means only the most catastrophic leaks will be detected, as measuring lagoon seepage and leakage through observation of a freeboard measuring stick is imprecise given the dynamic nature of LMSAs. With the substantial groundwater contamination problems plaguing Minnesota, especially the Southeastern portion of the state, a mere visual accounting of the integrity of large LMSAs is contrary to the goals of the Proposed Permits and Minnesota law.

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[155] Waste Management Field Handbook at 10D-2 (Ex. 46).
[156] MPCA, *Best Management Practices and Data Needs for Groundwater Protection*, at 16 (2019) (Ex. 47).

Moreover, construction requirements do not substitute for leak detection monitoring. The routine cleaning of manure solids results in excavation, erosion, and liner damage over the life of the lagoon. As a result, a lagoon that meets the permits' requirements when constructed may fail the requirements after the first and subsequent cleanings. Permittees cannot know if there is an impact to groundwater through construction mistakes or erosion without routine monitoring.

Thus, MPCA must require groundwater monitoring as a requirement of the permits. Indeed, as the Ninth Circuit Court of Appeals recently found in a challenge to a similar general feedlot permit in Idaho, "[w]ithout a requirement that CAFOs monitor waste containment structures for underground discharges, there is no way to ensure that production areas comply with the Permit's zero-discharge requirements."[157]

ii. MPCA has several options for adding groundwater monitoring at production areas to the Proposed Permits

While producers may claim that groundwater monitoring is overly burdensome, several options exist for groundwater monitoring, or at a minimum, a Subsurface Discharge Monitoring Plan for the production areas to be added to the Proposed Permits.

Groundwater monitoring is a simple and well-established process that does not require new or innovative technologies, and it is the only method to definitively determine whether a subsurface discharge complies with the state's groundwater quality standards. In fact, groundwater monitoring is a condition of numerous other state discharge permits.[158] Groundwater monitoring can be accomplished with low-cost lysimeters, a series of up and downgradient groundwater monitoring

[157] *Food & Water Watch*, 20 F.4th at 517.
[158] *See* MPCA, *Discharge Monitoring Reports*, https://www.pca.state.mn.us/business-with-us/discharge-monitoring-reports (last visited Aug. 29, 2024).

wells, or a designed leak detection sump system. Well drilling, sampling and analysis protocols are well documented in EPA regulations.[159]

To determine the most appropriate form of monitoring for a particular site, MPCA should require a Subsurface Discharge Monitoring Plan ("SDMP") as part of a permittee's MMP, included in the permittee's notice of issuance of permit and subject to public review and comment. An SDMP (a) identifies the structures and locations to be monitored, (b) establishes a routine periodic inspection schedule adequate to identify leaks, damage, and other issues that could cause a subsurface discharge, (c) identifies criteria or protocols that will be used to determine whether a subsurface discharge has occurred, and (d) establishes site-specific protocols for monitoring subsurface discharges.[160] SDMPs are particularly necessary where, as here, the Proposed Permits do not require routine inspections of the integrity of the liners used in production areas. Requiring SDMPs will ensure that liner materials retain their structural integrity and prevent all discharges, while also ensuring that permittees are not burdened with a "one size fits all" groundwater monitoring plan that might impose more monitoring than their feedlot truly needs.

To start, MPCA could follow the specific language EPA used in its latest draft NPDES General Permit Modification for CAFOs in Idaho to require SDMPs unless each wastewater or manure storage structure is "constructed of concrete or steel, or with a double-layer synthetic liner with leak detection, and is properly operated and maintained in accordance [with the Permit's structural evaluation requirement]."[161] MPCA should include language ensuring that monitoring plans are tailored to individual facilities, similar to how MMPs are facility specific. Since the approved manure storage structures are *designed to leak*, monitoring plans must be targeted at the

[159] 40 C.F.R. §§ 257.91–.95.
[160] EPA, *Proposed 2024 Permit for CAFOs in Idaho*, Section IV.D (Ex. 45).
[161] EPA, *Proposed 2024 Permit for CAFOs in Idaho*, Section III.A.2.a.iii (Ex. 45).

characteristics of the underlying hydrogeology receiving that continuous seepage. These site-specific plans must be designed by a professional engineer or geologist with experience in monitoring methodology, systems, and analytical requirements. Further, MPCA should require that groundwater monitoring systems be progressively more rigorous depending on the type of waste impoundment liner used. Earthen liners should require a full groundwater monitoring plan,[162] while synthetic liners could require an abbreviated monitoring scenario, and a double synthetic liner with leak detection or a sump and pump design would not require a groundwater monitoring system at all *if* the operation and maintenance standards outlined in Minnesota Rule 7020.2100 subpart 6 are met.

Notably, monitoring through these kinds of tools, even through monitoring wells, is immensely cheaper and less time consuming than remediation of impacts to groundwater and drinking water aquifers. Remediation involves the physical removal of the manure-saturated soils under the waste lagoons and compost areas, treatment or removal of contaminated soil in the vadose zone, active treatment of groundwater, or treatment of drinking water for communities and private well owners. Such remediation can cost tens to hundreds of millions of dollars. Proper permitting, monitoring, and management vastly reduce these costs by minimizing impacts to soil and groundwater. Thus, MPCA must alter the Proposed Permits to require effective monitoring at production areas and land application areas.

[162] For a full groundwater monitoring plan, wells should be placed upgradient and downgradient of the lagoon or area to be monitored, and sampling should be conducted quarterly or semiannually to establish seasonal fluctuation in groundwater quality or quantity, to collect representative data, and to establish statistically significant background data. Data analysis requires statistical evaluation of the data to determine if upgradient water quality is different than downgradient water quality. A statistically significant delta between these two data sets establishes that the monitored area is contributing pollutants to groundwater.

3. The Proposed Permits' new discharge sampling requirements are a step forward, but the provisions do not go far enough

In addition to monitoring for the existence of discharges, the Proposed Permits must include provisions that will determine whether the discharge is causing a violation of water quality standards or other state or federal laws—including requirements to sample the content of discharges and waters contaminated by the discharge. MPCA is obligated by Minnesota Rules to include monitoring requirements in the Proposed Permits that include (1) a measurement of the volume of effluent discharged from each outfall and (2) any other measurements needed to determine compliance with a permit condition.[163] Accordingly, the Proposed Permits must contain monitoring requirements that will measure the volume of effluent being discharged as well as measurements that will determine whether the discharge is leading to violations of water quality standards. In addition, the Proposed Permits require compliance with all state and federal water quality standards, including the groundwater antidegradation standard and the narrative standards for Class 2 waters. The permits must, therefore, contain provisions that would determine whether discharges are causing violations of these standards. This can only be done by requiring routine water sampling. Though the Proposed Permits do now require some water sampling, they do not go far enough to ensure compliance with state and federal law.

a. The new water sampling provisions are a welcome addition to the Proposed Permits

The Proposed Permits now require that the permittee monitor discharges by collecting a sample of the discharge and a sample of the water the discharge is entering and have those samples analyzed by a certified lab (§ 28.3). If conditions make sampling unsafe—as in flood conditions or severe weather—the permittee may delay sampling until the conditions have passed (§ 28.3).

[163] Minn. R. 7001.1080, subp. 5.

These provisions are required by MPCA's obligations under state and federal law to include appropriate monitoring provisions to ensure permit compliance. As with the visual inspection of the land application areas, obtaining several samples of discharges is the absolute minimum that should be required of permittees. Without samples, MPCA cannot determine whether water quality standards are being exceeded, violating state and federal law as well as the permit provisions. Sampling requirements must be included in the Proposed Permits.

b. Further instructions for sampling and additional sampling requirements must be added to the Proposed Permits

While the addition of water sampling is a step forward, the Proposed Permit provides little guidance for how, when, and where to obtain samples, and it does not go far enough in imposing conditions that will actually determine whether water quality standards are being violated. The Proposed Permits should be revised to remedy these deficiencies, and in particular to require sampling of drain tile outlets, as recommended by the EPA.

First, the Proposed Permits provide little guidance for permittees who may not know how to correctly obtain a discharge or water sample. Though the Proposed Permits point to Minnesota Rule 7053.0155, this rule does not provide any practical information about how to obtain the samples. Nor do the Proposed Permits explain where, how, or when to send such samples, other than to a "certified lab." Additional details—either in the permit itself or a linked document—likely would increase compliance with this new provision of the Proposed Permits. MPCA could point to established water sampling protocols, such as Section 3 of EPA's Industrial Stormwater Monitoring and Sampling Guide[164] or the EPA Region 4 Surface Water Sampling procedures.[165]

[164] EPA, *Industrial Stormwater Monitoring and Sampling Guide, 832-B-09-003* (April 2021), https://www.epa.gov/sites/default/files/2015-11/documents/msgp_monitoring_guide.pdf.
[165] EPA, *Region 4 Surface Water Sampling Procedures, LSASDPROC-201-R6* (April 2023), https://www.epa.gov/sites/default/files/2017-07/documents/surface_water_sampling201_af.r4.pdf.

Alternatively, it could draft its own details. Either way, MPCA should provide more information about how to sample, including how large the sample should be, what kind of container is appropriate, how to handle the samples after obtaining them, and information for labs where the samples could be sent. The protocol should specify instances where instruments that require experienced operators—such as the automatic flow proportionate sampling devices for stream water grab samples—are necessary. Samples should be analyzed in accordance with approved EPA methods (as set forth in 40 C.F.R. Part 136) for, at a minimum, total Kjeldahl nitrogen, nitrate nitrogen, nitrite nitrogen, total phosphorus, E. coli, fecal coliform, and five-day biochemical oxygen demand. Producers should be required to identify the sampling points with a map, latitude and longitude, or a narrative description that provides enough information for a reviewer to pinpoint the location. Including more specific instructions would likely encourage more compliance with the sampling requirements, as permittees will have more information about how to effectively comply.

Second, the sampling requirements are not clear regarding when samples must be taken. As written, Section 28 could be read to require sampling only of a discharge that is detected and reported to the State Duty Officer. But to actually obtain representative data sufficient to characterize the monitored activity and determine whether it causes or contributes to a violation of state water quality standards, producers must do more. Instead, MPCA should impose a regular schedule of required sampling at both land application sites and production areas, including samples of dry-weather discharges into tile outlets, ditches, or alternative locations that provide representative data.[166] For land application areas, this should include samples taken before land application, to provide baseline data, and samples taken within 14 days of land application, to

[166] *See* EPA, *Proposed 2024 Permit for CAFOs in Idaho* (Ex. 45).

determine whether changes have occurred. For production areas, producers should be required to take samples to obtain baseline data and then set a regular schedule for sampling of authorized and unauthorized discharges. These requirements for both land application and production areas could be built into the MMP, and specifically into MPCA's new online tool, which could help producers identify appropriate places for sampling.

In its comments on the Proposed Permits, EPA recommended to MPCA that it include sampling requirements for drain tile outlets, but MPCA asserted that such a requirement would be too difficult to implement.[167] However, tile drainage is one of the most significant ways that nitrate gets into Minnesota's waters, making the tile outlets one of the most important sources to monitor and sample. To meet its obligations to include monitoring provisions sufficient to ensure that permit provisions are being met, MPCA must revise this section to include more information regarding sampling protocol and a regular schedule for sampling at discharge points.

Overall, adding effective monitoring and sampling provisions is one of the most significant changes MPCA can make to the Proposed Permits. As other courts have recently determined, and the EPA has recognized in the proposed Idaho CAFO General Permit, permits without effective monitoring provisions cannot address the problem of water pollution from feedlots. These changes are absolutely critical to addressing Minnesota's nitrate contamination crisis.

E. MPCA must add provisions requiring pre-plant soil testing for nitrate to the Proposed Permits

To comply with state and federal law and address water quality issues, MPCA should not only implement its proposed changes to the Proposed Permits and make revisions to strengthen those changes, MPCA should also make several additional changes to the permits that will help

[167] MPCA, Letter to EPA re: Pre-Public Notice Draft Feedlot NPDES General Permit (MNG440000) (June 18, 2024) (Ex. 49).

address nitrate pollution. First, in addition to requiring water sampling, the Proposed Permits must include requirements for pre-plant soil nitrate testing. No spring soil testing for nitrate currently is required by the Proposed Permits, although they require soil phosphorus testing every four years (§ 11.5). Adding requirements for nitrate pre-plant testing will ensure that producers are appropriately taking credit for nutrients already in the soil before they add even more nitrogen.

Under Minnesota's land application rules and the provisions of the Proposed Permits (§ 12.3), manure must not be applied at rates that "exceed expected crop nitrogen needs for nonlegume crops and expected nitrogen removal for legumes."[168] In determining whether sufficient nitrogen has been applied, producers must consider *all* nitrogen sources, including not only fertilizer and manure applied that particular year, but also manure applied in previous years, soil organic matter, and legumes grown during previous years.[169] However, it is well-established that producers often fail to properly credit all sources of nitrogen, particularly for previously planted legumes and previously applied manure.[170] Requiring a pre-plant soil nitrate test would ensure that producers who may not properly account for all nitrogen sources actually need additional applications of nitrogen.

Recognizing that pre-plant nitrogen tests can be a tool to ensure nitrogen is not overapplied, the feedlot rules require MMPs to include plans for soil nitrate testing in accordance with Extension Service recommendations.[171] Even though the Proposed Permits do not require soil

[168] Minn. R. 7020.2225, subp. 3(A).
[169] *Id.* subp. 3(A)(1).
[170] MDA, *Minnesota Nitrogen Fertilizer Management Plan*, 63, 136-37 (Mar. 2015) (explaining survey data shows the need to improve crediting for nitrogen sources including previous years' legumes and manure, that proper manure crediting is one of the greatest opportunities for advancement in nutrient management, and that lack of proper manure crediting is a statewide issue).
[171] Minn. R. 7020.2225, subp. 4(D)(12).

nitrate tests, the Extension Service does recommend soil nitrogen tests in the fall in western Minnesota and in the spring in south-central, southeastern, and east-central Minnesota.[172] The recommendations also explain that appropriate credits based on the soil nitrate concentration determined by the test can be up to 155 pounds of nitrogen per acre—the entire amount of nitrogen that should be applied in some situations under Extension Service recommendations.[173] This could, in some cases, prevent significant overapplication of nitrogen to fields where more nutrients are not needed—which is helpful both for the environment and producers' bottom lines. Accordingly, to comply with the feedlot rules, MPCA must add requirements for annual pre-plant soil nitrate tests that follow the Extension Service recommendations.

F. MPCA must add a provision requiring nutrient testing before any application of digestate

The Proposed Permits currently require permittees to analyze manure for its nutrient content annually and following any changes that may significantly affect its nutrient content (§ 8.2). This provision should be revised to explicitly require that any digestate from an anaerobic digester be sampled and analyzed for nutrient content before application. Manure that enters a digester and the digestate that exits it will have significantly different properties and nutrient content, particularly if different waste streams are combined. Digestate has significantly higher concentrations of nutrients than manure, with higher proportions of plant-available forms of

[172] Univ. of Minn. Extension Service, *Fertilizing Corn in Minnesota* (Ex. 25). The Extension Service recommendations say the pre-plant nitrate test should not be used in the spring when manure or commercial nitrogen has been applied the previous fall or in the spring before the sample was taken. *Id*. However, for western Minnesota, this simply means that the nitrate test should be taken in the fall before any manure or commercial fertilizer is applied. For the areas of Minnesota where a spring pre-plant nitrate test is recommended, the sample should be taken before any nitrogen is applied.

[173] *Id.*

nitrogen.[174] This higher concentration could easily lead to overapplication of nitrogen when digestate is applied. In addition, digestate may have a different composition each time it is applied, depending on the particular inputs that were combined to produce it. Accordingly, production of digestate should be considered a "change[ ] to conditions that may significantly affect the nutrient content," (§ 8.2) and any application of digestate should be tested for its content before application. Stating this clearly in the Proposed Permits will help reduce the risk of inadvertent nutrient overapplication.

G. MPCA must add a provision requiring producers to use the Runoff Risk Advisory Forecast before land applying manure

The Proposed Permits require manure to be injected or immediately incorporated into soil if the National Weather Service predicts that there is a more than 50 percent chance of rainfall over 0.5 inches within 24 hours of the application period (§ 13.3). This is not a new requirement, and it is reasonable considering the higher risk of runoff in rainy conditions. However, MPCA should further decrease the risk of manure runoff by also requiring permittees to use the MDA's Runoff Risk Advisory Forecast ("RRAF"), a tool specifically created by MDA to help producers determine the best time to apply manure.[175]

The RRAF was created specifically to help reduce manure nutrient runoff.[176] Rainfall during or immediately after manure application is a significant source of runoff—in one study, more than half of the runoff from fields was caused by one or two rain events each year.[177] The RRAF is more accurate in predicting a runoff risk than a weather report, as it considers not only

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[174] *See* MDA, *Manure Digesters*, https://www.mda.state.mn.us/environment-sustainability/manure-digesters.
[175] MDA, *Runoff Risk Advisory Forecast*, https://www.mda.state.mn.us/protecting/cleanwaterfund/toolstechnology/runoffrisk.
[176] *Id.*
[177] MDA, *Root River Field to Stream Partnership* (Ex. 23).

upcoming rainfall, but also soil moisture content, temperatures, snow melt, and other factors.[178] It is more precise than a weather report as well—the RRAF uses this information to assign a specific runoff risk to each 2 square kilometer area of the state: No Runoff Expected, Low, Moderate, or Severe. Producers can sign up to receive texts on their phones for their fields, making the system extremely user-friendly. However, relatively few producers have signed up to use the tool, despite its usefulness.

To reduce the risk of runoff—at times when the state's own model has determined risk of runoff is high—MPCA should add provisions to the Proposed Permits that require permittees to (1) sign up for the RRAF, (2) reconsider applying manure in fields where the risk is "moderate," and (3) refrain entirely from applying manure in fields where the risk is "severe." Again, MPCA has the authority to add such a provision to the permit. Spreading manure at a time when the state's own tool determines that the risk of runoff is "severe" violates the feedlot rules' requirement that manure not be applied in a way that will create runoff that will pollute the waters of the state.[179] In addition, prohibiting application of manure when runoff risk is "severe" is a reasonable BMP to impose in order to ensure permittees comply with water quality standards. To help address nitrate pollution, MPCA should add these provisions to the Proposed Permits instead of relying solely on weather forecasts.

H. MPCA must add a provision imposing additional restrictions on emergency manure applications

The Proposed Permits allow emergency manure applications (1) when application would ordinarily be prohibited because of forecast rain (§ 13.3), (2) without the otherwise-required implementation of the fall BMPs, even in vulnerable groundwater areas (§§ 13.5, 13.6), and (3) of

[178] *Id.*
[179] Minn. R. 7020.2225, subp. 1(A)(2).

liquid manure in winter conditions when certain BMPs are followed (§ 13.7). Situations that constitute an emergency under the Proposed Permits include "unusual weather conditions, unavoidable equipment failure, or other circumstances that could not have been avoided with proper planning and management." (§ 31.20.) Under these circumstances, producers are allowed to apply manure in ways that MPCA has explicitly determined are too dangerous to water quality to otherwise be allowed.

MPCA should implement more restrictions on these emergency applications. As EPA recommended, MPCA should provide further clarification of the extremely vague phrase "unusual weather conditions," [180]which permittees could interpret as meaning nearly anything, even one instance of unusually heavy rain. Instead, this should be defined as a truly extraordinary and unexpected amount of rainfall. As EPA also recommended, MPCA should provide more options for managing manure than only storage—for example, treatment—before allowing emergency application.[181] In addition, even in an emergency application, certain of the fall BMPs still could be used, including using a nitrogen stabilizing agent or requiring cover crops after the application. MPCA could also require the BMPs for winter application of liquid manure to be followed for any emergency application of manure (§ 13.7).

In response to EPA, MPCA asserted that further restrictions on emergency application are unnecessary because producers must notify MPCA within 24 hours of encroachment of the freeboard in an LMSA, which allows MPCA and the producer to explore options other than an emergency application.[182] There are several problems with this response. Nothing prohibits a

[180] EPA, Letter to MPCA re: Pre-Public Notice Draft Feedlot NPDES General Permit, at 5 (Ex. 43).
[181] *Id.*
[182] MPCA, Letter to EPA re: Pre-Public Notice Draft Feedlot NPDES General Permit, at 7 (Ex. 49).

permittee from conducting an emergency application within that 24-hour period before contacting MPCA—in fact, the responsibility of the permittee to maintain the freeboard might suggest to permittees they should conduct the application immediately (§17.5). Alternatively, the producer might have considered the application to be an "emergency" without encroachment of the manure into the freeboard, or the application could be of solid manure, not from an LMSA at all. Nor does this response explain why MPCA could not require any fall BMPs feasible under the particular conditions, or why the winter emergency limitations do not apply to other emergency applications. If MPCA is indeed relying on permittees to discuss an emergency application with MPCA in advance, MPCA should simply prohibit all emergency applications until the permittee has contacted MPCA to discuss options for the application. But the Proposed Permits do not have such a provision.

Under the Proposed Permits, a determination that an emergency application of manure is needed—which permittees have considerable freedom to determine on their own—allows producers to engage in a number of practices that MPCA has explicitly determined pose an unacceptable risk to water quality. MPCA has the authority and duty to place further limitations on these risky practices to ensure that such applications are used only when necessary and are conducted in the manner that poses the least threat to water quality.

IV. MPCA must consider the positive climate impacts of the changes to the Proposed Permits

In addition to considering the effects of the Proposed Permits on nitrate pollution, MPCA must assess the climate implications of issuing the Proposed Permits, even though the permits are not directed at controlling air emissions. The Minnesota Legislature has prioritized greenhouse gas

emission reductions, setting a goal to reduce all emissions to net zero by 2050.[183] This goal is informed by the state's 2022 Climate Action Framework, which establishes a goal of reducing annual greenhouse gas emissions and increasing the amount of carbon sequestered from the "working lands" economic sector, which includes agriculture, by 25% by 2035.[184] The Framework's key initiatives for achieving this goal include promoting soil health and best manure management practices, and supporting end markets for the cover and perennial crops that increase carbon storage and decrease use of nitrogen fertilizer.[185] Accordingly, MPCA is also required to use its authority to implement Proposed Permits that will move Minnesota toward the accomplishment of these goals.

The same changes in the Proposed Permits that will have positive water quality impacts will also mitigate greenhouse gas emissions and, in some cases, even act as a carbon sink. Changes that limit the amount of excess nitrogen in soil and water will also reduce denitrification, which creates nitrous oxide emissions. The proposed fall BMPs, limits on winter spreading, the requirement that manure recipients follow MMPs, and requirements for visual inspections to minimize overapplication and runoff will all have climate impacts as well as water quality impacts. In addition, certain BMPs—including the requirements to use cover crops and perennial crops—even act as carbon sinks.

A literature review conducted by the MPCA estimated that cover crop use could avoid an average of 1.19 CO_2e metric tons of emissions per hectare per year.[186] This review also estimated

[183] Minn. Stat. § 216H.02.
[184] *Minnesota's Climate Action Framework*, at 33, https://climate.state.mn.us/sites/climate-action/files/Climate%20Action%20Framework.pdf.
[185] *Id* at 36-38.
[186] MPCA, *Greenhouse gas reduction potential of agricultural best management practices (revised edition)*, at 91 (Sept. 2022), https://www.pca.state.mn.us/sites/default/files/p-gen4-21.pdf.

that cover crops could sequester an additional 0.42 metric tons of carbon per hectare per year.[187] Lengthening annual crop rotation by adding two or more years of perennial grasses or alfalfa could avoid 41,000 CO2e tons of emissions annually, per 100,000 acres, with most of the emission reductions coming from carbon sequestration in soil.[188] Published studies of the carbon sequestration potential of perennial or alfalfa crop rotations suggest that these practices could sequester 0.32 to 0.46 metric tons of carbon per hectare per year.[189] Accordingly, the potential for greenhouse gas reductions from the agricultural sector—the state's largest contributor to climate-change causing emissions—provides another reason for MPCA to implement its proposed changes and the further changes proposed by the Clean Water Organizations to limit excess nitrogen in soil and water.

CONCLUSION

MPCA's Proposed Permits make helpful steps forward on the nitrate pollution problem, as well as reductions of greenhouse gas emissions, but the Clean Water Organizations respectfully submit that they do not go far enough to make sufficient progress on this widespread, persistent, and dangerous problem. To comply with state and federal law and to protect Minnesota's surface waters and groundwaters, MPCA must include all of its proposed changes to the Proposed Permits, including the following:

Permit Section	**Provision**	**Summary of Change Proposed by MPCA**
9.3	Prohibitions on manure transfer	• Permittee must not transfer manure to recipient who will improperly apply liquid or solid manure to vulnerable groundwater areas during winter conditions in December, January, February, or March.
9.4	Summary of requirements	• Permittee must provide a Manure Transfer Tracking form to the recipient at time of transfer.

[187] *Id.* at 93.
[188] *Id* at 121-22.
[189] *Id* at 123.

10.2	MMP development	• All manure recipients must comply with the requirements of the MMP.
13.6	Vulnerable Groundwater Restrictions: Fall Spreading	• For October and November land applications of manure, use additional BMPs starting in 2028.
13.8, 13.9	Vulnerable Groundwater Restrictions: Winter Spreading	• For December, January, and February, application of solid manure is prohibited in winter conditions.
14.3	Land application area visual inspections	• All fields that receive manure must be visually inspected for evidence of manure discharge at downgradient field edges and other potential discharge locations, at least once for each day of application, at the end of each day of application, and as soon as possible after a rainfall of 0.5 inch within 14 days of application, unless manure is injected or incorporated.
15.4	Incorporation in 100-year floodplain	• Manure must be injected or immediately incorporated within the 100-year floodplain.
24.7	Records of manure application	• Permittee must maintain records of manure application activities, including when manure ownership is transferred, within the Nutrient Management Tool.
28.3	Sampling of discharges	• Permittee must ensure that all discharges, including authorized discharges, do not cause or contribute to non-attainment of applicable state water quality standards and must take samples of discharges.

In addition, MPCA should include the following additional changes in the Proposed Permits:

Permit Section	**Provision**	**Summary of Change Proposed by Clean Water Organizations**
8.2	Manure nutrient testing	• Add requirement that any digestate from an anaerobic digester be sampled and analyzed for nutrient content before testing.
11.5	Soil testing	• Add requirement for annual nitrate soil tests in accordance with Extension Service guidelines for fall tests in western Minnesota and spring tests in south-central, southeastern, and east-central Minnesota.

13.3	Prohibition on spreading when rain forecast	• Add requirements to follow the Runoff Risk Advisory Forecast. • Permittee must reconsider applying manure in fields when risk is "moderate." • Permittee cannot apply manure in fields when risk is "severe."
13.5, 13.6, 13.7	Emergency manure applications	• Require permittees to consider treatment of manure before spreading. • Require permittees to follow fall BMPs where possible in an emergency application. • Require permittees to follow BMPs for an emergency application of manure in winter conditions for any emergency application. • Alternatively, prohibit emergency manure applications until the permittee has contacted MPCA to discuss options for the application.
13.6	Oct./Nov. vulnerable groundwater area restrictions	• Remove language stating that vulnerable groundwater area restrictions are not required until 2028. • Require these BMPs statewide.
13.8, 13.9	Dec./Jan./Feb. winter conditions restrictions	• Require these restrictions on spreading in winter conditions statewide.
14.3	Visual inspections of land application areas	• Require visual monitoring plan that identifies locations where monitoring will occur and all sensitive features. • Require monitoring of subsurface drain tile outlets. • Add requirements for motion sensor cameras for high-risk areas in vulnerable groundwater areas, including downgradient field edges and sinkholes during application and for 14 days thereafter.
14.4	Groundwater monitoring at land application areas	• Add requirements for soil probes and soil moisture probes or lysimeters in fields that lie entirely within vulnerable groundwater areas. • If discharge discovered, professional engineer or hydrogeologist must review MMP and permittee must address deficiencies.
20.2	Visual inspections of production areas	• Require daily inspections of production areas.

21.2	Inspections of LMSAs	• Add site-specific groundwater monitoring plan, based on liner used at LMSA and manure stockpile or Subsurface Discharge Monitoring Plan. • Require regular groundwater monitoring in accordance with plan.
28.3	Sampling requirements for discharges	• Add further details about sampling by referring to established water sampling protocols or adding more information about how and where to sample and handling and testing of samples. • Require permittees to identify sampling points with specificity. • Add regular schedule of required sampling at land application areas, including samples of dry weather discharges into tile outlets and ditches, taken before land application and within 14 days of land application. • Add sampling requirements for drain tile outlets. • Add regular schedule of required sampling at production areas.
31.20	Definition of emergency manure application	• Further define "unusual weather conditions" to ensure only excessive rain events qualify.

/s/Joy R. Anderson
Joy R. Anderson
Minnesota Center for Environmental Advocacy
1919 University Avenue West, Ste. 515
Saint Paul, Minnesota 55104
(651) 223-5969

/s/Carly Griffith
Carly Griffith Ph.D.
Minnesota Center for Environmental Advocacy
1919 University Avenue West, Ste. 515
Saint Paul, Minnesota 55104
(651) 223-5969

On behalf of the Clean Water Organizations

Minnesota Center for Environmental Advocacy,
CURE
Environmental Working Group
Friends of the Mississippi River
Food & Water Watch
Minnesota Division, Izaak Walton League of America
Will Dilg Chapter, Izaak Walton League of America
Minnesota Trout Unlimited
Hiawatha Trout Unlimited
Minnesota Well Owners Organization
Northern Waters Land Trust

Roots Return Heritage Farm LLC
Winona Clean Water Coalition

And the undersigned individual supporters:

Name	Address	City	State	Zip
Janet Ackerman	15781 Hayes Trl	Apple Valley	MN	55124
Mair Allen	2829 17th Ave S	Minneapolis	MN	55407
Andrew Anderson	133 3rd Ave SW Apt 201	Hutchinson	MN	55350
Angela Anderson	1121 4th St N Apt 1	Stillwater	MN	55082
Janet Anderson	317 Locust St	Saint Peter	MN	56082
Lynn Anderson	15621 Goshawk St	Tamarack	MN	55787
Craig Andresen	2013 Walnut Ave	Saint Paul	MN	55112
Lori Andresen	3025 E Superior St	Duluth	MN	55812
Christine Andrews	94 Crocus Pl	Saint Paul	MN	55102
DyAnn Andybur	4119 Mcculloch St	Duluth	MN	55804
Christine Austin	606 N Saluki Dr	Marion	IL	62959
Sharon Bachman	13000 Sylvan Ave	Lindstrom	MN	55045
Ellen Barr	2735 138th Ave NW	Andover	MN	55304
Vedavathi Bellamkonda-Athmaram	350 Nathan Ln N Unit 542	Plymouth	MN	55441
Bonny Bellville	737 Forest Hills Dr SW	Rochester	MN	55902
Glenn Biegon	1071 Charles Ave	Saint Paul	MN	55104
Gerald Blaisdell	4216 Manorwoods Dr NW	Rochester	MN	55901
Jon Blumenthal	5941 Grimes Ave S	Edina	MN	55424
Joanna Bobbitt	3327 21st Ave S	Minneapolis	MN	55407
Lawrence Bogolub	1424 Lincoln Ave	Saint Paul	MN	55105
Julia Bohnen	8881 Irving Ave S	Minneapolis	MN	55431
Dean Borgeson	36030 Bonnie Lakes Rd	Crosslake	MN	56442
Diana Brainard	4544 Sunset View Dr	Duluth	MN	55803
Gretchen Bratvold	3444 Edmund Blvd	Minneapolis	MN	55406
Naomi Brim	1800 Washington Ave S Apt 412	Minneapolis	MN	55454
Cynthia Brockway	1664 Nebraska Ave E	Saint Paul	MN	55106
David Brockway	6301 Maloney Ave	Hopkins	MN	55343
Kelsey Brodt	1013 120th Ln NW	Minneapolis	MN	55448
Meredith Bruster	421 Dayton Ave Apt 2	Saint Paul	MN	55102
Elizabeth Burr	2025 Fairmount Ave	Saint Paul	MN	55105
Garrett Butler	PO Box 64	Medford	MN	55049
Liz Campbell	605 N 64th St	Seattle	WA	98103
Rick Canning	548 S Randall Rd	Aurora	IL	60506
David Carlson	5818 County Road 2	Fort Ripley	MN	56449
Susan Chambers	700 Agency Trl Unit 202	Mankato	MN	56001
JL Charrier	1910 Heritage Dr	Wayzata	MN	55391
Steven Chesney	8172 Zenith Ct N	Minneapolis	MN	55443
Jeff Christopherson	2382 Bourne Ave	Saint Paul	MN	55108
James Clapp	24613 N Melissa Dr	Detroit Lakes	MN	56501
sharon coombs	3400 Owasso St	Saint Paul	MN	55126
Lori Cox	14525 County Road 40	Carver	MN	55315
Amy Crane	4909 Hodgson Connection	Shoreview	MN	55126
Dennis Cuchna	2108 Irvine Pl	Alexandria	MN	56308
Cathy Curtis	1714 Whitetail Run	Buffalo	MN	55313

Name	Address	City	State	Zip
Suzanne Damberg	415 Vadnais Lake Dr	Saint Paul	MN	55127
Matthew Davis	15274 Sunset Hill Dr	Detroit Lakes	MN	56501
Tina Decker	2253 Clark Ct	Saint Paul	MN	55122
Lobsang Dhondup	2680 Oxford St N	Saint Paul	MN	55113
Christy Dolph	3323 Benjamin St NE	Minneapolis	MN	55418
Patrick Doss-Smith	210 N 3rd Ave	Albert Lea	MN	56007
Kim Dupre	17835 Norell Ave N	Marine On Saint Croix	MN	55047
Valerie Eastland	13570 Hershey Ct	Saint Paul	MN	55124
Kaye Eiken	25783 Cedar Rd	Peterson	MN	55962
Stephanie Emerich	1393 Schletti St	Saint Paul	MN	55117
John Enblom	14755 113th St S	Hastings	MN	55033
Barbara Erickson	104 W 36th St	Minneapolis	MN	55408
Cheryl Ethen	1225 Karth Lake Dr	Arden Hills	MN	55112
William Faber	7427 Cottonwood Rd	Cushing	MN	56443
Mary Faulkner	4921 Girard Ave S	Minneapolis	MN	55419
Alan Felix	4141 Connelly Cir NE	Bemidji	MN	56601
dwight fellman	7909 Victoria Curv	Minneapolis	MN	55426
John Finazzo	1070 N Shore Dr W	Mound	MN	55364
Simona Fischer	3220 33rd Ave S	Minneapolis	MN	55406
Richard Fish	5345 37th Ave S	Minneapolis	MN	55417
Elizabeth Fleck	4253 40th Ave S	Minneapolis	MN	55406
Steven Foldes	2700 Glenhurst Ave	Minneapolis	MN	55416
Michael Forbes	9611 Foxcroft Rd NW	Bemidji	MN	56601
Joyce Frohn	425 Congress Ave	Oshkosh	WI	54901
Greta Gaard	3034 41st Ave S	Minneapolis	MN	55406
Mary Gallagher	5509 Costa Garraf Rd NW	Albuquerque	NM	87120
Jane Gfrerer	7520 Cahill Rd Apt 323A	Edina	MN	55439
Mark Giese	1520 Bryn Mawr Ave	Mount Pleasant	WI	53403
Anne Marie Gillen	3999 Clover Ave	Saint Paul	MN	55127
Yazmin Gonzalez	9627 Maple St	Bellflower	CA	90706
River Gordon	4320 45th Ave S	Minneapolis	MN	55406
Jesse Gore	2411 Chapel Ave	Nashville	TN	37206
Susan Gray	5120 Logan Ave S	Minneapolis	MN	55419
Taran Green	4343 Zane Ave N	Crystal	MN	55422
Peter Gunther	5628 N Spaulding Ave	Chicago	IL	60659
Roger Hagedorn	521 2nd St SE	Minneapolis	MN	55414
Diane Haines	8868 Hidden Oaks Dr	Eden Prairie	MN	55344
Cherie Hales	511 E King St	Winona	MN	55987
Sue Halligan	5350 Nolan Pkwy	Oak Park Heights	MN	55082
Verlaine Halvorsen	3510 the Mall	Minnetonka	MN	55345
Carolyn Ham	1672 Hartford Ave	Saint Paul	MN	55116
Eric Hammang	1896 Barclay St	Saint Paul	MN	55109
John Harrington	30726 Ivywood Trl	Stacy	MN	55079
Kenneth Harris	5099 157th St N	Hugo	MN	55038

Name	Address	City	State	Zip
Paul Harris	704 20th Ave S	Moorhead	MN	56560
Sharon Hattenberger	16100 Panola Dr	Lindstrom	MN	55045
Jon Hayenga	421 2nd St NW	Stewartville	MN	55976
Monta Hayner	63 Arthur Ave SE	Minneapolis	MN	55414
Jim Head	15307 Northgate Blvd Apt 201	Oak Park	MI	48237
Linda Headley	121 SE 276th St	Cross City	FL	32628
Susan Heath	2552 Mount Vernon St SE	Albany	OR	97322
Susan Hedin	650 Main St N Apt 405	Stillwater	MN	55082
Nathan Hetrick	1279 Westlake Ave	Lakewood	OH	44107
Cynthia Hill	161 Amherst St	Saint Paul	MN	55105
Susan Hix	11341 300th Ave NW	Princeton	MN	55371
Barbara Hoch	391 Whiting Ave	Dedham	MA	02026
Philip Holtegaard	305 Maple Dr	Lanesboro	MN	55949
Sarah Horner	3125 43rd Ave S	Minneapolis	MN	55406
Virginia Huber	1516 W 61st St	Minneapolis	MN	55419
Maxine Hughes	1259 Maxine Cir E	Shakopee	MN	55379
jason husby	3531 N 3rd St	Minneapolis	MN	55412
Susan Imker	309 Elizabeth St SW	Isanti	MN	55040
Daniel Iverson	4640 N Arm Dr	Mound	MN	55364
Dana Jackson	814 Everett St N	Stillwater	MN	55082
John James	740 Carla Ln	Saint Paul	MN	55109
Annette Jewell-Ceder	4950 170th Ln NE	Andover	MN	55304
John Joadwine	2010 Ohm Ave	Eau Claire	WI	54701
Julie Johnson	31764 Wiscoy Ridge Rd	Winona	MN	55987
Kyle Johnson	7 Barton Ave SE Apt 3	Minneapolis	MN	55414
MATTHEW JOHNSON	705 McKnight Rd N Apt 302	Saint Paul	MN	55119
Steve Jorgenson	36901 Xenon St NW	Princeton	MN	55371
Sana Joseph	4678 Blaine Ave	Inver Grove Heights	MN	55076
Shawn Kakuk	4340 Clearwater Rd Apt 106	Saint Cloud	MN	56301
Tracey Katsouros	1322 Harwich Dr	Waldorf	MD	20601
Sophia Keller	851 SW 127th St	Seattle	WA	98146
Theresa kelly	49540 Nautical Dr	Chesterfield	MI	48047
Loni Kemp	14083 County 23	Canton	MN	55922
Vernita Kennen	2665 Victoria St N Unit 415	Roseville	MN	55113
Andrew Kistler	25260 Chase Dr	North Olmsted	OH	44070
Robert Klein	1520 Oakcrest Ct	Appleton	WI	54914
Aaron Klemz	1359 Hillcrest Dr NE	Minneapolis	MN	55432
Dag Knudsen	70985 277th Ave	Lake City	MN	55041
Eugene Kremer	3938 Cannon Ball Lake Rd	Duluth	MN	55803
Martha Krikava	9696 101st St N	Stillwater	MN	55082
Jennifer Krinke	99 Milton St N Apt 3	Saint Paul	MN	55104
Diane Kroll	9680 234th Ln NE	Stacy	MN	55079
jane kroon	17820 28th Ave N	Minneapolis	MN	55447
Suzanne Kruger	60 Huckleberry Ln	Harpers Ferry	WV	25425

Name	Address	City	State	Zip
Thomas Kunkel	40211 120th St	Waseca	MN	56093
Janelle Kuznia	26775 Grand Ave	Elko New Market	MN	55020
Laura Lambert	2708 Gerald Ave	Saint Paul	MN	55109
Phedra Larson	826 Wall St	North Mankato	MN	56003
Anna Larsson	801 Washington Ave N Apt 109	Minneapolis	MN	55401
Susan Lasoff	1235 Yale Pl Apt 407	Minneapolis	MN	55403
Karen Leno	460 1st Ave SE	Harmony	MN	55939
James Leon	373 Runge Ln	Saint Paul	MN	55118
Lee Lewis	4100 Edmund Blvd	Minneapolis	MN	55406
Robynne Limoges	701 Southwaite Ct	Redwood Falls	MN	56283
Kristin Lindner	28935 127th St NW	Zimmerman	MN	55398
Christopher Loch	2410 Garfield Ave	Minneapolis	MN	55405
Elene Loecher	4300 W River Pkwy	Minneapolis	MN	55406
alice madden	3316 Columbus Ave	Minneapolis	MN	55407
Michael Madigan	2366 Hidden Lake Cv	Saint Paul	MN	55125
Thomas Mahoney	3121 SE 19th Pl	Cape Coral	FL	33904
Craig Maki	311 E Redwood St	Marshall	MN	56258
Kathleen Malecki	2709 Pearson Pkwy	Minneapolis	MN	55444
Barry Maloney	5511 Pompano Dr	Minnetonka	MN	55343
mary jane manion	4325 Cooke St	Duluth	MN	55804
Gina Marano	9013 13th Ave S	Bloomington	MN	55425
Laurence Margolis	3916 Avondale St	Minnetonka	MN	55345
Maureen McCarter	1931 17th St S	Saint Cloud	MN	56301
Harriet McCleary	2440 Stevens Ave Apt 2	Minneapolis	MN	55404
Judith McCormick	311 Pleasant Ave Apt 202	Saint Paul	MN	55102
Mary McGilligan	814 5th Ave	Two Harbors	MN	55616
Robert McKIveen	5261 Lochloy Dr	Edina	MN	55436
Molly McMullen	916 Ashland Ave Apt 12	Saint Paul	MN	55104
Nicholas McNeely	35225 Whitetail Ave	Bayfield	WI	54814
Joan Meierotto	13900 44th St S	Afton	MN	55001
Juventino Meza	318 Washburn Ave N	Minneapolis	MN	55405
Mary Miller	3804 Cedar Lake Pl	Minneapolis	MN	55416
Scott Mills	9 N Yukon Dr	Ely	MN	55731
Donald Mitchell	798 HI Park Ave	Red Wing	MN	55066
T Mo	3310 69th St E	South Saint Paul	MN	55076
Margot Monson	22 Ludlow Ave	Saint Paul	MN	55108
WENDY MORICAL	3942 Enchanted Ln	Mound	MN	55364
Steven Morley	574 Shryer Ave W	Saint Paul	MN	55113
jackie Mortenson	7325 63rd Ave N	Minneapolis	MN	55428
Kathryn Mosher	4316 Clemson Cir # B	Eagan	MN	55122
Paul Moss	1849 Whitaker St	White Bear Lake	MN	55110
Terrence Nayes	9133 Preserve Blvd	Eden Prairie	MN	55347
Bonnie Nelson	4105 30th Ave S	Minneapolis	MN	55406
Robert Nesheim	1705 W Highway 61 # 729	Grand Marais	MN	55604

Name	Address	City	State	Zip
Richard Nethercut	14083 County 23	Canton	MN	55922
Debi Niebuhr	571 E Howard St	Winona	MN	55987
kimberly nieman	4550 Orchid Cir	Minneapolis	MN	55446
Randall Nies	4525 Nicollet Ave Apt 4	Minneapolis	MN	55419
Carley Nipp	8994 Lone Oak Ln	Chisago City	MN	55013
Eric Norgaarden	5019 Campbell Ave	White Bear Lake	MN	55110
Carrie Noring	7200 Kentucky Ave N	Minneapolis	MN	55428
Dawn Nothwehr	722 Center St W Apt 315	Rochester	MN	55902
Cheryl Olseth	601 Carlson Pkwy Ste 1050	Minnetonka	MN	55305
Michael Overend	1087 Isackson Rd	Two Harbors	MN	55616
Ron P	524 S Euclid Ave	Ontario	CA	91762
Lynda Pauling	5812 Olene Ave N	Stillwater	MN	55082
John Pegg	4300 W River Pkwy Apt 371	Minneapolis	MN	55406
Constance Pepin	4031 Zenith Ave S	Minneapolis	MN	55410
Candice Pierce	5192 Lavaque Junction Rd	Hermantown	MN	55811
Peter Pierce	1928 E Superior St Apt 12	Duluth	MN	55812
Meryl Pinque	615 Odlin Rd	Bangor	ME	04401
Robin Pinsof	FORT SHERIDAN Rd	Highland Park	IL	60035
Nora Plesofsky	1235 Yale Pl Apt 409	Minneapolis	MN	55403
Raphael Ponce	20 RUE DE NAPLES	Toulouse	MH	31500
Christine Popowski	2630 Pleasant Ave Apt 101	Minneapolis	MN	55408
Betsey Porter	10040 Penn Ave S Apt 11	Minneapolis	MN	55431
Charlotte Quiggle	10789 Hollister Ave NW	Maple Lake	MN	55358
Ian Radtke-Rosen	22300 Penn Ave	Lakeville	MN	55044
Gyles Randall	2642 8th St NE	Waseca	MN	56093
Lynn Reeser	3320 Court Ave	Vernon	FL	32462
Anne Reich	751 Pine Cone Trl	Marine On Saint Croix	MN	55047
Karen Renaud	1975 Collin St	Mora	MN	55051
James Reynolds	4455 W 7th St	Winona	MN	55987
Lynn Rice	225 Prairie Rd	Monticello	MN	55362
Sue Rich	153 Winifred St W	Saint Paul	MN	55107
Annick Richardson	420 Lewiston Rd	Dayton	OH	45429
Paul Richtman	2854 Nightingale Ct	Stillwater	MN	55082
Cheryl Ritenbaugh	4917 Oliver Ave S	Minneapolis	MN	55419
Jean Ross	3624 Bryant Ave S	Minneapolis	MN	55409
Maisie Rossi	10 Glade St	Excelsior	MN	55331
Juliann Rule	35002 115th Ave	Avon	MN	56310
Scott Russell	5124 Thomas Ave S	Minneapolis	MN	55410
Trevor Russell	3519 32nd Ave S	Minneapolis	MN	55406
Ann Sandritter	3 Ashwood Mall Apt B	Old Bridge	NJ	08857
Judy Sausen	530 1st Ave Apt 5	Two Harbors	MN	55616
Jennifer Schally	1104 Creekside Cir	Stillwater	MN	55082
Robert Scheierl	1109 NE 5th Ave	Grand Rapids	MN	55744
Terrance Schrammen	859 McKnight Rd N	Saint Paul	MN	55119

Name	Address	City	State	Zip
Craig Schroeder	19524 Rosemary Ct	Paynesville	MN	56362
Jon Schroeder	8407 Penn Ave S	Bloomington	MN	55431
Jane Schuler	695 Sherwood Ave	Saint Paul	MN	55106
Maribeth Schulke	4207 Fiedler Ave NW	Maple Lake	MN	55358
Cherry Schwartz	100 Shady Ave	Owatonna	MN	55060
Caroline Sévilla	4 Allée Marc Chagall	Boling	TX	77420
Lansing Shepard	5289 Pleasant Ct W	Saint Paul	MN	55110
Adaline Shinkle	4708 Eastwood Cir	Minnetonka	MN	55345
Joanne Sieck	5877 River Ridge Ct NE	Rochester	MN	55906
Kurt Simer	3201 E 24th St	Minneapolis	MN	55406
Kent Simon	4733 Isabel Ave	Minneapolis	MN	55406
Ginger Sisco	8308 40th Ave N	New Hope	MN	55427
Julie Skelton	40900 Bemis Rd	Van Buren Twp	MI	48111
Kay Slama	5380 132nd Ave NE	Spicer	MN	56288
Carrie Slater Duffy	38 Harrison Ave S	Hopkins	MN	55343
Nancy Elizabeth Slocum	31005 County 7 Blvd	Welch	MN	55089
Gregory Solberg	1645 Millwood Ave	Saint Paul	MN	55113
Lindsay Sovil	1197 Kawishiwi Trl	Ely	MN	55731
Kelley Stanage	31775 Hwy 76	Houston	MN	55943
Greg Stawinoga	1247 E 168th Pl	South Holland	IL	60473
William Steele	21950 County Road 445	Bovey	MN	55709
Heidi Steinert-Bresilge	703 Esta Dr	Plano	IL	60545
DeeAnn Stenlund	2687 Matilda St	Saint Paul	MN	55113
Ron Sternal	2712 Glenhurst Ave	Minneapolis	MN	55416
Cleone Stewart	41265 500th St	Perham	MN	56573
Leland Stoe	13826 Eveleth Ct	Apple Valley	MN	55124
Patricia Thomas	6219 E Superior St	Duluth	MN	55804
Mary Thompson	1370 White Lake Dr	Duluth	MN	55803
Steven Timmer	5348 Oaklawn Ave	Edina	MN	55424
Anne Tisel	2940 Autumn Woods Dr	Chaska	MN	55318
Elizabeth Tisel	100 2nd St SE Apt 503	Minneapolis	MN	55414
Lyndon Torstenson	4138 41st Ave S	Minneapolis	MN	55406
Sheila Tran	1766 Serpentine Dr	Saint Paul	MN	55122
Clara Ueland	1902 Homestead Trl	Long Lake	MN	55356
Jennifer Valentine	313 1st Ave	Massapequa Park	NY	11762
Tracy van der Leeuw	128 Saint Albans St N	Saint Paul	MN	55104
Caroline van Schaik	40002 Wolf Hill Dr	La Crescent	MN	55947
Mary Ann VandeVusse	13960 Kentucky Ave	Savage	MN	55378
Mike Vant	495 Mackubin Cir	Shoreview	MN	55126
Martha Vennes	1015 2nd St NE Apt 214	Hopkins	MN	55343
John Viacrucis	3002 17th St S Apt 206	Moorhead	MN	56560
Barb Viker	3929 Everest Ln N	Minneapolis	MN	55446
Karl Vohs	428 2nd St NW	Faribault	MN	55021
Nicholas Vorpahl	1525 Sherburne Ave	Saint Paul	MN	55104

Name	Address	City	State	Zip
Wallace Wadd	2530 Queensport Rd	Woodbury	MN	55125
Donald Waskosky	310 River Park Dr	Mankato	MN	56001
Carol Weber	5223 Silver Maple Cir	Hopkins	MN	55343
David Wee	1920 S 1st St Apt 406	Minneapolis	MN	55454
Alice West	315 1st Ave E Apt 11	Grand Marais	MN	55604
Rebecca Wiinanen	19150 Easton Rd	Wayzata	MN	55391
Mary Lou Wilm	2919 45th Ave S	Minneapolis	MN	55406
Katharine Winston	4634 France Ave S	Edina	MN	55410
Larry Wolf	2425 County Road C2 W	Roseville	MN	55113
Bruce Wood	190 Albany St	Cambridge	MA	02139
Daryl Wood	1804 Cameron Ave	La Crosse	WI	54601
John Wozniak	7070 153rd St W Apt 105	Saint Paul	MN	55124
Bryan Wyberg	2458 Farrington Cir	Saint Paul	MN	55113
Stephen Yahn	1467 Thomas Ln	Saint Paul	MN	55122
Jenna Yeakle	623 N 39th Ave W	Duluth	MN	55807
Don A. Zatroch	2366 17th Ave NW	Saint Paul	MN	55112
Nick Zeller	19521 P And M Dr	Rollingstone	MN	55969
David Zentner	2116 Columbus Ave	Duluth	MN	55803