Response to Individual Comments on the draft Nitrogen Fertilizer Management Plan

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Minnesota Department of Agriculture

Pesticide and Fertilizer Management Division

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Contents

Agrium Advanced Technologies 5
Anez Consulting 6
Anonymous #1 7
Anonymous #2 7
Dakota County 7
Davis, Herbert A. Jr 10
Dodge County 10
Everett, Les 11
Freshwater Society 12
Friends of the Mississippi River 14
Gates, Larry 21
Hansen, Rick 22
Huberty, Brian 27
Joachim, Gary G. 29
Kresha, Ron 29
Kroll, Duane 30
Lucking, Mike 31
Minnesota Center for Environmental Advocacy 33
Minnesota Corn Growers Association 38
Minnesota Department of Health 41
Minnesota Independent Crop Consultants Association 45
Minnesota Pollution Control Agency 49
Minnesota Well Owners Association 52
Minnesota Agricultural Water Resource Center 62
Morrison-Crow Wing-Todd Corn Growers Association 65
Morse, Steve 69
National Park Service 70
Pearson, Grant 70
Randall, Gyles 71
Rehm, George 72
Stearns County Soil and Water Conservation District 74

*For Subjects 1-15, please refer to the MDA document:
Response to Comments on the draft Nitrogen Fertilizer Management Plan

Sunnyfield Farms Partnership 76
Washington County..... 77
Zimmerman, Dean..... 77

Agrium Advanced Technologies

The following comments are directed mainly at Chapter 5 of the Minnesota Department of Agriculture document titled “Minnesota Nitrogen Fertilizer Management Plan”. Agrium Advanced Technologies would like to commend the Minnesota Dept. of Agriculture on including enhanced efficiency fertilizers (EEFs) in the nitrogen Best Management Practices (BMPs). Enhanced efficiency fertilizers (EEFs) are products designed to increase nutrient availability and plant nutrient uptake while decreasing losses to the environment compared with a reference soluble fertilizer. By including EEFs grouped together in an unbiased way demonstrates Minnesota is much farther ahead than other states.

Our comments address how EEFs, specifically Environmental Smart Nitrogen (ESN) are referred to in the BMPs. Agrium Advanced Technologies (AAT) ESNis a polymer coated urea product that is considered a controlled release fertilizer. The polymer membrane allows water to diffuse into the granule, dissolving the nitrogen inside, becoming a water and urea solution. Moisture and temperature – the same growing conditions that favor plant growth and nutrient demand – release nitrogen from the polymer coating. Moisture creates the nitrogen solution inside the coating, which moves through the coating at a predictable rate, based on soil temperature.

The current recommended application timing for corn states using ESN is acceptable but with risks. We disagree with the term “risks” because it is very broad and not defined for ESN. The term “risk” is broken down into six categories on page 41. They are as follows: Agronomic, Economic, Psychological, Environmental, Societal, and Logistical. As a person reads these, and sees that a product such as ESN is acceptable but with risks, this very broad category may lead some not to use ESN with the fear that there is something wrong with it.

In an email correspondence between Gyles Randall (formerly with University of Minnesota, Waseca) and Alan Blaylock (Manager of Agronomy, Agrium Advanced Technologies), Gyles states that the risk terminology around ESN is solely economic. Gyles writes “The cost is substantially higher than the cost of N supplied as urea or ammonia. Therefore, ESN falls into a higher economic risk category and not an environmental risk category. We consider ESN to fit within the general category of Acceptable, but with greater risk.”

There is a substantial price difference on most fertilizers and ESN is not the only exception nor always the highest cost. Currently, on a per pound of nitrogen basis, anhydrous ammonia costs $0.40/pound, urea costs $0.54/pound, UAN 28% costs $0.60/pound, and ESN costs $0.72/pound.

Most years the price spread is similar, with ammonia as the cheapest source of nitrogen fertilizer. If economic risk is a concern, then all fertilizers costing more than the cheapest source should also be considered an economic risk.

In addition, while there is a price spread between different fertilizers, there are other benefits that outweigh the economic risks. For example, a grower uses 150 lbs of N/acre as anhydrous ammonia, which can be applied from fall to late spring, with the later application potentially damaging the plant. Using the costs above, the cost of fertilizer will be around $60/acre, plus an additional $12/acre for application costs, for a total cost of $72/acre. That same grower decides to use urea instead due to convenience of timing of application. The new cost for the same 150 lbs

N/acre is now $81/acre plus $5/acre for application costs. The total new costs are $86/acre, but the convenience of applying a more versatile source of fertilizer, as well as the logistical risks outweigh the economic risks, making the increased cost justified. The following year, the same grower, finds there were significant N losses limiting his yields so he and decides to try an EEF product, such as ESN. . The recommendation for the field is to use a blend of 80% ESN and 20% urea pre-plant (our recommendation for most of Minnesota at that time) which will cost $103/acre. Again, because of the convenience of application, the application cost is only $5/acre, with a total cost of$108/acre. ESN allows for a better nitrogen use efficiency, when compared to anhydrous ammonia and urea, increasing the potential for environmental losses. On average, using ESN has demonstrated an average increase of 8 to 10 bushels corn/acre. The return to the grower by using ESN is ~$50/acre more than ammonia or urea alone. Therefore, based on this analysis, there is actually more "risk" in using anhydrous ammonia or urea.

Enhanced efficiency fertilizers are one tool that farmers can utilize to help increase their nutrient use efficiencies. Using EEFs, especially ESN, farmers have the ability to increase yields, lower N rates, and increase nutrient use efficiencies, which can decrease the potential for nutrient losses to the environment. We encourage you to consider the risk analysis around EEFs in the Minnesota Nitrogen Fertilizer Management Plan. As with any best management practice, EEFs must be used within the framework of a 4R Nutrient Management System (right source applied at the right rate, right time, and in the right place) in order to achieve the desired results.

MDA Response: We agree that the reader will not understand the different associated risks within the current U of M BMP publications. Future BMP revisions should better define and articulate those risks.

Anez Consulting

As an independent crop consultant, I realize that our firm could potentially profit from the increased services that would be needed by farmers due to increased regulations imposed by the 2013 Nitrogen Fertilizer Management Plan. However, I believe that the overall impacts of this plan would be over-reaching and harmful to MN farmers.

Our consulting firm works with over 50,000 acres of cropland in central MN. Farmers hire us to provide independent advice, information, and technology to assist them in making more timely and informed decisions based on sound science. Farmers willingly hire us because they want to be profitable, but they also want to be good stewards of the land.

Regarding nitrogen management, we spend thousands of dollars every year on lab fees for soil nitrate testing and plant tissue testing to help our growers dial in their nutrients more efficiently. We've even spent over $10,000 this year on a new soil nitrate machine so we can adjust nitrogen fertilizer recommendations within minutes or hours instead of days. Farmers and people in our industry can give you countless examples of how we as an industry are investing in new methods and technology to be more efficient and productive with our crop nutrients.

It is frustrating to read the Revised Nitrogen Fertilizer Plan and find out that these kinds of practices are not addressed. Rather, it seems, MDA wants to indict agriculture based on the testing of private wells.

MDA Response: The MDA acknowledges and supports the very good work that Minnesota farmers and their crop advisors are doing to protect the environment. Unfortunately nitrate is easily leached into groundwater and is present in vulnerable aquifers and in many drinking water wells above the drinking water standard.

Anonymous #1

Too little, to slow to address a health standard! The timeline is for too long to achieve the goal of prevention. If the state has pursued a voluntary approach for 23 years since the first N management plan, and N rates in the groundwater are increasing. There is no reason to believe this plan will succeed. Without a regulatory backbone, this plan is too slow, too timid, to protect water.

*MDA Response: See Subject 1**

Anonymous #2

When determining the townships to be sampled do not eliminate townships that have incorporated. Stearns County has 2 townships – Rockville and St Augusta, which are legally incorporated municipalities but are in no way "urban." Incorporation is a means of governance and is not related to land use. St Augusta and Rockville are highly row cropped and are vulnerable to groundwater contamination.

*MDA Response: See Subject 1**

Dakota County

In general, Dakota County staff support the intent of the Plan to prevent, evaluate, and mitigate nonpoint source pollution from nitrogen fertilizer in groundwater, a type of pollution which creates serious problems with drinking water aquifers underlying much of Dakota County. We appreciate the thoughtfulness and diligence that Minnesota Department of Agriculture (MDA) staff has devoted to this revision of the Plan. The approach described in the draft Plan will take many years to implement. In some parts of the state, such as Dakota County, faster actions may be advisable to reverse the significant degradation of groundwater that has already occurred.

*MDA Response: See Subject 4**

<u>Areas with nitrate concerns</u>

Dakota County staff strongly support this Plan's approach to identify areas with nitrate concerns through private well monitoring on the township scale. This will provide all stakeholders with data to evaluate nitrate conditions in the groundwater of vulnerable areas. Sampling a large number of existing private wells over a number of years is likely the most cost-effective method available for characterizing nitrate. Although well construction information about some private wells may be missing or unreliable; the sampling results from those wells will be highly informative from a public health perspective. In Dakota County; construction information for about 40% of private drinking water wells is not available. Nitrate testing results that include these wells will show the drinking

water quality for a significant portion of the population.

*MDA Response: See Subject 1**

Groundwater quality

The draft Plan identifies 5% as the percentage of private drinking water wells in a township that must exceed the Nitrate Health Risk Level (HRL) in order to delineate a "Phase 1" nitrate mitigation area. Dakota County staff considers the proposed level to be a reasonable and practical limit. From a public health standpoint, it would be ideal to have no drinking water wells that exceed the nitrate Health Risk Limit (HRL).

However, we understand that a lower percentage of private wells exceeding the HRL in a community may be indicative of other issues, such as highly localized conditions (i.e., a well inside a feedlot) rather than a community issue. On the other hand, if the limit were 10%, the state would be accepting, at a policy level, having hundreds of households with drinking water that exceeds the Health Risk Limits in areas like Dakota County. Based on these considerations, 5% of the tested wells are an appropriate limit.

Best Management Practices

Under Minnesota Statute 103H.005, the term "best management practices" means "practicable voluntary practices that are capable of preventing and minimizing degradation of groundwater..." Because BMP adoption is voluntary, the rate of BMP adoption to reduce nitrate in groundwater is difficult to estimate. Statewide information about BMP adoption and BMP effectiveness is either very general and anecdotal (i.e., the amount of nitrogen fertilizer sold in the state is approximately the recommended amount for the number of acres planted in the state's major crops) or based on farmers' voluntary reporting. As a result, conclusions about statewide BMP adoption rates are unreliable.

The available information indicates that nitrate contamination of groundwater in the state is widespread. If BMP adoption is, indeed, prevalent, then the BMPs currently being promoted apparently are not "capable of preventing and minimizing degradation of groundwater," as the law requires. The process of developing BMP5, promoting them, and evaluating their effectiveness takes years. At the current rate, decades may pass before nitrate conditions improve in the state's groundwater resources. New strategies are needed for ensuring that

BMPs are "capable of preventing and minimizing degradation of groundwater" and for accelerating the evaluation of BMP effectiveness and adoption. In particular, more comprehensive and reliable information is needed regarding farming practices and their impacts on water resources.

One such strategy available under current law could generate extremely informative data about the impact of water appropriations for crop irrigation on groundwater quality and quantity. Under Minnesota Statute 103G.282 the Commissioner of the Department of Natural Resources (DNR) has the authority to "require the installation and maintenance of monitoring equipment to evaluate water resources impacts from permitted appropriations.., the Commissioner may determine the frequency of measurements and other measuring methods... the measurements must be reported annually to the commissioner." Dakota County staff urges MDA and the Minnesota Pollution

Control Agency to consider working with the DNR to make groundwater monitoring a condition of irrigation appropriations permits issued in jurisdictions where more than 5% of the private drinking water wells tested exceed the HRL for nitrate. In these high-nitrate areas, farm operators, the State, and the County would gain valuable information from monitoring wells and equipment adjacent to irrigated fields. When combined with data on groundwater levels, precipitation, irrigation water usage, and groundwater nitrate concentrations (both at the water table and from the irrigation well itself) over the course of each growing season, this information would enable all parties to learn a great deal about nitrate and groundwater movement below irrigated crops and the effectiveness of BMPs. The cost to farm operators to install and sample the required monitoring wells would be relatively small compared to the large capital investment represented by the irrigation system as a whole.

In order to understand what practices effectively protect water quality and what practices do not, across the state's wide range of field conditions, more detailed information about current farming practices may be needed — even beyond the information that could be gathered from irrigators, as described above. It may be necessary to enact WRPRs sooner than outlined in the Plan in order to collect detailed information from farmers about their crops, soil and water test results, yields, and their fertilizer, manure, tillage, conservation, and other pertinent practices. This information will be needed to understand the efficacy of the various BMPs being employed.

*MDA Response: See Subjects 8, 12**

Mitigation

The strategies outlined in the Plan appear to be effective for areas in which nitrate is a relatively low or new contamination issue. However, for an area with a serious and well-documented nitrate problem like Dakota County, the rate of implementation appears very slow. Quicker action in such areas is desirable. For example, restricting fall applications of nitrogen fertilizer and beginning to collect the type of cropping information described above.

The Plan does not make any proposals to address the significant costs borne by public and private well owners when their wells are high in nitrate. For example, the City of Hastings has installed a $3 million nitrate removal system for its public water supply wells that exceed the drinking water standard. In addition, private well owners pay the price for installing and maintaining treatment systems, replacing their wells, or purchasing bottled water. Strategies should be considered to reverse this cost-shifting from farmers to their neighbors. Leaving well owners to bear the cost of drinking water contamination for which they are not responsible is an inequity that should be addressed.

In high-nitrate areas, it would also be helpful to have specific time-frames (e.g., five years) in which measurable improvement in groundwater conditions (such as the percentage of wells exceeding the drinking water standard, or the trend in nitrate concentrations) would have to be documented. Failure to improve within the specified time-frame should result in predefined consequences, such as restrictions on irrigation permits, other restrictions, or financial penalties.

*MDA Response: See Subjects 4, 5, 13**

Davis, Herbert A. Jr

Relying on voluntary compliance makes no sense when there is a demand for corn at a price that is better than ever. “Make hay while the sun….” is certainly going to prevail and folks will do whatever they can to maximize profit, thereby adding to the already insufficient best practices that lead to the problems your trying to solve. This seems more likely to be good PR than protecting our water.

*MDA Response: See Subject 1**

Dodge County

Comment: It appears that MDA’s “preliminary assessment phase” and “Phase 1 assessment” will be redundant in areas of the state where there is already enough data to meet the goals of each phase.

Dodge County is a good example. Drinking water protection has been the top priority of the Dodge County Water Management Plan since 1990. We have over 20 years of ground water quality data from over 1900 unique wells. This data is highly accurate: water analysis is completed by certified labs, well locations are field verified, and wells are matched with driller’s construction logs when available.

See attached Figure 1 for summary of nitrate concentrations in Dodge County. Our water quality testing data reveals that, in four (4) townships, >10% of all wells sampled have nitrate concentrations exceeding the Health Risk Limit (HRL) of 10 milligrams per liter. Our data also reveals that, in two (2) townships, between 5 - 10% of all wells sampled have nitrate levels exceeding 10 milligrams per liter.

Recommendation: We feel that the NFMP should provide flexibility for MDA to advance areas of the state that have sufficient existing data, directly to Phase 2 and Phase 3 mitigation levels. This flexibility will reduce redundancy, lower costs, and allow us to deal with problems sooner.

*MDA Response: See Subject 8**

Comment: It appears that threshold nitrate levels for each phase of the mitigation plan reflect the average concentration for all wells in the township regardless of the aquifer the water comes from. We feel that to meet the goal of the Groundwater Protection Act, threshold nitrate levels must apply to each drinking water aquifer.

The attached Figure 2 illustrates the how nitrate concentrations vary from a highly vulnerable aquifer in Dodge County (Galena Limestone) to lower, protected aquifers (St. Peter and Prairie du Chien/Jordan).

As the draft NFMP stands today, in a preliminary assessment of a township with 150 homes using a vulnerable aquifer and 150 homes using protected aquifers, the average nitrate concentration for all wells may be diluted below the action level, leaving the high risk population unattended and a drinking water source contaminated.

Recommendation: We feel that the nitrate threshold level should apply to each aquifer; insuring that every impacted aquifer will be a part of the mitigation plan.

*MDA Response: See Subject 8**

Comment: In the Minnesota Nitrogen Fertilizer Management Plan August 2013 Public Comment Draft document, reference is made on pp. 28-30 to the Nitrate Probability Map for Dodge County, developed by the MN Department of Health in 2011. The map utilizes geologic and soil data, cropland, and urban land use data to develop regions of hydrogeologic sensitivity and nitrate-loading capabilities.

Based on our extensive well test results over the last 20 years, we find that the Dodge County map on p.30 does correctly illustrate certain areas of the county, such as the northeast and western edge, where some high nitrate wells are found. We have found, however, a simple map of the county depicting areas of less-than-50 ft. to bedrock, combined with high groundwater sensitivity areas (typically sandy soils), provides a layer which we can used, with high correlation, to predict the existence of high-nitrate wells. Note on the attached Figure 3 the consistency with which high-nitrate wells coincide with the shallow bedrock/high sensitivity layer.

Recommendation: When appropriate, use the county map in Figure 3 as an accurate guide in predicting the location of high nitrate wells.

*MDA Response: See Subject 8**

Everett, Les

The plan needs to differentiate between a "pollutant" and a "health risk limit", and align the phases (or levels) of the plan to reflect that differentiation in the law.

In the Groundwater Protection Act, 103H (https://www.revisor.mn.gov/statutes/?id=103h) Quoting from the section on definitions: "Pollutant" means a chemical or substance for which a health risk limit has been adopted. "Pollution" means degradation of groundwater by a pollutant. "Degradation" means changing groundwater from its natural condition by human activities. "Health risk limits" means a concentration of a substance or chemical adopted by rule of the commissioner of health that is a potential drinking water contaminant because of a systemic or carcinogenic toxicological result from consumption.

The Minnesota Department of Health (MDH) has set a standard of 10 milligrams per liter for nitrate in drinking water. see:
http://www.health.state.mn.us/divs/eh/hazardous/topics/sacnitrate.html

The Federal drinking water standard is 10 mg/l and 10 mg/l is the Health Risk Limit (HRL) (confirmed by MDH staff). Therefore, the threshold for pollution (degradation) is lower than that for an HRL and voluntary action to prevent a rise to the level of the HRL should be exhausted well before reaching that level (5% of the wells at or above 10 mg/l). I would suggest that the intensive BMP promotion begin when 5% of the wells exceed 7ppm or some lower level.

If the nitrate level reaches the HRL (5% of the wells at or above 10 mg/l), then a first level of required practices should be immediate. For corn production, this should include preclusion of fall N fertilizer application prior to soil temperatures lower than 50 degrees F at six inch soil depth, require application with a nitrification inhibitor if fall applied, and follow UM rate guidelines. Similar first level required practices (e.g. slow-release N-fertilizer and following rate guidelines) should be

determined for other crops.

Where the HRL continues to be exceeded, then fall application for corn should be precluded. None of these required practices would be out of the norm for best management practices in vulnerable groundwater areas and are not a significant burden for agricultural producers. We should recognize that under the state feedlot rules, nitrogen rates are already regulated for fertilizer wherever manure is applied.

For areas above the HRL when the plan goes into effect, then one cycle (maximum of four years) of voluntary BMP promotion and monitoring may be necessary before moving to mandatory practices, since that appears to be a requirement of the law. A first line of enforcement through the licensed commercial fertilizer dealers and applicators should be considered. They could be required to follow the required practices as a condition of the license in areas declared by MDA to be above the 10 mg/l limit.

As stated in the Roseville public meeting, there will be cases where row crop best practices will not be adequate to lower nitrate levels below the drinking water standard. At that point, if alternative cropping systems are refused, then purchase of an easement to change the plant cover, or provision of an alternative drinking water source may be necessary.

Finally, I agree with the comment of Linda Meschke in the Roseville public meeting that MDA should not continue to build a parallel Extension service with yet more agronomist hires for BMP promotion. MDA should contract with UM Extension for that work, as it did in the 1990s and early 2000s. These are my personal observations, not a University of Minnesota position.

*MDA Response: The MDA doesn't intend to duplicate Extension. See Subjects 4, 5**

Freshwater Society

The plan should state more directly that Minnesota has a nitrate water pollution problem. And it should state more clearly that the problem is caused by major changes over the last 50 years in the crops we grow and the way we grow them.

You can find those changes if you make your way to Page 34 in the plan. They are: increased use of commercial nitrogen fertilizer; substantially more acres of corn, a crop that needs high levels of nitrogen fertilizer; and the replacement of many acres of alfalfa and other hay crops, which consume nitrogen, with soybeans.

*MDA Response: NFMP Chapters 3 and 4 include a discussion of nitrate pollution in groundwater and how changes in cropping systems have impacted water quality over time. See Subject 10**

The plan should explicitly say the nitrate problem is serious. Some--relatively few--wells at homes and farms have water with nitrate concentrations that exceed the health limits. But if one of those wells is yours — especially if you have infant children or grandchildren, if you are pregnant or your wife is pregnant — it is a serious and expensive problem.

If you live in one of the communities where public wells are contaminated by fertilizer from nearby fields you are already are paying higher water bills. Those higher costs are reported on Page 20 in

the draft plan.

Beyond the issue of drinking water wells, we have evidence from Ag Department tests that nitrate pollution of shallow groundwater near fertilized fields is bad and getting worse. Depending on the region of the state, 8 percent to 62 percent of the water samples drawn from shallow, edge-of-field monitoring wells had nitrate levels above the health standard. In six out of seven regions, the tests showed that contamination getting worse in the last decade. That data is reported on Page 56 in the draft plan.

*MDA Response: The MDA monitoring well network is designed specifically as an early warning, edge of field monitoring network for pesticides. Nitrate concentrations in groundwater can vary significantly over short distances, over short timeframes and with changes in depth. The MDA monitoring network is not designed to address this variability and does not provide a valid assessment of nitrate contamination trends within the aquifers of Minnesota. See Subject 8**

The plan should direct significantly more attention to contamination of surface waters. This plan and the two-year process that led to it have focused on nitration contamination of groundwater. But we know nitrogen fertilizers and manure also contaminate Minnesota lakes and rivers and contribute to the oxygen-deprived Dead Zone in the Gulf of Mexico.

The Minnesota Pollution Control Agency's June 2013 report titled "Nitrogen in Minnesota Surface Waters" estimates that 73 percent of the nitrogen flowing to surface waters comes from agricultural sources: cropland groundwater, cropland tile drainage, cropland runoff; and feedlots. The report also says sampling has found nitrate exceeding the health standards in 15 streams in Southeastern Minnesota and that Minnesota contributes 6 percent of the nitrogen loading to the Gulf of Mexico.

On a legalistic, bureaucratic level it is understandable that this draft report would largely refrain from offering solutions to surface water contamination. State law gives the Department of Agriculture responsibility for the pollution of groundwater by agricultural chemicals and leaves it to the Pollution Control Agency to protect surface waters.

But common senses says the Department of Agriculture should not now write one plan aimed at reducing pollution of groundwater from farming and leave it to the Pollution Control Agency to perhaps later offer another, more-stringent, strategy.

*MDA Response: See Subject 11**

The plan should be less timid in its proposals for some — ultimate — resort to regulation in extreme cases.

The plan proposes an almost endless succession of proposals for increasingly aggressive voluntary best management practices. The Department, under this plan, proposes to resort to regulation only when farmers have finally declined to adopt those practices. We believe the statute's language — "if the implementation of best management practices has proven to be ineffective" — allows the Department to resort to regulation when reasonable best management practices fail to reduce nitrate contamination. We do not believe the Department is required to

propose every possible voluntary remedy before imposing reasonable regulation.

*MDA Response: See Subjects 1, 4**

Friends of the Mississippi River

2013 MN NFMP Development Process and Timeline

Comment: Minnesotans deserve to know that Nitrogen Fertilizer Management Plan will be revised and updated periodically, to reflect advances in technology, agriculture, and water resource sciences in Minnesota.

Recommendation: The MDA should commit to updating the Minnesota Nitrogen Fertilizer Management Plan on a 10-year cycle. Ten year planning horizons are common for many water quality-related planning efforts at the state, watershed, county, and municipal level.

*MDA Response: See Subject 2**

2013 MN NFMP Concerns

A. Information provided by the MDA's Bruce Montgomery during his October 16th, 2013 presentation at the Minnesota Water Resources Conference emphasized that the MDA plans to rely extensively on nitrogen reductions derived from the widespread adoption of University of Minnesota Extension Best Management Practices (BMPs).

   The NFMP itself includes multiple references to this approach. Examples from the text include:

   Page 40: "BMPs are the basis for the Nitrogen Fertilizer Management Plan's Prevention Strategy."

   Page 68: "The Minnesota Department of Agriculture (MDA) will work with various partners to educate and promote Best Management Practices (BMPs) for general nitrogen fertilizer use. The adoption of BMPs is designed to prevent or mitigate degradation of groundwater."

   Page 69: "The objective of education and promotion in the NFMP is for crop producers to use nitrogen fertilizer BMPs to the fullest extent practicable for their given operation."

   This is a fundamentally flawed approach that is highly unlikely to result in meaningful protection of the state's groundwater.

   The University of Minnesota Extension Best Management Practices for Nitrogen Use in Minnesota emphasizes that regional BMP recommendations are not designed to meet environmental protection or restoration goals. The University of Minnesota Extension clearly states that the use of BMPs suggested in regional bulletins increases the probability of obtaining the most economic yield for the optimum N rate – even if that nitrogen fertilizer application rate results in excess pollution.

   The NFMP acknowledges as much on Page 37, stating the following: " It is important to note that there will almost always be some level of nitrate losses under row crop production regardless of nitrogen rate inputs…losses frequently increase 10-20% when using the

optimum nitrogen rate." For example, page 3 of the University of Minnesota Extension Best Management Practices for Nitrogen Use in South-Central Minnesota states that "Maximum Economic Return to N" (MRTN) rates are used to determine economically optimal fertilizer application rates. In the example used, the MRTN rate was found to be spring-applied at 120-lb/acre. "Greatest yield and profit with a minimal increase in NO3-N concentration was found with the spring-applied 120-lb N rate." Table 2 of that same document concludes that the recommended spring application of nitrogen fertilizer at a 120lbs/acre would yield nitrate loss to drain tile systems at 13.7 mg/l – well above the state's Health Risk Limit for nitrate. As this example suggests, the fertilizer application rates recommended by the U of M Extension are designed to provide the rate that ensures maximum producer profitability.

The clearly defined goal of the Groundwater Protection Act is to prevent degradation by altering groundwater from its natural condition by human activities. The MDA has not provided any reasonable explanation as to how nitrogen fertilization rates that yield pollution concentrations in excess of the HRL can possibly comply with the goals of the Groundwater Protection Act. Figure 13 (inset, right) from the NFMP indicates the optimum fertilizer application rate as derived by the UofM Extension BMP approach. FMR notes that the green "Nitrogen Loss" curve in Figure 13 represents total nitrogen loss at the defined optimal application rate. This loss represents a clear economic externality that is not accounted for in the economic optimization model.

The NFMP itself acknowledges this on page 41, stating "The UofM BMP recommendations focus on managing the agronomic risk." Agronomic risk factors are managed to ensure maximum agricultural profitability, not to minimize total nitrogen loss to Minnesota's surface waters and groundwater. It is clear that MRTN is not the rate that minimizes pollution, but rather the rate that maximizes producer profit. This approach is unacceptable to Minnesotans who bear the significant financial and public health burdens of contaminated drinking water.

Comment: The U of M BMP recommendations used in the NFMP are designed to promote maximum producer profitability. These BMPs are not tailored to achieve environmental outcomes, and may result in significant impacts to Minnesota's surface water and groundwater resources.

Recommendation: The MDA should partner with the U of M and local stakeholders, including public and private well owners, to establish water quality based Maximum Nitrogen Loss Levels (MNLLs) in prioritized communities. MNLLs would be tailored to the needs of local groundwater resources, and would be derived from existing University of Minnesota Extension data. MNLLs would define the maximum allowable level of nitrate export under local conditions. The NFMP should then assign BMP fertilization application rates that result in nitrogen losses that do not exceed the MNLL. In this way, BMP fertilizer application rates are localized to meet water resource goals, resulting in fair and efficient achievement of protection and restoration outcomes. In addition, because these MNLL rates are based on water quality needs, the NFMP will be insulated from changes in the MRTN recommendation approach resulting from unexpected swings in commodity and fertilizer prices.

*MDA Response: Soil solution concentrations, either from suction tube lysimeters or tile drainage, are frequently monitored to determine the treatment impacts in nitrogen fertilizer experiments. These numbers should be used to compare various treatments. These values should not be equated to drinking water standards. In most Midwestern studies, it is uncommon for soil solutions to be less than 10 mg/L even when no nitrogen fertilizer is applied. See Subjects 1, 7, 10, 12**

B. Phase Determination Criteria: The draft NFMP utilizes a phased approach to determine the appropriate BMP adoption criteria and mitigation strategy, based on a variety factors included BMP adoption rate, groundwater nitrate concentrations, and other local factors. The NFMP includes the following table (Table 9) that summarizes the NFMP mitigation phase criteria.

2a1: Phase 1 & 2: Phase 1 is considered when 5% of the wells have nitrate levels greater than the HRL or 10% or more of the wells have groundwater concentrations greater than 7 mg/L. Phase 2 is considered when 10% of the wells have nitrate levels greater than the HRL and BMPs are being adopted or the response effort is initially promoting BMP adoption.

Comment: The threshold for Phase 1 is far too high. Postponing action until 1 in 20 local groundwater wells exceeds the HRL imposes a significant cost on local residents and businesses. These costs are excessive and should not be born by local residents absent some meaningful efforts to establish BMPs by agricultural operations.

Recommendation: Phase 1 should begin when 5% of wells exceed 7ppm. This level allows communities to engage in mitigation efforts before HRLs are exceeded, and before local residents are forced to invest in bottled water, expensive new wells, or residential de-nitrification systems.

*MDA Response: See Subjects 1, 5, 13**

Comment: The threshold for Phase 2 is far too high. Postponing regulatory action until more than 1 in 10 local groundwater wells exceed the HRL imposes significant costs on local residents. Asking 1 in 10 local families to make substantial investments in bottled water, de-nitrification systems, or new drinking water wells absent any accountability for the agricultural businesses responsible for that contamination is profoundly unfair.

Recommendation: Phase 2 should begin when 5% or more of local well exceed the HRL, or when 10% exceed 7ppm. This allows communities to establish clear nitrogen reduction strategies before drinking water resources are contaminated. Given that the NFMP has been in place for more than 2 decades and nitrogen contamination is increasing in wells in 6 of 7 regions of the state, it should by now be abundantly clear to the MDA that an approach that relies strictly on voluntary BMP adoption to prevent groundwater degradation is insufficient. Parents and families should not suffer the excessive costs and risks of contaminated drinking water for years to come while the MDA refuses to take meaningful regulatory action to protect the health and well being of our communities.

*MDA Response: See Subjects 1, 4, 5, 13**

2a2: Page 81 of the NFMP states that "…nitrogen fertilizer BMPs would need to be

implemented on approximately 80% of available row crop land in order for the mitigation phase to meet adoption criteria."

Comment: This adoption rate goal is far too low, and is highly unlikely to result in meaningful nitrogen pollution reductions.

Recommendation: Include in table 9 the specific BMP adoption rate adherence thresholds that must be achieved in Phase 1 & Phase 2. FMR recommends that an 80% adoption level be set at the Phase I threshold, and a 95% adoption level be set as the Phase 2 threshold.

Recommendation: Modify the NFMP to include the provision that if Phase 1 & Phase 2 BMP adoption rates are not met, or if they are met but excessive nitrate levels persist, the NFMP should move to Phase 3 & 4 regulatory mitigation regardless of BMP adoption rates – since BMP adoption in that case will have been proven ineffective.

*MDA Response: There can be practical and logistical difficulties that can make it difficult for a farmer to implement all the BMPs every year. MDA believes a 95% adoption rate may be difficult to achieve. See Subjects 1, 5, 7**

2b: Phase 3 & 4: According the draft NFMP, Phase 3 is considered when 10% of the wells have nitrate levels greater than the HRL and BMPs are not being adopted. Phase 4 is considered when 15% or more of the wells have nitrate levels greater than the HRL and BMPs are not being adopted. In the text above, as well as in Table 9 above, the phase criteria stipulates that Phase 3 and Phase 4 are not utilized if BMPs are being adopted. This corresponds to the MDA's October 16th, 2013 presentation on the NFMP at the Minnesota Water Resources Conference, during which staff stated: "If growers adopt best management practices, its very unlikely that regulation will be adopted."

2b1: In the draft NFMP as written, the modest local adoption of inherently sub-optimal BMPs deprives the entire community of the Phase 3 and Phase 4 regulatory protections altogether, regardless of water quality conditions. This is profoundly unfair to local residents and is a serious flaw in the draft 2013 NFMP.

The serious health risk associated with elevated nitrate contamination in community and private drinking water supplies demands immediate intervention. The MDA is unwise to disregard this risk in an apparently interminable cycle of BMP promotion. A community with 10+% or 15+% of drinking water wells above the HRL should not have to wait for agricultural producers to install BMPs over the course of a multi-year crop rotation, only to see those same BMPs promoted all over again for another crop rotation, and another, and another…ad infinitum.

The very U of M Extension BMPs promoted by the MDA are not determined by the Maximum Nitrogen Loss Level (MNLL) in a Phase 3 or Phase 4 scenario, as they should be. Instead, the MDA assumes that a rate that ensures maximum producer profitability will be sufficient. Adoption of BMPs at the economically optimal level may be insufficient to prevent 10% or 15%+ of wells from exceeding the HRL for nitrate in drinking water.

Increased adoption of voluntary BMPs may depend on the availability of taxpayer funding.

Communities should not be excluded from the assistance that regulatory mitigation can provide because additional taxpayer dollars are not available to pay polluters to stop polluting.

Page 80 of the NFMP itself concludes that: "…at some locations the widespread adoption of BMPs has not provided sufficient environmental benefits to prevent exceeding the nitrate standard in drinking water".

If the MDA is truly confident that the promotion and adoption of current BMPs is sufficient to secure meaningful protections for groundwater resources in Minnesota, the agency need not fear unpopular Phase 3 & 4 regulatory intervention in the agricultural sector. However, if those same BMPs prove insufficient to meet HRLs (as is clearly already the case in some parts of the state), it is unfair and unwise to deprive Minnesotans of the regulatory protections they deserve at the expense of public health.

Comment: Phase 3 mitigation should be automatically triggered at the 10% threshold following the first crop rotation period of three years, regardless of whether or not any particular BMP adoption rate is achieved in Phase 1 or Phase 2. Phase 4 mitigation should be automatically triggered at the 15% threshold following the first crop rotation period of three years, OR if 10% wells exceed the HRL after the second crop rotation of 3 years. This should occur regardless of whether or not the 80% or 95% BMP adoption rates are achieved.

Recommendation: Remove the BMP adoption criteria from Phase 3. If 10% of wells exceed the HRL after the first crop rotation of 3 years, the NFMP should move to Phase 3 regulatory mitigation without exception, regardless of whether or not the 80% or 95% BMP adoption rates are achieved.

Recommendation: Remove the BMP adoption criteria from Phase 4. Phase 4 mitigation should be implemented if 15% of wells exceed the HRL after the first crop rotation of 3 years, OR if 10% of wells continue to exceed the HRL after the second crop rotation of 3 years. Phase 4 regulatory mitigation activities should proceed under these conditions regardless of whether or not the 80% or 95% BMP adoption rates are achieved.

*MDA Response: See Subjects 5, 12, 15**

C. Proposed mitigation activities: Despite decades of BMP promotion in Minnesota, the NFMP itself acknowledges on page 21 that "…the odds of elevated Nitrate concentrations [are] significantly higher in wells where the principal land use within one-quarter mile was agricultural."

3a: The NFMP lays out a 16-step process for addressing groundwater contamination through the multi-phase mitigation process. FMR has many concerns about certain aspects of that process, independent of the phase determination concerns listed above. A sampling of these concerns are listed below. Mitigation step #5: indicates that the local advisory team host a public information session for farmers. This meeting can and should include all parties involved, including those who are experiencing high levels of contamination in drinking water wells. Mitigation steps #7, #10, #13: indicate that the advisory team activities should include efforts to identify and promote regionally specific BMPs. FMR understands that this activity has been occurring for at least 23 years, as that is the life span of the current NFMP, and is

unsure as to how continued promotion and adoption of BMPs will yield a different result. Mitigation step #8: We applaud the MDA for acknowledging here that “at some locations the widespread adoption of BMPs has not provided sufficient environmental benefits to prevent exceeding the nitrate standard in drinking water.” However, this step indicates that under this condition, the MDA will “encourage” the local advisory committee to move past BMPs to AMTs. If BMPs are adopted and HRLS remain exceeded, the MDA should require that AMTs are adopted. Mitigation Step #16: Indicates that phase determination should: “Consider the following actions: a. If the recommended BMPs are being adopted but are not effective in reducing nitrate contamination, promote additional management tools (e.g. AMTs) and/or consider revising the BMPs to address local conditions. b. If the recommended BMPs are not being adopted, consider developing Water Resource Protection Requirements (rules).” An arbitrarily assigned adoption rate of BMPs should not bar communities from pursuing WRPR adoption to protect their own drinking water resources. Phase determination is not the sole province of the MDA, and local communities must have the clearly established authority to develop WRPRs based on their sound judgment, independent of local BMP adoption rates.

3b: Additional mitigation activities to consider: In general, additional mitigation activities are available to communities that exceed the items included on the list beginning on Page 84 of the NFMP. However, FMR recommends that the NFMP be amended to include the following:

Activities to consider for Phase 2: 1. Sampling efforts and to provide information on nitrogen crediting for determining proper nitrogen fertilizer application rates. 2. Recommend and support developing irrigation, water management or nutrient management plans. 3. All farmers allow access to collect irrigation well water samples. 4. Farmers must report on their management practices, including nitrogen fertilizer and/or manure application rates, timing, sources and placement. All of the above activities are common in agricultural landscapes and do not require farmers to take specific mitigation actions. By requiring meaningful planning and reporting activities (as distinct from regulatory BMP adoption) advisory committee members can better assess practices and target additional effort.

Activities to consider for Phase 3: 1. Restrict practices to those that are considered “recommended” by regional University of Minnesota Extension Best Management Practices for Nitrogen, and exclude any and all practices labels “acceptable with risk”. 2. Mandatory self-reporting on multiple aspects of nitrogen fertilizer use and environmental impacts including but not limited to expected and actual yields; water and soil tests; credits for past legume crop and manure or sludge; and laboratory testing and reports for soil and water analysis. 3. Require irrigation, water management and nutrient management plans. 4. Advisory groups identify locally appropriate Maximum Nitrate Loss Levels (MNLLs). Activities to consider for Phase 4: 5. MNLLs are enforced on all farm operations.

3c. Evaluating Phase Implementation: On page 85, the NFMP states that that: “A site may be downgraded if water quality monitoring results support that water quality has continuously improved to below the water quality guidelines, or the rate of BMP adoption has improved.”

Comment: FMR wishes to remind MDA staff that the 2013 Draft NFMP states the following: “at some locations the widespread adoption of BMPs has not provided sufficient environmental benefits to prevent exceeding the nitrate standard in drinking water.” The MDA cannot

seriously propose that a phase downgrade can or should be the result of BMP adoption alone. Downgrading a mitigation phase if BMP adoption rates improve but water quality results do not is absurd. Only water quality results should determine that a mitigation phase downgrade is appropriate.

Recommendation: Revise to read as follows: "A site may be downgraded to a lower phase if water quality monitoring results support that water quality has continuously improved to meet the water quality guidelines appropriate to that phase." The following paragraph assigns a "margin of assurance" of 10% below the HRL to suspend Phase 3 & Phase 4 rules, and reads as follows: "A target of sustained monitoring results at least 10% below the water quality guideline may be appropriate to ensure the reduction is permanent."

Comment: FMR wishes to remind the MDA that the goal of the Comprehensive Groundwater Protection Act is not simply achieving waters that are only 90% of the HRL. Recommendation: Contamination levels can and should fall at least below the recommended Phase 2 threshold (Comment 2a1 above) before Phase 3 & 4 mitigation activities are suspended.

*MDA Response: See Subjects 1, 5, 7, 12, 14, 15**

D. FMR notes that page 72 of the NFMP details the establishment of a new entity: the Nitrogen Fertilizer Education and Promotion Team (NEFPT). We are concerned about the role, makeup, and potential conflicts of interest among the Nitrogen Fertilizer Education and Promotion Team (NEFPT) membership.

Comment: FMR notes that the NFEPT is open to fertilizer retailers. Fertilizer retailers have an explicit economic incentive to maximize the sale and distribution of nitrogen fertilizers in Minnesota. This is a clear conflict of interest. We are concerned that the presence and role of fertilizer retailers on the NFEPT may discourage the NFEPT from recommending strategies that do not align with the economic interests of the fertilizer industry.

Recommendation: Adopt strong conflict of interest rules for participation on the NFEPT. These rules must require the disclosure of any potential conflicts of interest among membership, and must exclude members that stand to profit directly from the sale and distribution of nitrogen fertilizers in Minnesota.

*MDA Response: MDA disagrees with this recommendation. The NFEPT is specifically intended to engage the agricultural community, not exclude them. The NFEPT will not make any regulatory decisions. Their purpose is to promote voluntary practices that will reduce nitrate losses to groundwater. It is the agricultural community including farmers, crop advisors, agricultural organizations, agricultural businesses, USDA and agricultural researchers who have the greatest ability to implement and effectively promote these practices. The MDA will actively seek the participation and leadership of the agricultural community on the NFEPT. See Subjects 1, 6, 7**

Comment: The NFMP is vague about the representation and responsibilities of the NFEPT.

Recommendation: the NFMP should be revised to include specific information on the intended makeup and role of the NFEPT. This should include the following:

• Intended and/or invited stakeholder representation, including environmental NGOs, public drinking water supply managers, and private well associations.

• A commitment that the NFEPT provide an annual report on its activities to the public.

E. FMR applauds the MDA for committing to coordinate with state and local governments and initiatives in order to efficiently achieve nitrogen pollution reductions. However, we are concerned about the language on page 74, paragraph 2, which states that: "… However with the endorsement of the MPCA within the impaired waters process, it may be determined that the impacts of nitrogen fertilizer use on water resources may not be the highest priority concern and that the potential for increased nitrate concentrations in groundwater are an approved and acceptable tradeoff in order to promote specific BMPs that will be protective for other impairments."

Comment: FMR requests clarification as to what circumstances would result is this determination. Under what conditions would the adoption of nitrogen control BMPs on agricultural landscapes be incompatible with the adoption of additional BMPs that might address other surface water impairments? We are not clear as to how such practices would be deemed mutually exclusive, or how the MDA and MPCA would arrive at such a conclusion.

Recommendation: Provide an example in which the MPCA and MDA would arrive at such a determination, and provide scientific research as to how the adoption of BMPs that address surface water impairments would exclude additional or co-located BMPs that might address nitrogen pollution to groundwater in an agricultural landscape in that scenario.

Recommendation: Clarify what public entity would be charged with making such a final determination, and provide language stipulating that such a determination must be accompanied by a public hearing and a public comment period of no less than 30 days.

*MDA Response: MDA believes that conflicts between recommended practices to address different contaminants are likely to occur in the future and we were trying to anticipate this possibility. However, since these conflicts are not currently obvious we will remove this text. See Subject 1**

Gates, Larry

It occurred to me that I've been going to meetings about water quality/quantity in SE MN for about 40 years. During this time I have seen information provided on the status of our surface and water quality from a large number of state and federal land and water resource organizations and non-profits. All of the long term data sets I have seen say that we are falling on our efforts to maintain/protect water quality.

I did not hear a sense of urgency attached to addressing water quality impairments and climate change, land use changes (increased row crop, decreased perennial vegetation) require a quick or more adaptive approach.

I am also very concerned that I did not hear that there is a synthesized, integrated approach to water management in Minnesota. The SE has SE MN Water Resources Board, BALMM, watershed project setting, etc. all of which say they are doing something to maintain/improve

water quality. It appears the approach is slow, tedious, redundant and unable to figure out the culprits. Agriculture definitely has an adverse impact on our land water resource. All of the ag folks appear as apologetic for their bad behavior. The best comment I heard this evening was "…invest in rural water projects."

*MDA Response: See Subjects 1, 4, 11**

Hansen, Rick

The proposed Nitrogen Fertilizer Management Plan (NFMP) does not reflect current Minnesota Statute to protect public health and the environment, specifically with groundwater. It continues a strategy that does not acknowledge current agricultural business goals, procedures and practices in situ. The plan proposes an extensive and costly public investment to mitigate contamination caused by private business practices. It is unprecedented and unwise for the public to pay this cost through massive expenditures with no evidence of any outcome meeting the statutory goals. The proposed NFMP is not legally defensible, nor does it include the innovative and creative approaches Minnesotans have come to expect in environmental protection.

The plan does not acknowledge the costs incurred by public drinking water systems because of the inability of the current NFMP to meet goals established in 1990...a generation ago. Communities in rural areas where groundwater is contaminated because of high nitrate-nitrogen levels have to bear the cost of cleaning up. The plan states that 27 public water systems (PWS) are monitoring quarterly for elevated nitrates and that MDA and MDH are helping. It is just assumed the municipalities will have to pick-up these costs. Sharing the cost, to have deeper municipal wells and/or blending water with those who contaminated the water may have an immediate incentive for more prevention activities.

The plan references Perham, St. Peter and Lincoln-Pipestone experiences with groundwater contamination from nitrates. It details the extensive public effort to change behavior, but does not provide the detailed cost over time. It appears the NFMP is either unaware or indifferent of the public costs incurred by municipalities (and the state) to mitigate agriculturally induced groundwater degradation.

*MDA Response: See Subject 13**

The plan does not acknowledge current realities with farm ownership and rental responsibilities, nor does it recognize the influence of lenders and financing on business decisions and cropping practices. It continues the same information and education delivery mechanisms that have not shown any evidence of working so far (after 20 years). And it envisions an extensive publically funded effort at the Township level of subsidized implementation and monitoring.

Specifically, farm ownership is increasingly comprised of absentee landowners, and in some cases multiple landowners. The person(s) living on the farm site may not own or rent the crop land. The renter may also be absentee, living miles from the farm. The NFMP relies on farmers without understanding the current reality of decision makers. Cropping practice decision makers are no longer driving to the local Extension office or SWCD for information and assistance. Financial decisions such as lending and tax implications are driving cropping rotations and

practice decisions. Also, the fertilizer supply chain industry has an interest in selling the product, rather than the practice which could limit their profit.

*MDA Response: Comment is noted for further consideration. See Subject 1**

The FANMAP program is extremely time consuming, expensive, and shows no evidence of achieving an outcome to prevent or mitigate groundwater degradation. To double down and scale up these efforts with expanded public funding will waste time and money.

*MDA Response: See Subject 4**

The proposed NFMP also does not appear to incorporate recent scientific analysis, such as long term isotopic monitoring of nitrates in agricultural production. The NFMP continues a monitoring approach that focuses on volunteer, altruistic and ad hoc participation rather than scientifically based, statistically designed monitoring that would provide legally defensible regulatory decision making. The plan also does not provide specific resolutions to the groundwater and surface water degradation identified in the recent MN Pollution Control Agency report released this summer.

*MDA Response: See Subject 8, 11**

The proposed NFMP cites the: 103H.001 Degradation Prevention Goal: "It is the goal of the state that groundwater be maintained in its natural condition, free from any degradation caused by human activities. It is recognized that for some human activities this degradation prevention goal cannot be practicably achieved. However, where prevention is practicable, it is intended that it be achieved. Where it is not currently practicable, the development of methods and technology that will make prevention practicable is encouraged." However, the plan does not provide specific actions for prevention. Land conversion is not referenced or solutions provided. Failed efforts at information distribution and practice demonstrations have not prevented degradation. Publically funded cost share practices are not practicable on a state-wide scale for prevention and mitigation, even with Clean Water Legacy funding.

*MDA Response: See Subject 6**

After 23 years of education and promotion, the NFMP proposes establishing a Nitrogen Fertilizer Education and Promotion Team. This will be another stakeholder process to spend public money analyzing materials and processes. This is another in a set of process and analysis mechanisms with special interests groups and agencies over extended periods of time without measurable outcomes.

*MDA Response: See Subject 6**

The Alternative Management Tools (AMI) listed in the NFMP also have a high potential public costs, specifically land retirement and easement options.

*MDA Response: See Subject 7**

The Appendix A. MDA lessons learned from Elevated Nitrate work with farmers is one of the most important components of the NFMP. It highlights the extensive challenges involved in the publically funded voluntary approach that we have used for a generation and that the plan

proposes to expand and fund. No other businesses in the state that impact groundwater have had this type of analysis and assistance from the public sector.

The Appendix D. lays out the challenges and the opportunities for practice changes, but the methods proposed to achieve them are the same as they have been for a generation. However, prevention can be achieved by prohibiting and/or requiring certain practices and modifications that produce degradation. These practices can be further limited in defined sensitive areas.

A specific example of this is the Best Management Practice (BMP) of fall application of anhydrous ammonia in South Central Minnesota only being recommended when the six inch depth soil temperature falls below 50 degrees Fahrenheit. Acceptable, but with greater risk, "Fall application of ammonia+ N-Serve after soil • temperature at the 6-inch depth is below 50°F."-U of M publication with higher soil temperatures anhydrous ammonia is converted to nitrate-nitrogen in the fall and can be lost to groundwater. Therefore, fall application of anhydrous and urea without an N-inhibitor is not recommended as is no N fertilizer application on frozen soils. This BMP should be made a requirement in sensitive areas without the never ending process scheme of water resource protection requirements.

This authority currently resides within the Fertilizer Law 18C.005:

Subd. 10. Environment. "Environment" means surface water, groundwater, air, land, plants, humans, and animals and their interrelationships.

Subd. 37. Unreasonable adverse effects on the environment. "Unreasonable adverse effects on the environment" means an unreasonable risk to humans or the environment, taking into account the economic, social, and environmental costs and benefits of the use of a fertilizer.

Public health can be protected by preventing unreasonable adverse effects caused by specific fertilizer practices in specific sensitive areas. The precedent already exists:

Subdivision 1. Storage, handling, distribution, or disposal. A person may not store, handle, distribute, or dispose of a fertilizer, rinsate, fertilizer container, or fertilizer application equipment in a manner: (1) that endangers humans, damages agricultural products, food, livestock, fish, or wildlife; (2) that will cause unreasonable adverse effects on the environment; or (3) that will cause contamination of public or other waters of the state, as defined in section 1 03G. 005 subdivisions 15 and 17, from backsiphoning or backflowing of fertilizers through water wells or from the direct flowage of fertilizers.

These regulatory authorities reside at the state level. It is unlikely that many local governments would take the regulatory action if it was expected of them. Making agricultural public benefits contingent on adoption of BMPs would also improve implementation. Preferential property tax treatment and other subsidies are a privlege, not a right.

*MDA Response: See Subjects 1, 4**

The plan does not reference the implementation of the following statute by DNR and how it is incorporated into decision making: 103H 1O1 PROTECTION OF SENSITIVE AREAS.

Subdivision I. Criteria for determination of sensitive areas. The commissioner of natural resources

in consultation with the Minnesota Geological Survey, soil and water conservation districts, local water planning authorities, and other interested parties shall develop specific criteria for identifying sensitive groundwater areas and adopt the criteria by rule.

Subd 2. Identification of sensitive areas. The commissioner of natural resources shall, in consultation with the Minnesota Geological Survey, identify the location of sensitive areas by mapping and other appropriate methods after consulting the Minnesota Geological Survey, soil and water conservation districts, and local water planning authorities.

Subd 3. Notification of location of sensitive areas. The commissioner of natural resources shall:

(I) notify political subdivisions with planning or zoning authority and provide maps and other materials that show where sensitive areas are located and indicate the type of risk of groundwater degradation that may occur from activities at or near the surface; and (2) publish notification of sensitive areas in a newspaper of general circulation in the county where the sensitive areas are located.

Subd. 4. Information gathering. The commissioner of natural resources shall coordinate the collection of state and local information to identify sensitive areas. Information must be automated on or accessible to systems developed at the Minnesota Geospatial Information Office.

Subd. 5. State protection of sensitive areas. (a) The commissioner of agriculture for pollution resulting from agricultural chemicals and practices and the Pollution Control Agency for other pollutants must consider the type of risk identified under subdivision 3 when adopting best management practices, water resource protection plans, and water resource protection requirements to prevent and minimize groundwater degradation in sensitive areas. (b) To prevent and minimize groundwater degradation, state agencies must consider the type of risk identified under subdivision 3 when undertaking an activity within a sensitive area.

Subd. 6. Actions by regulating authorities. Upon adoption of a comprehensive local water plan as defined in section I 03B.I OJ to J 03B.355 or a water management plan under chapter 473 or sections I03B.20I to I03B.255, a regulating authority must take into account the plan and any geological assessments referenced in the plan when taking appropriate actions in sensitive areas.

Subd. 7. State agencies. Each state agency that has a program affecting activities that may cause or contribute to groundwater pollution shall identify and develop best management practices to ensure that the program is consistent with and is effective in achieving the goal of section 103H.OOI. For those activities which may cause or contribute to pollution of groundwater, but are not directly regulated by the state, best management practices shall be promoted through education, support programs, incentives, and other mechanisms.

The following statutes describe landowner responsibilities and protections. Please note it describes landowner rather than farmer. Educational and regulatory efforts should recognize the differences between landowners and renter and the responsibilities of each.

103H.111 LIABILITY AFTER PROTECTION OF SENSITIVE AREA.

(a) A landowner within a sensitive area, identified under section I 03H.I OJ, has a complete

defense to liability for degradation of groundwater caused by surface water from the sensitive area recharging groundwater if:

(1) the landowner's portion of the sensitive area is subject to a plan adopted by the soil and water conservation district to protect the groundwater from degradation through surface water recharge;

(2) the projects and practices required by the plan have been implemented and have been certified as having been implemented by the soil and water conservation district;

(3) the projects and practices required by the plan are maintained according to the plan; and

(4) the landowner has not allowed unlawful practices on the property that disrupt the projects and practices required by the plan.

(b) The soil and water conservation district's plan must include appropriate best management practices and water resource protection requirements.

*MDA Response: See Subject 6**

Comment Period. The MDA prepared a traditional public input method of public meetings scheduled throughout the state based on area rather than population. The metro area had one location for input during business hours. The MDA should extend the comment period and seek representational input. Stakeholders have a vested interest in the participation for comment. Public participation needs to have greater access for the public affected by groundwater contamination and those paying for the cost of clean-up. It also appears the outreach for input effort was traditional as well and did not reach underserved communities.

The NFMP does not fully recognize, reference or utilize the Clean Water Legacy Act statutory authorities. The Clean Water Fund abilities for the MDA are not acknowledged, specifically:

(5) providing funds to state agencies to carry out their responsibilities, including enhanced compliance and enforcement.

114D.10 LEGISLATIVE PURPOSE AND FINDINGS

Subdivision 1. Purpose. The purpose of the Clean Water Legacy Act is to protect, enhance, and restore water quality in lakes, rivers, and streams and to protect groundwater from degradation, by providing authority, direction, and resources to achieve and maintain water quality standards for groundwater and surface waters, including the standards required by section 303(d) of the federal Clean Water Act, United States Code, title 33, section 1313(d), and other applicable state and federal regulations.

Subd. 2. Findings. The legislature finds that: (1) there is a close link between protecting, enhancing, and restoring the quality of Minnesota's groundwater and surface waters and the ability to develop the state's economy, enhance its quality of life, and protect its human and natural resources; (2) achieving the state's water quality goals will require long-term commitment and cooperation by all state and local agencies, and other public and private organizations and individuals, with responsibility and authority for water management, planning, and protection; and (3) all persons and organizations whose activities affect the quality of waters, including point and

nonpoint sources of pollution, have a responsibility to participate in and support efforts to achieve the state's water quality goals.

114D.50 CLEAN WATER FUND

Subdivision 1.Establishment. The clean water fund is established in the Minnesota Constitution, article XI, section 15. All money earned by the fund must be credited to the fund.

Subd. 2. Sustainable drinking water account. The sustainable drinking water account is established as an account in the clean water fund.

Subd. 3. Purpose. (a) The clean water fund may be spent only to protect, enhance, and restore water quality in lakes, rivers, and streams, to protect groundwater from degradation, and to protect drinking water sources by:

(1) providing grants, loans, and technical assistance to public agencies and others testing waters, identifying impaired waters, developing total maximum daily loads, implementing restoration plans for impaired waters, and evaluating the effectiveness of restoration;

(2) supporting measures to prevent surface waters from becoming impaired and to improve the quality of waters that are listed as impaired, but do not have an approved total maximum daily load addressing the impairment;

(3) providing grants and loans for wastewater and storm water treatment projects through the Public Facilities Authority;

(4) supporting measures to prevent the degradation of groundwater in accordance with the groundwater degradation prevention goal under section I 03H. 001; and (5) providing funds to state agencies to carry out their responsibilities, including enhanced compliance and enforcement.

(b) Funds from the clean water fund must supplement traditional sources of funding for these purposes and may not be used as a substitute.

In summary, I would recommend the MDA extend the comment period to include greater public and scientific input. Cost analysis should also be included. Implementation plans need greater detail with consideration of other options than those that have already been tried.

MDA Response: The MDA would note the extensive NFMP Advisory Committee process, see page 14 – 15 in the draft NFMP.

Huberty, Brian

Generally the document to a good job at outlining the history and trends for the problem. While there are some minor successes in addressing the problem, as the report and results show there has been little progress in reduction of nitrogen in groundwater. In some areas of the state, levels continue to rise. So in effect, the plan has not worked as intended so other approaches must be used.

Personally, I live in a rural area just SW of Hastings, MN in an outwash plain. The well is surrounded by agriculture with the nearest row crops ranging from 130 meters to 180 meters in all directions except south. I have seen my nitrate levels rise in my well system steadily over the last decade to where it has exceeded the EPA limit. I regularly check my well on average of at least once a year if not more.

Since Ag is the dominant problem; economics is the major driving force for any substantial change. Unless we change the economic driving force, BMP's or other 'incentives' will not work. Local property taxes with state and federal farm policies ultimately drive the economic forcing mechanism.

*MDA Response: See Subject 1**

One alternative that was only mentioned by name is precision agriculture. With 'true' precision ag, the entire process of inputs and outputs is measured across the farmland down to a square meter. Thus not only does the farmer know how many bushels he or she may be growing on every square meter through the use of 'quantity' yield monitors on combines but they also know through the use of 'quality' yield monitors the amount of nutrients removed in the grain through the percent oil or protein. This is very important because it allows the farmers to reapply the exact amount of nutrients removed every year instead of the blanket approach. So on average, there should not be any nitrogen runoff or loss into the groundwater since there is not excess nitrogen available.

This technical approach continues to be research and tested for over a decade by Dr. Dan Long, USDA ARS and others. I first met Dan when I was part of a small team (Case IH, Textron, NRCS) looking at quality yield monitors in the late 1990's. As you can see by the link below, Dr. Dan Long continues to be one of key people looking at Precision Nitrogen Management:
http://www.ars.usda.gov/pandp/people/people.htm?personid=35825

"I am investigating how information from on-combine yield monitors and optical sensors can be applied into N management thereby improving grain quality and yield. Because of the correlation between grain protein and plant N nutrition, optical sensing provides an opportunity for growers to use grain protein maps to assess spatial variability in soil N fertility levels. This approach could lead to improved soil sampling protocols that direct sampling to areas of a field that are deficient in N. Plus, the resulting grain protein maps can also be a useful post-harvest indicator of whether the N supply was sufficient for optimum wheat yields."

So here is a technical approach that does work but how does one implement it? Talking last month one-on-one with Dr Tom Peters, Director of Biotechnology, Monsanto (former head of Monsanto's Precision Ag Research), getting farmers to add 'quality yield monitors' is just part of the bigger problem. An Ag Information Infrastructure (AII) system is needed for the farmer, the county assessor, as well as the regulator. The AII needs to be structured so the farmer can easily see the inputs (seed, fuel, herbicide rates, fertilizer rates, etc.) and outputs (yield, runoff, nutirents removed, etc) across every square meter on the farm. The results are then automatically analyzed for on-going treatments as well as to plan for next year's crops where both the economic gains are maximized AND environmental impacts are minimized.

The county assessor also needs this information to more fairly assess each landowner based on their soil variability instead of blanket assessments.

In a form that protects private information, the regulators also need to know these inputs and actions from farmers to insure both a level playing field but also to assess whether further actions are warranted.

As the report shows, the State of Minnesota has diverse geology, soils and climate. Making the system be fair will be a challenge since there are farming areas like SE and SW Minnesota which have high nitrogen levels. Policy will be needed to provide economic and environmental incentives to maintain the farm economies while protecting ground water.

The report also needs to address the 'scale' or resolution of the problem in more detail. Many of the failed wells may be due to a few localized problems.

MDA Response: There is a significant amount of new research focusing on mineralization and how we can manage in-field variability with precision agricultural technology, anticipating that there will be some significant advances in the next 4-6 years. These tools will be extremely important in groundwater sensitive areas.

Joachim, Gary G.

Will you be monitoring the “alfalfa” pivot areas” by Perham to see what happens should the alfalfa winter-kill or need to be reseeded? There may be a spike in nitrate levels. There might be practices or crops to minimize nitrate spikes.

MDA Response: Yes, the MDA will be monitoring the pivot areas.

Kresha, Ron

I am writing to you with concerns about the process for creating the draft of the 2013 Nitrogen Fertilizer Management Plan (NFMP). As a member of the Agriculture Policy Committee, I hope that we will have a chance to fully discuss the objectives of the 2013 NFMP and the process for review, comment, and completion.

As you may well be aware, farmers today are using advance technology and efficiency to reach the optimal rates of nitrogen fertilizer. It is not in their best interest from an environmental nor economic standpoint to be applying nitrogen fertilizer in a careless or inefficient manner. Furthermore, there are many sources of nitrogen than just fertilizer, and all of these sources need to be reviewed and their implications on our drinking wells.

I realize the importance of maintain our safe water supply, but I suggest we move forward in a manner that is transparent and fully discussed with all the stakeholders and legislators.

One first step is that the Agriculture Policy committee should fully understand the process and goals of revising the 1990 NFMP. What, if any, parts are out of date? What specifically needs to be changed? What are the intended consequences and what are the unintended consequences? Before we jump to conclusions and revisions, I suggest we proceed with caution.

*MDA Response: See Subject 2**

Kroll, Duane

How much more time and resources will the MDA spend going down a wrong road that will lead only to public concern and fear and an inaccurate perception of water quality issues in Minnesota?

The Draft 2013 Nitrogen Fertilizer Management Plan is a lengthy document that, in the end, has not provided any documented proof that the agricultural use of commercial nitrogen is the source of high nitrate levels in private residential wells. It appears the MDA has used non-verified data to support their position. Many farmers are afraid to comment on the Plan because of fear of any repercussions that could come their way from becoming actively involved in this process. Others who attended the Public Listening Sessions felt hopeless in responding as it appears the MDA is very determined to move forward with this plan regardless of any input you are given.

It is my understanding that in 1990, a similar process and plan was constructed to address this issue of nitrogen management. At that time, there was greater input from the ag community. In comparison, the 2013 NFMP advisory committee had minimal true ag representation, ie:a producer not serving on some commodity organization board. The 1990 plan is still relevant and usable. The presenters from the MDA at the Public Listening Session could not help themselves from repeatedly saying how this study is possible because of the Clean Water Legacy Act funding. It must be tiring looking for a way to link contaminated wells to agricultural activity when you have no solid proof. Is this a good use of taxpayers' dollars? The wells that are experiencing high nitrates need to be evaluated to rule out site specific problems. If you have a real genuine concern for these families and individuals, your plan would include purchasing and distributing reverse osmosis systems for their homes.

Looking back to the June 2012 issue of the MDA Update, page 6 headline reads "Good News for Central Sands Well Owners". The article states that over 88% of the wells sampled had nitrate-nitrogen concentrations less than 3mg/L;only 5% exceeded the safe drinking water guideline of 10mg/L. The article goes on to say that "it is important to note that the older and/or shallower wells tended to have a higher percentage at unsafe nitrate-nitrogen concentrations." We question how less than a year later the MDA is spending time and resources and calling this an immediate threat to public health?

The presenters at the meetings/listening sessions that my wife and I attended were so unaware of many of the conservation and fertilizer management practices already being used by producers. The technological advances that continue to be made in the agricultural industry utilize less water, less commericial fertilizers, and fewer passes over the land. Farmers have, for many years, been actively seeking and implementing better practices. Look around--- we are not farming like we did 20 years ago. Or in most cases not even like we did 5 years ago.

How can the MDA, in good consciousness, propose a plan that you, yourselves, have said that the recorded history is somewhat foggy and that the effects of nitrogen-nitrates in well water doesn't sometimes show up until about 20 or more years later?. Has your plan been verified by a third-party non-government agency? How can you establish regulations when you don't fully understand the effects of what farmers are currently doing? According to what you have said, you may not know these effects until 20 years from now. We do know that farmers are using nitrogen in more efficient ways. One presenter was amazed to hear that as a producer, I use variable-rate

nitrogen applications. This allows the nitrogen to be used most efficiently when the plant needs it and can utilize it. The use of cover crops has been common practice on our farm for over 30 years. Most farmers are excellent stewards of the land and to imply that we need the NFMP to keep us "in-line" is an insult. After clean air and water, people need food. Farmers are growing more food with fewer resources than ever. What economic hardships are you willing to put on farmers just to follow a plan that likely will not have a significant change in the nitrate-nitrogen levels of private wells? What happens after you have spent all the Clean Water funds, made farmers make unreasonable changes to their operations, and the public sees no positive change in their water quality? What will this do to the credibility of the MDA?

Your plan calls for phases. But why does it not call for trial segments that could test the validity of this plan?

This only skims the concerns I have with this Draft 2013 NFMP. In the best interest of the people of Minnesota, I strongly support the MDA to reconsider this proposed plan and to actively engage a greater number of producers from across the state for future input.

*MDA Response: See Subjects 2, 13**

Lucking, Mike

The undersigned appreciate the opportunity to comment on the draft 2013 Nitrogen Fertilizer Management Plan (NFMP) that the Minnesota Department of Agriculture (MDA) is proposing. After reviewing the draft 2013 NFMP, questions arise as to the need for a revision of the 1990 plan. The 1990 NFMP is as valid today as it was in 1990. The 1990 plan was written with significant input from agriculture stakeholders and was designed to accommodate future changes in agricultural practices. Nitrogen fertilizer use in Minnesota has been flat for the last 25 years, while yields have increased significantly. Nitrogen fertilizer use efficiency today is as high as scientific processes and technology allows. Minnesota farmers are not interested in using more nitrogen fertilizer than is needed to optimize economic yields for the crops they produce. Competitive pressures prevent them from doing otherwise.

*MDA Response: See Subject 2**

Farmers in Minnesota use lower rates of nitrogen per acre than farmers in any of the surrounding states with similar yield levels. This is due to the soil and climatic conditions that exist in Minnesota, as well as the need to maximize economic returns. Both over and under application of nitrogen have a negative impact on yields and quality of crops grown in Minnesota; and therefore, there is no economic incentive to over apply nitrogen. If anything, nitrogen fertilizer rates are below optimum for the yields that are now being produced. In fact, a five year MDA study indicates this. Higher economic yields were obtained from rates that were 30-40 lbs/acre higher than the existing University of Minnesota nitrogen fertilizer guidelines.

MDA Response: The U of M guidelines are designed to optimize, not maximize, yields. Frequently the additional 30-40 lb/acre will produce a small yield increase although it is not uncommon for these yield increases to be statistically insignificant. Additionally, the farmer may not be getting an adequate return on the additional fertilizer investment cost.

The purpose of the MDA's Nutrient Management Initiative (NMI) is to assist farmers with the decision. We also need to factor in the environmental cost to water resources. Lastly, the U of M rates will not work if one of the other 4Rs in not adequately implemented. For example, frequently in the NMI project, farmers in South Central MN were fall applying without including N-Serve. The additional N was beneficial in these cases in order to compensate for the higher leaching losses.

There is no evidence provided in the draft 2013 NFMP to indicate that groundwater nitrate problems are increasing due to the use of nitrogen fertilizers. Therefore, we question the MDA motives in redoing the 1990 plan with the inclusion of a phased approach to regulation of nitrogen fertilizer that is outlined on pages I 0, 76, 78 & 130 of the draft. The Phase Approach being proposed is adapted from an approach used in Nebraska. The Nebraska situation is unique and there are no areas in Minnesota that are comparable to the Nebraska region which has high nitrates in groundwater. Irrigation wells in this Nebraska region are in very shallow groundwater aquifers, and an established linkage between the irrigation well high nitrate levels versus past intensive irrigation and excessive nitrogen fertilizer usage had previously been documented. The type of irrigation management and nitrogen use that helped create the Nebraska situation has never existed in Minnesota. In Nebraska, irrigation well concentrations are the triggering mechanism for phasing in regulation, not unrelated drinking water wells, as is being proposed in Minnesota.

The draft NFMP (on pages 10, 76, 78 & 130) addresses mitigation phases and criteria that are part of the proposed regulatory process. Private drinking water wells tests will be used to trigger the various phases of the process. Serious concern exists over the lack of scientifically established cause & effect linkage of high nitrate wells to nitrogen fertilizer usage. There are other well-established causes of wells testing high in nitrates. These causes include contamination from other nitrogen sources, such as nitrates produced from soil organic matter mineralization, septic systems, manure, atmospheric deposition, etc. The recently released Minnesota Pollution Control Agency (MPCA) Nitrogen Report indicates that more than 75-80% of the source nitrogen which can impact ground or surface waters is from non-fertilizer nitrogen sources. The MDA does not have statutory authority over the naturally occurring soil organic matter mineralization process.

There can be other causes of high nitrates in wells, in addition to all the non-fertilizer nitrogen sources, that can cause high nitrates. These causes include poor well construction, improper well placement, cracked or rusted out casings, dug wells and many other possible causes. Trying to relate drinking water well nitrates levels to nitrogen fertilizer use is a flawed concept. Existing drinking water well nitrate levels should not be considered as an indicator of groundwater nitrate levels because of the site-specific problems that exist with them. MNICCA is very concerned that the use of existing drinking water wells in the phased approach, as is being proposed in the 2013 NFMP, is likely to trigger negative public perceptions of nitrogen fertilizer usage and possible regulations when nitrogen fertilizer is not the problem.

There are better approaches to monitoring groundwater nitrate levels than a township well testing program. One approach might be to install properly constructed and designed monitoring wells in various groundwater aquifers around the state. These monitoring wells would need to be

constructed and properly placed in order to account for all the nitrate-nitrogen sources and various pathways of nitrates to the monitoring well.

In summary, the township well testing program being proposed in the draft 2013 NFMP which would be used as part of the phased approach to regulation of nitrogen fertilizer has serious technical and scientific flaws and is likely to result in serious economic harm to Minnesota agriculture. It is also unlikely that this program would have any positive impact on groundwater quality. The MDA needs to rethink whether the 1990 NFMP needs to be revised and if so, it needs to fully engage the agricultural community as part of that revision similar to what was done in 1990.

*MDA Response: See Subjects 2, 8**

Minnesota Center for Environmental Advocacy

MCEA disagrees that the existing Nitrogen Fertilizer Management Plan (1990) is in need of major revisions. The 1990 Plan recognizes that the Groundwater Protection Act calls for voluntary BMP's, evaluation and assessment of effectiveness of BMPs, and establishment of regulations if BMPs prove ineffective. After more than two decades of BMP development and promotion, it is clear that the voluntary measures are not achieving the goal of the Groundwater Protection Act, which is to prevent groundwater pollution. In the Central Sands area of the state, for example, nitrate contamination is now detected in 97% of monitoring wells. Fully 62% of recent samples exceed the Department of Health's established Health Risk Limit (HRL) designed to protect children from toxic levels of nitrate in drinking water.

Because the Department has ample evidence proving that voluntary BMPs have been ineffective at preventing the contamination of groundwater, MCEA submits that the focus of the Department's efforts should be on managing this widespread and significant pollution through adoption of "water resource protection requirements" as intended by the Legislature when it enacted the Groundwater Protection Act.

*MDA Response: See Subjects 1, 2, 4**

The Groundwater Protection Act

The Groundwater Protection Act of 1989 has the goal of preventing groundwater degradation. For agricultural chemicals, including nitrogen fertilizer, the statute is implemented by the Minnesota Department of Agriculture (MDA), which has the duty to:

- Identify and develop best management practices to ensure that the program is consistent with and is effective in achieving the goal; Promote these BMPs, which are voluntary, practicable measures that are capable of preventing and minimizing degradation of groundwater;
- Evaluate the use and effectiveness of the BMPs and report this information to the Environmental Quality Board for inclusion in reports to the Legislature;
- Evaluate the detection of agricultural pollutants in the state's groundwater;

- Monitor groundwater for pollutants found to be a “common detection”—detection of a pollutant that is not due to misuse, but rather is the result of normal use of a product or practice.

If the voluntary BMPs prove ineffective, the Legislature provided MDA with the authority to adopt mandatory practices called water resource protection requirements (WRPR) that include “design criteria, standards, operation and maintenance procedures, practices to prevent releases, spills, leaks, and incidents, restrictions on use and practices, and treatment requirements.”

The statute anticipated that WRPRs would be needed fairly quickly, but proscribed their adoption prior to January 1, 1991. Although clear evidence shows that voluntary BMPs are insufficient to prevent groundwater pollution, in the 24 years since enactment of the Groundwater Protection Act, the MDA has not developed or adopted WRPRs.

The Act, like other resource protection statutes, recognizes that there is a cost borne by society when an industry is allowed to pollute our shared resources. The Legislature intended that MDA measure the extent to which agricultural activity had already degraded groundwater resources, take measures to prevent further degradation, and impose rules if voluntary measures did not work. Without such rules the costs of pollution are shifted to the public and there is no incentive for those whose activities pollute to stop polluting.

*MDA Response: See Subjects 1, 13**

The implementation of voluntary BMPs has proven to be ineffective.

Although MDA and the University of Minnesota developed and promoted the BMPs required by the Act and agricultural producers have widely adopted them, nitrate levels in groundwater are high and are worsening. There is clear evidence that the BMPs are ineffective at preventing nitrate contamination and that additional measures are needed.

The 1990 Nitrogen Fertilizer Management Plan included a list of voluntary BMPs for agricultural producers to adopt statewide, plus additional tiers of regional and special situation BMPs.10 These sets of BMPs are still in place and have been further refined. MDA’s assessment found that on the whole agricultural producers have adopted the BMPs. MDA has successfully developed and achieved broad implementation of the BMPs required by the Groundwater Protection Act.

Despite the high BMP adoption rates, monitoring shows increased degradation in ambient groundwater, natural springs, and public water supplies. This pollution is widespread. Worse, trends in groundwater nitrate concentrations are increasing in nearly all regions of Minnesota.

MDA has conducted shallow groundwater monitoring since 1985. All agricultural regions show substantial nitrate contamination. Comparing recent samples to monitoring conducted in the 1990s reveals that the rate of detection is increasing across all regions, as shown in Table 1 on page 56.

This rate of increase ranges from 19 to 44 percent. As a result, at least half the water quality samples show nitrate contamination in every agricultural region of the state.

A startling number of groundwater samples show nitrate concentrations above the Health Risk

Limit (HRL) of 10 mg/L. All agricultural regions of the state now have groundwater that is unsafe for human consumption. Six of seven agricultural regions exceeded the HRL more frequently in the last decade than in earlier monitoring.

A majority of the samples in the Central Sands region, which includes Regions 4 and 5, have nitrate levels that are unsafe for human consumption. Groundwater samples above the HRL increased by 24 percent in Region 4, resulting in the highest rate of samples above the HRL at 62 percent. Nitrate contamination was detected in 97 and 93 percent of samples in Regions 4 and 5, respectively. Of note is that areas with the highest rates of BMP adoption also have the highest rates of nitrate above the HRL.

While the Southeast region showed a decrease in samples above the HRL, nitrate was detected in 16 percent more samples. At this point, nitrate contamination is essentially universal in the region, with 99 percent of samples finding contamination.

A separate 20-year monitoring effort on two groundwater-fed springs in the Southeast region found that both springs have statistically significant increases in nitrate loading.

Public water supply well testing presents additional cause for concern. Communities where well nitrate concentrations exceed 5 mg/L are required to test their water quarterly. In 1990, 17 communities had to test for nitrates. Today, 27 communities must test their water for nitrate – a 59 percent increase.

These high nitrate levels have forced investment of significant public funds to ensure communities provide safe drinking water and meet federal law. For example, the city of St. Peter installed reverse osmosis treatment at a cost of $18.8 million because the city could not find wells without high nitrate levels. In an interview with Minnesota Public Radio, Bruce Montgomery, manager of MDA's fertilizer management section, stated that fertilizer BMPs alone cannot protect drinking water supplies, and "the science strongly suggests … the use of perennial cropping systems such as alfalfa strategically placed throughout the wellhead area may have the most significant impact."

Other communities are facing the same issue. Park Rapids, located in Region 4, recently approved a $2.45 million upgrade to its treatment system to remove nitrates. Lincoln-Pipestone Rural Water District invested $2 million to remove nitrates. Additional public water suppliers have considered similar investments.

Increasingly pervasive high nitrate levels have externalized costs onto citizens who pay for water treatment upgrades. Continued increases around the state will trigger additional public investments to remediate groundwater pollution in agricultural areas.

There is no dispute that agricultural practices are causing groundwater degradation despite implementation of the BMPs. As shown in Table 2 [not shown here], groundwater under all agricultural land in the state has a median nitrate concentration of 8.75 mg/L, only slightly below the HRL. This concentration is more than three times higher than any other land use. By comparison, concentrations in groundwater under undeveloped land are 0.05 mg/L.

The land use monitoring data are buttressed by recent findings of nitrate pollution in surface water. MPCA determined that 30 percent of nitrate pollution to surface waters resulted from

shallow groundwater below cropland.

The BMPs developed, promoted, and adopted pursuant to the Groundwater Protection Act have not been effective at preventing degradation of the state's groundwater. Because nitrate pollution from agricultural activities across the state is degrading groundwater resources and in many instances exceeding human health risk limits, MDA must take immediate action to develop rules that will prevent further degradation.

*MDA Response: See Subjects 1, 4, 8**

The 2013 draft Nitrogen Fertilizer Management Plan is unnecessary and contrary to the goal of the Groundwater Protection Act.

Despite the widespread pollution of Minnesota's groundwater resources, substantial trend toward increased degradation and demonstrated ineffectiveness of BMP implementation, the MDA has not acted to redress the situation with WRPRs. Instead, MDA offers a 2013 revision to the 1990 Nitrogen Fertilizer Management Plan that delays real action to address a growing problem by erecting roadblocks to adoption of WRPRs. The 2013 "update" is neither called for by law nor necessary and should be set aside in favor of regulatory requirements that will address the agriculture industry's degradation of Minnesota's groundwater resources.

The 1990 plan was required by the 1989 Act and was to include: the determination of trends in nitrogen pollution; causative factors; the development of recommended best management practices to reduce and minimize the pollution; regulatory controls; the feasibility of proposed treatment and corrective or mitigative measures; and the economic impacts of proposed corrective measures.

Updates to the plan are not required by law. As noted above, the required plan was adopted in 1990, and included a full suite of BMPs. These 1990 BMPs have been promoted, revised and widely adopted over the past 23 years.

The regulatory phase authorized by the 1989 Act is endorsed by MDAs 1990 plan: If the voluntary BMPs are not effective, the MDA will rule development for Water Resource Protection requirements (WRPRs) to be applied to the area.

Minnesota currently faces the situation envisioned by the statute and MDA's 1990 plan—proven ineffectiveness of the voluntary BMP approach. However, instead of adopting WRPRs to stem the degradation of our groundwater resources, MDA has drafted a plan that premises such action on a slew of extra-statutory conditions including a 16-step process, four mitigation phases and numerous conditions:

- Exceedance of the health risk value for nitrate (10 mg/L) instead of preventing and minimizing degradation (which is defined as a change in groundwater from its natural condition by human activities);
- Determination of mitigation need and phase based on percent of wells exceeding the HRL;
- Premising action and "effectiveness" determination solely on the basis of non-adoption of BMPs instead of implementation effectiveness as demonstrated by groundwater trends;

- Prioritizing action where local government and agricultural community are willing to participate;

- Setting the clock back 24 years and starting over with a host of resource-intensive steps: groundwater sampling, review, voluntary BMPs, discussions by a local farmer advisory team, detailed BMP adoption surveys, identification and promotion of more BMPs, consideration of locally developed "alternative management tools," development of educational programs, securing funding for BMPs, developing new field demonstration projects, continued monitoring and promotion, another adoption survey, more evaluation of adoption rates, and on and on.

There is no need for this 2013 plan, and it is contrary to the goal of the 1989 Act.

*MDA Response: See Subjects 1, 2**

State law requires MDA, as the agency responsible for regulation of groundwater from agricultural pollutants, to prevent the on-going degradation of the state's groundwater resources.

As set out above, the Legislature provided MDA with the authority to implement water resource protection requirements to prevent continued degradation of groundwater from agricultural pollutants. The evidence is very clear that MDA's efforts in the quarter century since passage of the Groundwater Protection Act have been ineffective. MDA's monitoring demonstrates that voluntary BMPs are ineffective at preventing groundwater pollution. Despite widespread adoption, widespread pollution continues to get worse.

MDA's failure to develop and implement water resource protection requirements has resulted in the degradation of state's groundwater resources, which continues today. Minnesota's bedrock laws protecting the state's natural resources, the Minnesota Environmental Policy Act, Minn. Stat. § 116D, and the Minnesota Environmental Rights Act, Minn. Stat. § 116B, give a clear mandate to state agencies to act to protect the state's resources for future generations. MDA's failure to use its authority under the Groundwater Protection Act to execute its duty to protect and preserve the state's groundwater resources is unlawful. Its failure to act is causing pollution, impairment and destruction of the state's resources in violation of state law.

What is needed in 2013 is not an "update" to MDA's statutorily mandated 1990 Nitrogen Fertilizer Management Plan. After two decades of BMP promotion and near universal adoption, the voluntary implementation of BMPs has been proven ineffective. Groundwater quality has worsened substantially and is still declining. Despite the continued rise in nitrate concentrations, MDA has not taken additional action. Instead, the Draft Plan proposes to reset the clock and delay action even further.

Continued delay in developing water resource protection requirements authorized by the GWPA violates MDA's duty to prevent degradation and allows ongoing pollution, impairment, or destruction of Minnesota's natural resources. MCEA requests that MDA immediately develop water resource protection requirements, beginning with the Central Sands and Southeast Regions, to prevent further degradation of the state's groundwater.

*MDA Response: See Subjects 1, 4**

Minnesota Corn Growers Association

General Comments

- There may be value in following Chapter 3, 'Groundwater Contamination and Sensitive Areas,' with Chapter 6, 'Nitrate Conditions in Minnesota Groundwater.' Chapter 3 provides soil, geologic, and climatic context for the observed nitrate conditions presented in Chapter 6. It would be useful to more closely connect these two chapters and then follow them with the information on nitrogen sources and best management practices (BMPs) that is presented later in the NFMP.

MDA Response: This change will be considered.

- Information presented in Chapter 4,'Nitrogen Cycle, Sources and Trends,' and Appendix C cites statewide sources of nitrogen inputs to Minnesota cropland. Figure 9 acknowledges that the relative percentages of these sources may not directly relate to amounts reaching groundwater. Though the statewide values provide some context for nitrogen sources, it is more relevant to understand the relative magnitude of these sources and their relationship to groundwater in the sensitive areas of the state that are well documented in the NFMP which may be significantly different from the statewide depiction of nitrogen sources to cropland. The information presented in Appendix D could be incorporated into this chapter as it highlights some of these regional differences related to sources of nitrogen in areas sensitive to groundwater contamination.

MDA Response: Agree. Local assessments of inputs and management are critical in understanding nitrate leaching losses relationships and one of the primary reasons the NFMP implementation is geared toward localized areas such as Wellhead Protection Areas.

Comments on Specific Chapters

- Chpt 1, P. 12: It is important to distinguish crop root zone water from groundwater in this section as there may be confusion as to whether the latter is inclusive of the former.

MDA Response: Noted

- Chpt 1, P. 16: The statement regarding tile drainage not being a high priority for a localized response to groundwater contamination is an important one that needs to be highlighted as the NFMP is implemented.

MDA Response: Noted

- Chpt 2, P. 18: Is the drinking water standard the primary metric used to determine groundwater degradation as it relates to nitrate-nitrogen? It might be useful to state that more directly in this section as it is also one of the fundamental criteria of the mitigation plan presented later in the NFMP.

MDA Response: The Groundwater Protection Act directs that the health standard is an

important reference point and that it should be not exceeded, so it's a benchmark. However, the Act also directs that groundwater non-degradation is the goal; therefore the health standard is not the primary metric. No change to text.

- Chpt 2, P. 19: If the drinking water standard is the primary basis of the mitigation plan criteria, it doesn't seem germane to present health effects that haven't been conclusively substantiated in the literature nor used to establish nitrate-nitrogen standards for groundwater quality.

MDA Response: The MDA will review this text with the MDH to ensure the comments are appropriate and accurate.

- Chpt 2, Pp. 19-21: Economic Cost of Nitrate Contamination- this section addresses mitigation strategies that can be used to address private and public well nitrate-nitrogen contamination. Is the purpose of this section to highlight examples of mitigation strategies or the cost of mitigation strategies? If it is the former, then should these practices be highlighted later in the document in the discussion of mitigation practices? If it is the latter, is it appropriate to also include the costs associated with other mitigation strategies that go beyond the Best Management Practices (BMPs) such as Alternative Management Tools (AMTs)? AMTs such as retiring land from production and installing easements also have financial costs associated with them. Are statewide data available indicating how many public and private wells have had to use the options outlined in this section in response to elevated nitrate-nitrogen concentrations?

MDA Response: The purpose of the section is to highlight the cost of contamination. There is some information available for public drinking water supplies, very little information for private drinking water.

- Chpt 2, p. 22: The issues described under the ' Other Risks' section are very complex and primarily surface water related. A comprehensive explanation is needed to grasp these issues. The NFMP is focused on groundwater degradation so inclusion of these issues does not seem warranted.

MDA Response: The MDA acknowledges this comment and will take into consideration.

- Chpt 4, Pp. 34- 35: It is important in Figure 9 to clarify that 'Cropland Soil Mineralization' is actually net mineralization which accounts for the inorganic nitrogen from cropland fertilizer and manure that is immobilized by micro-organisms and plants. This section should also highlight the information presented on page 107 related to the uncertainty of net mineralization estimates which are highly dependent on variations in soil moisture and temperature.

MDA Response: Agree on this important distinction and will add additional clarification in the captions and supporting text.

- Chpt 4, P. 37-39: A form of Figure 13 is used in at least two University of Minnesota Extension publications (BU-07936 and 08560). It would be useful to cite the exact publications from which this is adapted. In each of the publications the graphic appears slightly different and has differences in the accompanying explanation. It would be useful to clarify that this is a conceptual diagram that illustrates the impact nitrogen rate has on crop yield and its potential

loss to groundwater at a field scale from a corn production system. It is also important to note that there are a number of environmental and management related factors that influence nitrate-nitrogen leaching as reflected in the BMP section presented in Chapter 5. Supplementing or replacing Figure 13 with a summary of data collected in Minnesota demonstrating the relationship of these factors to leaching losses of nitrate-nitrogen is recommended.

MDA Response: Agree. The final plan will use one figure and will cite the reference. Additionally, the final NFMP will emphasize that these relationships are conceptual and other factors, such as timing, need to be considered.

- Chpt 5, P. 41: Not all components of the 4Rs have equal agronomic and environmental consequences. In certain situations, some factors are more important than others such as the effects of source versus rate.

MDA Response: Agree. This is particularly true in irrigated areas. Irrigation management is an extremely important aspect. In livestock areas, the importance of manure management is critical. Because of these localized influences, it is critical that some type of assessment be completed (such as FANMAP).

- Chpt 5, P. 43: It is important to note that the nitrogen guidelines for fertilizing corn in Minnesota (University of Minnesota Extension, F0-3790-C) also account for soil productivity and previous crop in addition to the price/value ratio. Some soils have a reduced yield potential attributed to erosion, reduced water holding capacity, sandy soil texture, and poor drainage. Yield goal has not been disregarded in this approach but rather accounted for in the context of soil productivity potential.

MDA Response: The MDA acknowledges this comment and will take into consideration.

- Chpt 7, P. 65: Is the goal of the monitoring and assessment to characterize the condition of the drinking water within a particular township or to assess the condition of the underlying aquifer(s)? The goal stated in the opening sentence is unclear whether it refers to the drinking water portion of groundwater as this is an important distinction. The 'Monitoring Strategy' section should reference the information presented in Chapter 6 and page 126 to clarify the use of private wells to assess ambient drinking water quality as opposed to monitoring wells which may not reflect drinking water conditions and in many cases have higher concentrations of nitrate-nitrogen.

*MDA Response: See Subject 8**

Chpt 7, P. 66: Figure 19 and Appendix H indicate that wells would be screened for potential impacts from non-fertilizer sources. Appendix H indicates that wells that are hand-dug construction will not be included in the statistical data analysis. Page 29, 57, and 63 highlight the importance of well construction and groundwater quality. Given this documented relationship, will well construction characteristics also be considered in the screening process during the assessment period? It is important to separate site-specific drinking water issues such as well construction from regional drinking water issues such as potential impacts from nitrogen fertilizer before advancing in the phases of the mitigation framework.

MDA Response: Yes, well construction will be considered before determining a mitigation level.

- Chpt 9, P.76: What is the rationale for the criteria used to distinguish the four implementation phases of the mitigation framework? Are these criteria based on the Nebraska Central Platte Natural Resources District phased approach?

MDA Response: Conceptually yes, although modified for Minnesota.

- Chpt 9, Pp. 77- 83: Are certain activities listed in mitigation process associated with specific implementation phases of the mitigation framework? Is it possible to identify which phases are associated with each of the activities listed?

MDA Response: The framework is flexible and can be changed as needed. However early steps in the process are less likely to be repeated, see Figure 20 in the plan.

- Chpt 9, P.78: What are the specific well construction criteria (other than hand dug wells) that will be used to confirm there is a problem related to nitrogen fertilizer rather than well construction?

*MDA Response: See Appendix H in the plan and Subject 8**

- Chpt 9, P. 78: Details regarding the formation and composition of the local advisory team need to be specified. How many representatives from each entity will be recruited and what criteria will be used to determine who is eligible to serve on the team need to be documented. Given the importance of this team in the mitigation framework, the formation of this team needs to be thoughtfully articulated considering the lessons learned that are presented in Appendix A.

*MDA Response: See Subject 9**

- Chpt 9, P. 86: The standard that the Minnesota Pollution Control Agency has currently promulgated for nitrate-nitrogen in surface waters is only applicable to those waters that have a drinking water beneficial use designation. A nitrate-nitrogen standard for aquatic life toxicity is being developed but it has not undergone the rulemaking process to date.

MDA Response: Noted

- Chpt 9, P. 87: Will the practicable prevention goal of the Groundwater Protection Act be observed when a total maximum daily load (TMDL) nitrate-nitrogen goal for groundwater in a specific area has been identified? A future TMDL plan may identify a nitrate-nitrogen goal that is significantly lower than the drinking water standard making it necessary to consider the practicable prevention aspects of the Groundwater Protection Act.

*MDA Response: See Subject 11**

Minnesota Department of Health

General comments

Public Water Supply (PWS) Systems Impacted by Nitrate and the State's Wellhead Protection (WHP) Program. The MDH requests that the NFMP identify the WHP Program and public water suppliers impacted by nitrates as an on-going high priority focus for plan implementation. This approach is justified based on the public health risks of larger populations served and public costs associated with remediation and treatment of nitrate contaminated drinking water. The NFMP should describe and identify how a PWWS system fits into the mitigation process and consider an accelerated approach in the implementation of the mitigation phase for WHP areas. Our experience indicates that waiting until nitrate levels reach 7mg/l in public water supply wells to promote and adopt Best Management Practices (BMPs) and Alternative Management Tools (AMTs) in WHP areas may not allow a PWS sufficient time to avoid costly mitigation or treatment. The MDH recommends that the NFMP consider including as a high priority the activities of identifying and targeting nitrogen prevention efforts in geologically vulnerable WHP areas where row crop agriculture and nitrogen use may be increasing.

*MDA Response: The draft NFMP already identifies wellhead protection areas as a high priority on page 75 of the plan. See Subject 5**

Private Wells. The NFMP describes an ambitious approach to monitor and collect nitrate data in large geographic areas of Minnesota. Many central and southeast Minnesota counties have had nitrate data collected over a number of years. The plan should clarify the use of existing nitrate well data and the assessment process for identifying township areas potentially impacted by nitrogen fertilizer. The plan should consider giving priority to accelerated nitrate BMP promotion and mitigation efforts in areas where the source of nitrate contamination in groundwater is known to be from nitrogen fertilizer. The plan should also consider and identify how on-going data collection, monitoring and assessment will be balanced with the needs of implementing prevention and mitigation efforts in township or WHP areas where public health may be at risk.

*MDA Response: See Subjects 5, 8**

The NFMP Mitigation Process and addressing nitrate contamination where BMP's do not work. The NFMP and elements of Minnesota Statutes 103H.275 describing the development of "Water Resource Protection Requirements" (WRPRs) provide a limited scope in which to address some of the State's most impacted areas from nitrogen fertilizer use. The primary outcome of the proposed phased approach in the NFMP is verification or required adoption of existing nitrogen BMP's, which may not entirely resolve nitrogen loss or reduce nitrate levels in highly vulnerable groundwater areas. While some potential Alternative Management Tools (AMT's) may effectively reduce nitrate levels in groundwater as described in the plan, (CRP, different crop rotations or practices), there is no requirement to adopt them since they may not be practical or achievable from a landowner, grower or statutory perspective. As the state's blueprint for preventing or minimizing the impacts of nitrogen fertilizer, that NFMP should consider describing in more detail AMT's and opportunities to facilitate their adoption by growers where existing BMP's alone are not enough. Considering and identifying this issue in the NFMP may help stimulate and encourage innovation on the part of the local nitrate advisory teams, agricultural community, public water suppliers and private well owners facing this issue.

*MDA Response: See Subject 7**

Detailed comments

A. MDH: Private Well Data, Monitoring and Assessment:

1. Clarify and describe how past private well nitrate monitoring data could be used where monitoring has been coordinated by MDA, MDH and local partners in Phase 1 of the mitigation process. Consider how accelerated promotion of BMP's through the prevention strategy in the NFMP will be accomplished in areas currently monitored and determined to be impacted from nitrogen fertilizer.

2. Describe or provide guidance that would help local advisory teams assess well nitrate data and changes in groundwater quality from adoption of best management practices.

3. The NFMP mitigation process does not reflect protection of shallow contaminated aquifers in situations where more deep wells have been drilled to avoid nitrate contamination.

*MDA Response: See Subject 8**

B. Prevention:

1. The NFMP should consider identifying geologically vulnerable wellhead protection (WHP) areas where there is potential for conversion from the federal conservation reserve program (CRP) or grassland to row crop agriculture to create awareness of nitrogen impacts and identify them as high priority areas to promote prevention.

2. MDA describes the use of a Nitrogen Fertilizer Education and Promotion Team (NFEPT). The NFEPT may wish to focus particularly on counties I townships where: 1) land is being converted to or back into agriculture production, 2) groundwater is known to be geologically vulnerable and aquifers are not contaminated, and 3) the trend is towards increased use of crops requiring nitrogen fertilizer.

*MDA Response: Noted. See Subjects 5, 6**

C. Public Water Supply (PWS) Systems and Wellhead Protection:

1. The NFMP should state that it will use the MDH WHP program and approved areas as the vehicle for which to accelerate promotion of BMP's and mitigation (1st paragraph, Page 78). PWS systems impacted by nitrate nitrogen should be clearly identified as an on-going high priority focus in the NFMP as well as vulnerable WHP areas with agriculture land uses.

2. The mitigation process does not clearly describe how a phased approach would work for a WHP area.

3. The NFMP and mitigation process should consider using existing MDH PWS nitrate water quality monitoring data and history in evaluating if a PWS system and WHP area is in Phase 1.

4. The NFMP should consider and identify options for nitrogen impacted WHP areas to

begin Phase 1 of the mitigation process before public water supply wells reach 7 mg/L nitrate in order to: 1) provide more time for BMPs to be promoted, adopted by growers and work, and 2) reduce the likelihood of public health I economic costs of the PWS system constructing new wells, blending or treatment.

5. The NFMP should consider options for PWS who are presently treating for nitrates and the source is known to be from nitrogen fertilizer to be able to start or quickly enter into Phase 2.

6. The NFMP could more clearly describe that the mitigation process is limited to requiring growers to adopt existing nitrogen BMP's through Water Resource Protection Requirements (WRPR's) and may not entirely resolve or significantly reduce nitrate levels in highly vulnerable groundwater or WHP areas.

7. In regards to # 6 above, the NFMP should consider describing opportunities that will help stimulate and encourage innovation in AMT's and new BMP's that may provide more immediate and long term results in reducing nitrate levels from nitrogen fertilizer in vulnerable WHP and groundwater areas.

8. The Mitigation Chapter in the NFMP should clearly describe the interpretation and use of the word "ineffective" to mean that BMP's are not adopted by growers (when used in the context of development of WRPR's).

9. The NFMP should describe or consider opportunities for promoting research or efforts that could support improvements in nitrate BMP's in highly vulnerable WHP or groundwater areas.

10. Consider expanding the discussion on the use and development of Alternative Management Tools (AMT's) in the NFMP. Describe steps, efforts and opportunities local advisory teams and agencies could take to further their development, use and adoption.

11. Guidance documents and tools should be developed to assist local advisory teams in coordinating implementation of each of the four mitigation phases of the NFMP and how assessments of BMP adoption and effectiveness will be evaluated.

12. Better define the role and level of MDA support to the local advisory teams described in the NFMP. Provide direction or ideas for financial support for the promotion and evaluation of BMP's by the local advisory teams through the mitigation process.

*MDA Response: Wellhead protection areas are already a high priority in the draft plan. See Subjects 5, 7, 8, 9, 14**

D. Other comments

1. More information could be presented or referenced in the NFMP on the human health risks and costs to the public of nitrate contaminated groundwater. We can assist with this at your request.

MDA Response: The MDA is open to including the most recent information or links to related reports.

2. Part I WHP Plans and the associated delineation of wellhead protection areas and geologic data should be mentioned as a local source of geologic information in the NFMP.

MDA Response: Agree

3. The NFMP (page 57-63) suggests that nitrate nitrogen fertilizer impacts on groundwater may be decreasing because of the State Well Code and required new well construction methods. While the percentage of nitrate impacted wells may be decreasing, that may primarily be due to the reduced use of shallower aquifers by well drillers in certain areas of the State.

MDA Response: The MDA will take into consideration.

4. Accelerated research, funding and implementation of Alternative Management Tools (AMT's) is a high priority for MDH and public water suppliers who have nitrate contaminated groundwater. We would support identifying this issue in the NFMP as a long term priority activity.

*MDA Response: Noted, this is also a high priority for the MDA. See Subject 7**

5. Consider including a definitions section in the plan that would define the meaning of a BMP, use of the word "ineffective" in developing WRPR's, etc.

MDA Response: The term ineffective is not defined in the Groundwater Protection Act. As used in the NFMP; the term ineffective can have either meaning. The NFMP notes that BMPs may be revised if they ineffective in the context of not meeting water quality goals even though they are adopted. The term ineffective also applies if BMPs are not being adopted.

6. Describe other potential options that citizens, PWS, local units of government and other state agencies could take if BMPs are adopted and nitrate levels continue to increase. (land use controls, changes to the MN Groundwater Act, etc.).

*MDA Response: See Subject 14**

Minnesota Independent Crop Consultants Association

After reviewing the draft 2013 NFMP, questions arise as to the need for a revision of the 1990 plan. The 1990 NFMP is as valid today as it was in 1990. The 1990 plan was written with significant input from agriculture stakeholders and was designed to accommodate future changes in agricultural practices. Nitrogen fertilizer use in Minnesota has been flat for the last 25 years, while yields have increased significantly. Nitrogen fertilizer use efficiency today is as high as scientific processes and technology allows. Minnesota farmers are not interested in using more nitrogen fertilizer than is needed to optimize economic yields for the crops they produce.

Competitive pressures prevent them from doing otherwise.

*MDA Response: See Subject 2**

Farmers in Minnesota use lower rates of nitrogen per acre than farmers in any of the surrounding states with similar yield levels. This is due to the soil and climatic conditions that exist in Minnesota, as well as the need to maximize economic returns. Both over and under application of nitrogen have a negative impact on yields and quality of crops grown in Minnesota; and therefore, there is no economic incentive to over apply nitrogen. If anything, nitrogen fertilizer rates are below optimum for the yields that are now being produced. In fact, a five year MDA study indicates this. Higher economic yields were obtained from rates that were 30-40 lbs/acre higher than the existing University of Minnesota nitrogen fertilizer guidelines.

There is no evidence provided in the draft 2013 NFMP to indicate that groundwater nitrate problems are increasing due to the use of nitrogen fertilizers. Therefore, we question the MDA motives in redoing the 1990 plan with the inclusion of a phased approach to regulation of nitrogen fertilizer that is outlined on pages I 0, 76, 78 & 130 of the draft. The Phase Approach being proposed is adapted from an approach used in Nebraska. The Nebraska situation is unique and there are no areas in Minnesota that are comparable to the Nebraska region which has high nitrates in groundwater. Irrigation wells in this Nebraska region are in very shallow groundwater aquifers, and an established linkage between the irrigation well high nitrate levels versus past intensive irrigation and excessive nitrogen fertilizer usage had previously been documented. The type of irrigation management and nitrogen use that helped create the Nebraska situation has never existed in Minnesota. In Nebraska, irrigation well concentrations are the triggering mechanism for phasing in regulation, not unrelated drinking water wells, as is being proposed in Minnesota.

The draft NFMP (on pages 10, 76, 78 & 130) addresses mitigation phases and criteria that are part of the proposed regulatory process. Private drinking water wells tests will be used to trigger the various phases of the process. Serious concern exists over the lack of scientifically established cause & effect linkage of high nitrate wells to nitrogen fertilizer usage. There are other well-established causes of wells testing high in nitrates. These causes include contamination from other nitrogen sources, such as nitrates produced from soil organic matter mineralization, septic systems, manure, atmospheric deposition, etc. The recently released Minnesota Pollution Control Agency (MPCA) Nitrogen Report indicates that more than 75-80% of the source nitrogen which can impact ground or surface waters is from non-fertilizer nitrogen sources. The MDA does not have statutory authority over the naturally occurring soil organic matter mineralization process.

There can be other causes of high nitrates in wells, in addition to all the non-fertilizer nitrogen sources, that can cause high nitrates. These causes include poor well construction, improper well placement, cracked or rusted out casings, dug wells and many other possible causes. Trying to relate drinking water well nitrates levels to nitrogen fertilizer use is a flawed concept. Existing drinking water well nitrate levels should not be considered as an indicator of groundwater nitrate levels because of the site-specific problems that exist with them. MNICCA is very concerned that the use of existing drinking water wells in the phased approach, as is being proposed in the 2013 NFMP, is likely to trigger negative public perceptions of nitrogen fertilizer usage and possible

regulations when nitrogen fertilizer is not the problem.

There are better approaches to monitoring groundwater nitrate levels than a township well testing program. One approach might be to install properly constructed and designed monitoring wells in various groundwater aquifers around the state. These monitoring wells would need to be constructed and properly placed in order to account for all the nitrate-nitrogen sources and various pathways of nitrates to the monitoring well.

*MDA Response: See Subjects 2, 8**

In addition to the concerns regarding the township well testing program as a part of the phased approach to regulation, MNICCA would like to point out a number of other concerns with the draft NFMP.

Concern 1: On pages 18-19 the draft NFMP indicates that methemoglobinemia can develop in infants when fed high nitrate-nitrogen formula. The Plan goes on to indicate that a number of other possible negative effects of high nitrates have been suggested; however, the cause and effect relationships with these other effects have never been proven. This paragraph should be removed because unproven speculation is not appropriate for the NFMP. On the contrary, there are a number of studies that have established a positive relationship between high nitrates and human health. The positive benefits of high nitrates should be included within the NFMP, in order to provide an appropriate balance in the document.

MDA Response: The MDA will review this text with the MDH to ensure the comments are appropriate and accurate.

Concern 2: Also on page 19 the first paragraph indicates that the average adult in the U.S. consumes 20-25 milligrams of nitrate every day in food, largely from vegetables. The Plan does not relate this information to the Public Drinking Water Standard of 10 ppm. This information should be converted to a concentration of nitrate-nitrogen in water for comparison, in order to put it into a perspective that is relative to drinking water levels. The 20-25 milligrams of nitrate consumed by the average adult would equate to drinking a liter (1.2 quarts) of water daily with a concentration of 20-25 parts per million (ppm) of nitrate-nitrogen. If all adults stepped it up to consume 4 times more vegetables daily as recommended, the nitrates consumed would be equivalent to drinking a liter of I 00 ppm nitrate-nitrogen water daily.

MDA Response: The text notes that most adults can consume some nitrate with no ill effects. However the health standard is based primarily on infants. The change is not necessary.

Concern 3: On pages 128-129 of the draft NFMP, there are graphs that show the increasing trend of daily nitrate-nitrogen loading from two springs in SE Minnesota. What are the concentrations of nitrates in the water? Loading is not an appropriate way to present this information. Concentrations may actually be dropping if the water discharge is increasing due to increases in precipitation. It is well established that precipitation has increased significantly in SE Minnesota over the years cited.

MDA Response: Noted, the MDA will review the data and consider changes.

Concern 4: The graph on page 38 is a conceptual graph and doesn't have actual data to support it. Many different factors impact the potential for nitrate leaching losses. This graph implies that nitrogen fertilizer rate is the only factor controlling leaching losses. It is not appropriate to include this graph without discussion of the multitude of other factors that relate to leaching losses.

MDA Response: This is a conceptual illustration and will be labeled as such in the revised NFMP. The MDA agrees that other factors such as timing (fall vs spring pre-plant, etc.) can be very important.

Concern 5: The graph on page 39 can be confusing. The ratio should be inverted and graphed as pounds of nitrogen fertilizer input per bushel of corn produced. In this way the pounds of nitrogen per bushel of grain produced can be placed on the same graph. This will allow a quick reference of how close the nitrogen input is to nitrogen uptake by the crop. When crop removal nitrogen exceeds input of nitrogen, a net mining of soil organic matter occurs. Mining of soil organic matter.is not a sustainable management practice and therefore the promotion of mining of soil organic matter nitrogen should not be a goal of this Plan.

MDA Response: Most NUE discussion uses the notation of production per pound of nitrogen fertilizer input.

Concern 6: The NFMP does not address the point that crop rooting zone nitrate concentrations need to be high in order to supply the nitrogen needs of a growing crop. Crop rooting zone water needs to be separately defined from surface water and groundwater. Crop rooting zone water supplies the crop needs and is the conduit for delivery of nitrate-nitrogen to the plant. Nitrate concentrations in crop rooting zone water are dynamic throughout the year because of the biological processes that occur in the soil. Typically nitrate- nitrogen concentrations in the crop rooting zone water need to be above 100 ppm in order to prevent nitrogen deficiency from occurring.

MDA Response: Agree with these comments, however having discussions on vadose zone concentrations are beyond the scope of this document.

Concern 7: On pages 34 & 105 references are made to the contribution of nitrogen from soil organic matter through the mineralization process. The process of mineralization and immobilization of soil organic nitrogen is continuous throughout the spring, summer and fall. Soil organic matter nitrogen when mineralized will supply tile majority of nitrogen for crop growth, typically 75-80% of the nitrogen supplied to a crop. Nitrate produced by this source is just as susceptible to leaching as any other source. Why isn't it considered as a major component of groundwater contamination versus the emphasis that is placed on nitrogen fertilizer?

MDA Response: Agree. Figures 8 and 9 clearly illustrate that contributions from mineralization are the domain source. Additionally, Figure 13 illustrates that some level of nitrogen losses are typically going to occur under row crop production even without nitrogen fertilizer inputs.

Concern 8: The draft NFMP references significant portions of the recently released Minnesota Pollution Control Agency (MPCA) Nitrogen Report. This report was released in June 2013, well after the last meeting of the NFMP advisory committee meeting in 2012. This report is poorly

written, portions are inaccurate and it is extremely biased against agriculture. This report should have been provided to the NFMP advisory committee so they could determine the parts that were relevant to the NFMP.

MDA Response: Agree that the NFMP Advisory Committee did not review the June 2013 MPCA report. MPCA provided opportunities for public input on the report. No action.

Concern 9: The "Other Risks" section, on page 22 of the draft NFMP references various surface water concerns that have not been confirmed or are not supported by independent scientific studies. These non-validated surface water concerns should not be included in this document because the NFMP should relate to groundwater. If speculative statements about surface waters arc included in this report, then proven positive impact of nitrates on surface water quality should also be included. These positive effects include the suppression of methyl mercury production and the suppression of blue-green algae in surface waters.

MDA Response: Disagree, because surface water concerns have been confirmed and validated by the US EPA and MPCA. The NFMP Advisory Committee recommended that the NFMP consider surface water concerns in areas where there is a groundwater concern. The issue of methyl mercury was raised and addressed on January 2012. The MDA does not believe that there is a broad enough pool of knowledge regarding the impact of nitrate reduction on mercury methylation on a watershed scale to warrant further review of the topic for the purposes of the NFMP revision. No change.

In summary, the township well testing program being proposed in the draft 2013 NFMP which would be used as part of the phased approach to regulation of nitrogen fertilizer has serious technical and scientific flaws and is likely to result in serious economic harm to Minnesota agriculture. It is also unlikely that this program would have any positive impact on groundwater quality. The MDA needs to rethink whether the 1990 NFMP needs to be revised and if so, it needs to fully engage the agricultural community as part of that revision similar to what was done in 1990.

*MDA Response: See Subjects 2, 8**

Minnesota Pollution Control Agency

Overall Comments

- Given the extent of nitrogen contamination in some parts of the state, the plan needs to place a high priority on first addressing those areas that have the highest potential to impact human and ecological health.

MDA Response: The MDA will accommodate this comment by adding text.

- As discussed in the recent Water Governance Report, the plan should note that the use of certain nitrogen reducing practices (e.g. cover crops) will also have the added benefit of improving soil health. Add to AMT section p. 80

MDA Response: The MDA will accommodate this comment by adding text.

Page 18— Delete the words “lead” and “arsenic” as being associated with nitrate. Arsenic is primarily a natural contaminant and lead is rarely detected and not necessarily associated with nitrate. Agreed. http://psep.cce.cornell.edu/facts-slides-self/facts/nit-heef-grw85.aspx

MDA Response: The MDA will accommodate this comment by deleting text.

Page 22— delete “Lake Winnipeg” in reference to hypoxia. This lake has eutrophication problems, but oxygen levels may not go low enough to fit the term “hypoxia.”

MDA Response: The MDA will accommodate this comment deleting text.

Page 53—Third bullet. We recommend specifically listing cover crops in the list of alternative cropping systems which can help reduce nitrate leaching.

*MDA Response: Agreed, see Subject 7**

Page 57—The reference to a 9-15% decrease in wells exceeding the HRL seems potentially misleading. The decrease does not necessarily represent a trend in nitrate levels, but only shows the fact that during 2008, a higher than normal percent of wells exceeded the 1-IRL. It would be more defensible to state “the annual percentage of wells exceeding the HRL for each sampling round ranged between 9.3 and 14.6 percent.”

MDA Response: The MDA will accommodate this comment by changing the text as suggested.

Page 64— It is clear how the NFMP allows response to high nitrate at the local scale, but more explanation is needed regarding how the plan responds to nitrogen contamination on a “regional or state basis” as stated in the 2nd paragraph. It would be good to state how the plan addresses nitrogen contamination issues at larger scales.

*MDA Response: See Subjects 1, 6**

Page 64— Bottom paragraph. While it states that prevention activities focus on protecting groundwater, it should also state that prevention also protects tile drainage waters, as is noted on page 16. We believe that the prevention of high nitrate loads exiting tile drainage lines should be an important outcome of the education and promotion efforts. Also, is the “Education and Promotion Team” the same thing as the “Prevention Team” referred to earlier in the report? If so, it would be helpful to use consistent terminology.

*MDA Response: Noted. See Subject 6**

Page 65— 2nd to last paragraph. Does the statewide monitoring plan of paralleling the MPCA’s watershed assessment also mean that wells will be routinely sampled in the more natural areas and geologically protected areas of Minnesota? While some limited monitoring in such areas may be useful, the monitoring should focus on areas of the state where groundwater nitrate contamination is more likely.

*MDA Response: Noted. See Subject 8**

Page 69—It is not clear how the very important “Alternative Management Tools” will be used.

Education and promotion should also include alternative management tools, in addition to education on the more traditional BMPs.

*MDA Response: See Subject 7**

The plan could potentially benefit in the monitoring-related discussions by:

Combining Figure 16 and Table 4 on pages 55 and 56 so the results are shown on the map. Including, or clearly reference, Figure 4 from "The Condition of Minnesota's Groundwater 2007-2011" (map of nitrate concentrations in wells). Including, or clearly referencing, Table 1 from "The Condition of Minnesota's Groundwater 2007-2011" (median nitrate levels for different land uses). While the plan is clearly focused on groundwater, it does make several references to surface water, and surface water-groundwater interaction. As such, it might be useful to include or clearly reference Figure 1 in chapter Dl of "Nitrogen in Minnesota Surface Waters." The contrast between figures 4 and 1 could help support one of the points the plan makes — that groundwater nitrate is a bit more complex than surface water nitrate.

*MDA Response: Noted. See Subject 11**

Page 74—The discussion on page 74 about unintended consequences should be deleted. The MPCA is not aware of any situations where we would want to trade-off reducing nitrate so that another impairment can be addressed. We don't see this as an issue that needs to be highlighted in this strategy, and it may mislead people in thinking that we need to make trade-offs with nitrate and other contaminants.

MDA Response: The MDA believes that conflicts between recommended practices to address different contaminants are likely to occur in the future and we were trying to anticipate this possibility. However, since these conflicts are not currently obvious we will remove this text.

Page 79- 4th item. Consider adding monitoring wells to the private wells, as the way to assess changes over time. We recognize the increased costs, but in some cases monitoring wells will likely be needed.

*MDA Response: See Subject 8**

Page 84— Activities to consider under phase 3. In the 4th item for phase 3, change to end with "and/or" rather than "or," recognizing that each item listed has a different objective and more than one approach may be necessary.

MDA Response: Agree

Page 84— Evaluating phase implementation. We agree that consideration of lag time is important for evaluating BMP adoption, but it should also be noted that phase implementation can also be based on lack of BMP adoption alone. The evaluation of BMP adoption can be accomplished in a shorter timeframe than is sometimes inherent with groundwater monitoring and response lag times.

MDA Response: Noted

Pages 86-87 - The MPCA has various levels of rigor and analysis details in TMDLs, and in some cases the TMDLs can be approached in a more generic way than is described on pages 86-87. Please delete the last half of the last paragraph starting on page 86 beginning with “In order to be meaningful...”

MDA Response: Noted. The MDA will review this text for completeness and accuracy and revise as needed.

Page 88— several references are made of the term “ineffective” BMPs. Normally the term “ineffective” means that the BMPs do not work — they technically do not do the job. But in the case of the strategy, the term “ineffective” appears to mean that the BMP promotional activities are ineffective, such that the BMPs proven to be effective at protecting groundwater are not being adopted. This needs to be more clearly stated/defined in the strategy.

MDA Response: The term ineffective is not defined in the Groundwater Protection Act. As used in the NFMP, the term ineffective can have either meaning. The MDA states that we will consider revising the BMPs if they ineffective in the context of not meeting water quality goals even though they are adopted. The term ineffective also applies if BMPs are not being adopted.

Minnesota Well Owners Association

MnWOO finds sufficient inconsistencies and contradictions in the Plan that lead us to conclude that the Plan fails to propose appropriate and timely action to protect groundwater from degradation in areas of historic and well known groundwater contamination risks.

First, but not least, the proposed nitrogen in groundwater monitoring/prevention/mitigation strategy cannot protect groundwater when the trigger for action is contamination above the Health Risk Limit (HRL), and when it takes ten years to conduct redundant studies and repetitive assessments that have already established the imminent risk. Taking preventative action only when a new round of well samples show five percent of wells exceeding the HRL of 10 milligrams nitrate per liter water (mg/L) undermines the statutory mandate that “groundwater be maintained in its natural condition, free from any degradation caused by human activities.” The approach presented in the Plan does not actually make prevention of contamination a priority, nor does the Plan ensure mitigation actions can ever be taken to bring back the health of our water supply. In other words, as further explained, the MnWOO thinks that the Plan fails to set definitive proactive prevention and mitigation actions at levels far below HRLs and that this failure ultimately results in groundwater being polluted before the MDA takes action.

*MDA Response: See Subjects 1, 5, 6**

MnWOO further considers the Plan’s recommendation to start again with monitoring and risk assessments is another in a round of repeated shortcomings of effective groundwater management throughout large areas of the state; the MDA need not begin anew every time a commodity group or political action committee questions the data about groundwater risks. This leads to a second criticism of the Plan: the Plan either ignores or fails to give credence to important historic data and existing risk assessments in making the management

recommendations. For example, in the southeastern Karst and Central Sands the groundwater risk has been evident since the mid 1980s and both areas have been the focus of accelerated monitoring and the widespread promotion of Best Management Practices (BMPs). Despite the 25-30 year awareness of the nitrate problem, data still provides evidence of widespread nitrate contaminated groundwater above the HRLs, and an unknown rate of farmer BMP adoption and compliance for prevention or mitigation. It is undisputed that the risks are known, have been studied and published proving that shallow groundwater is contaminated throughout wide areas of the southeastern Karst and Central Sands; these areas require immediate action. MnWOO believes it is necessary to immediately designate large areas of Minnesota as Nitrogen Management Areas as prescribed in the 1990 Nutrient Management Plan. The southeastern Karst and Central Sands must have accelerated initiatives for prevention and mitigation in the new Plan.

*MDA Response: See Subjects 1, 4, 5, 8, 10**

There are additional concerns: aside from the local and State government representatives, we question the qualifications of some of the task force members to advise the State on serious health risks. Given the increased nitrate pollution in Minnesota, the Plan does not provide a meaningful vocabulary or timely action to prevent widespread nitrogen loss in porous and leaky aquifers. As mentioned above, the Plan does a poor job of communicating the scale of the risk throughout Minnesota, and especially in the southeastern Karst and Central Sands.

*MDA Response: See Subject 10**

MnWOO also questions the proposed assumption that farmer-led Advisory Teams can be effective environmental risk managers; is this a case of the fox guarding the hen house? For example, no where does the Plan emphasize the importance that farmers (or their crop consultants) understand and estimate how much nitrogen in applied fertilizer is lost and how much water will be contaminated for every ton of fertilizer that leaches into the ground. Farmers must know, accept and internalize the science that soluble nitrogen resulting from the application of fertilizer is a potent contaminant, with a relatively low HRL. MnWOO considers it necessary for every farmer to calculate the annual nitrogen loss in terms of pollution potential; if so, we would all have a common beginning to prevent continued groundwater degradation. But especially, Minnesota farmers alone cannot be expected to manage the risks of fertilizer application, let alone restore the quality of groundwater in aquifers that are already beyond the brink of safety. Farmers are more concerned with their crop, yield, profits or losses and should not be the environmental risk managers for the entire population of Minnesota.

*MDA Response: The MDA believes that involving farmers in understanding the extent and sources of groundwater nitrate problems and working with them to develop potential solutions is the most desirable approach for addressing these problems. We believe this approach can be successful if properly managed. See Subjects 9, 12**

Chapter 3: Groundwater Contamination and Sensitive Areas

The Plan, at Chapter 3, pages 24 through 30 identify many appropriate tools for defining the groundwater risk but these factors seemed to be dropped from consideration in the implementation of the Plan. For example, areas already known to be at high risk or already

contaminated are ignored and not specifically addressed in the proposed Assessment Process. Heedless of thirty years of data and research which created a historic baseline, and an ever improving ability to assess groundwater risk, the studies and work of Federal, State and local government units are essentially ignored when the Plan treats all of the state the same. The failure to immediately designate the known high-risk hydro-regions for immediate prevention and mitigation actions forfeits the ability to prevent further degradation.

MDA Response: The MDA agrees and will add tools described in Chapter 3 to this section.

Chapter 5: Best Management Practices (BMPs)

Minnesota Statute 103H.151 subd. 4 states in part that "[t]he commissioners of agriculture and the Pollution Control Agency shall, through field audits and other appropriate means, monitor the use and effectiveness of best management practices developed and promoted under this section [emphasis added]." This section was passed by the Minnesota Legislature in 1994. Since then, MDA has not undertaken a regional or statewide effort to either evaluate the effectiveness of nitrogen BMPs or the adoption rates. Although it has developed and promoted statewide and region nitrogen BMPs for over 20 years, MDA has not completed field audits to fulfill its responsibility under this section of the Groundwater Protection Act.

As an example, BMPs for nitrogen use in southeastern Minnesota were developed and promoted in 1993 and again in 2008. Minnesota Statute 103H.151 subd. 4 requires that MDA evaluate the implementation and effectiveness of its best management practices. MDA has not published a report evaluating the effectiveness of and the adoption rates by farmers of its nitrogen BMPs that were developed and promoted since 1993. MDA has undertaken Farm Nutrient Management Assessment Program studies in the region (Hastings and Whitewater Watershed), but these studies cover small geographical areas, involve a small number of farmers and rely on voluntary participation by farmers. No effort has been made by MDA to design a FANMAP sampling of farmers that would be representative of a larger geographical area or population. The FANMAP studies conducted in these small areas, however, have revealed that farmers are generally following nitrogen BMPs. The most troubling conclusion to be drawn from these studies is that despite farmers following nitrogen BMPs, nitrate concentrations in private and municipal wells, springs and base flow in streams are all increasing. (emphasis added) Thus, if the BMPS are being followed but there is no resulting decrease in high nitrate contamination of groundwater, it is reasonable to conclude that the nitrogen BMPs are not working. Therefore, in the well-studied areas throughout southeastern Minnesota, MDA should immediately move to adopt water resource protection requirements under Minnesota statutes 103H.275.

*MDA Response: See Subjects 1, 4, 12**

Chapter 6: Nitrate Conditions in Minnesota Groundwater & Appendix F Challenges of Monitoring Groundwater Quality

The Plan properly cites the fact that monitoring shallow groundwater is protective, is a proactive means of protecting the groundwater, and properly recognizes that nitrate loading to the subsurface can be significant in the Minnesota's southeastern Karst geology; however, the Plan fails to recommend timely action to address these known risks. The plan further fails to recognize

that many samples from older wells in the southeastern Karst and Central Sands, including samples from the poorly constructed wells referenced in the Southeast Minnesota Water Resources Board Volunteer Nitrate Monitoring Program (SEMNWRB) findings, are essentially sampling the nitrate contaminated shallow groundwater that cascades down the well bore. Shallow contamination puts the deeper aquifers at risk. The trigger for prevention and mitigation should be on the shallowest water, springs and base flow in groundwater fed streams. If shallow water is being contaminated, protective and mitigation efforts are immediately warranted to prevent further degradation.

The attached VNM Analysis of water from the SEMNWRB shows the importance of immediate designating southeast Minnesota a Nitrogen Management Area. Tables 3 and 4 of the southeastern Minnesota groundwater quality study show that 20 to 40 percent of the wells in the southeast Karst have more than 3 mg/L nitrate and that 5 percent to 24 percent of the wells have more than 10 mg/L. The analysis of matrix type as an influence on nitrate level shows that shallow bedrock, clastic bedrock and solution weathered bedrock as the first encountered rock already have groundwater with significant nitrogen contamination impacts. The existing data is adequate to determine that southeastern Karst should be immediately designated as a Nitrogen Management Area with accelerated protection and mitigation. A long delay with additional groundwater sampling is not necessary to define the high risk areas or to define the southeastern Karst watersheds where the need for action is immediate.

Similarly in the Central Sands both private and public water supplies are known to be sensitive and easily degraded, even when BMPs are promoted and utilized. For example, in recent legislative hearings held on October 7 and 8, 2013, MDA employee Bruce Montgomery touted the high level of BMP adoption by potato growers; however, when questioned, he admitted there was high nitrogen loss with irrigated potatoes (see Table 7 of BMPs for Nitrogen Use: Irrigated Potatoes by the U of M Extension). The same problems exist for corn and other annual crops in the Central Sands region. Mr. Montgomery, moreover, was unable to advise the Minnesota legislature on the amount of water contaminated above the HRLs for the “standard” potato leaching loss of eighty pounds nitrogen per acre per year.

*MDA Response: See Subjects 1, 4, 5, 8, 10**

It is significant that the Plan notes that the Minnesota Health Department requires 27 Minnesota public water suppliers to sample wells four times a year if wells exceed 5 mg/L but MDA does not propose taking preventive action until wells exceed the 10 mg/L HRL or are at 7 mg/L. MnWOO asserts that the MDA must adopt a more protective standard of 3mg/L if the Plan is to prevent further degradation. Statewide well sampling from the MDA shows a strong correlation between the mapped Water Table Aquifer Sensitivity and the occurrence of both public and private wells exceeding the nitrate HRL. The large numbers of wells with nitrate detections above 3 mg/l in Figure 18 of the Plan show the imminent risk of inaction and the certainty of wider groundwater degradation if the new Plan does not provide for immediate prevention and mitigation. The Minnesota Department of Health (MDH), Minnesota Pollution Control Agency (MPCA), local well drillers and water professionals should be engaged in selecting the watersheds where protection and mitigation plans will be immediately developed.

*MDA Response: See Subjects 1, 4, 5, 6**

Minnesota laws provide an existing nitrate standard for the protection of human health at 10 mg/L, which applies to surface waters designated for drinking water uses (class 2A and 2Bd which includes all designated trout streams). MPCA is in the process of drafting a new nitrate water quality standard for surface waters based on aquatic life toxicity. The proposed chronic standard is 3.1 mg/L for 2A streams and 4.9 mg/L for cool-warm water streams (MPCA wq-s6- 23). With this proposed change, the numbers of streams exceeding this standard will increased dramatically and include nearly all trout streams for which there is nitrate concentration data. Because high nitrate concentrations in trout streams occur exclusively during base flow conditions which are from groundwater contributions, MDA needs to include these proposed nitrate water quality standard rule changes in their nitrogen management planning efforts.

*MDA Response: See Subject 11**

MDA's proposal to conduct private drinking water well sampling in vulnerable areas with townships being the primary boundary to evaluate current nitrate conditions is flawed in several respects. The township scale chosen by MDA to monitor is arbitrary and ignores all of the groundwater sensitivity and probability mapping done by other State agencies. The Plan should consider the existing maps developed specifically for groundwater contamination purposes to direct its nitrate mitigation and monitoring efforts. These recommendations point to the fundamental flaw that the Plan fails to build on existing monitoring programs that have established increasing nitrate trends in groundwater over the last twenty years and thereby waste millions of dollars of taxpayer funded monitoring efforts. The Plan fails to recognize the value of Minnesota Department of Natural Resources' (MDNR) mapping groundwater sensitivity, MDH's nitrate probability mapping, the SEMWRB and MPCA's comprehensive watershed water quality monitoring efforts. It would be to the benefit of the citizens of Minnesota if MDA integrated their groundwater monitoring with these ongoing efforts of other state agencies and citizens groups to eliminate redundancy and wasteful duplication of water quality monitoring efforts.

MnWOO encourages MDA to build on existing monitoring networks of springs, private and municipal wells, and base flow in streams rather than begin a new sampling effort of private wells. The 20+ years of monitoring trends at existing sites indicate an increasing trend of nitrate concentrations at geographic scales from springshed to major watershed. MDA, moreover, has a network of 193 wells located in ten counties in the Central Sands and eleven springs in southeastern Karst to build on for future nitrogen management efforts. MDA's failure to integrate this data in current nitrogen management planning efforts could be construed to purposely delay meaningful action to reduce nitrate contamination of the State's water resources and ignore provisions of the Groundwater Protection Act.

For 25 years MDA has avoided using private drinking water wells for regulatory purposes. The only explanation for the change in position can be delay of any meaningful regulatory action until wells can be located, permission obtained, sources of contamination ascertained, and many rounds of sampling evaluated to determine nitrate concentration trends and seasonal variability. The SEMWRB voluntary nitrate monitoring network sampling on private wells that was done during 2008-2012, had a wide variability 33-99 percent in the numbers of wells it was able to sample during any given round, see MnWOO's Appendix A attached with these comments. In addition, in some counties over fifty percent of the well owners with concentration greater than 10 ppm dropped out of the network. Voluntary networks cannot be relied upon to give samples at a

predetermined time or for a long period of time.

*MDA Response: See Subject 8**

Chapter 7: Overview of the Nitrogen Plan Process

MnWHOO: The Plan in Chapter 7 proposes to start sampling yet again and conduct another decade of monitoring and assessment in the southeastern Karst and Central Sands without accelerated action to protect and mitigate groundwater in the known high-risk hydro regions. This proposal is imprudent in these regions because they are very high-risk and the proposal to monitor and access provides a low-return to the health of our water supply for human and animal consumption. The passive notion that more sampling will satisfy the statutory requirements to prevent groundwater degradation is a denial of fact. If the known groundwater risks referenced in Chapter 3 and discussed in Chapter 6 are heeded in the least, all the areas with rapid recharge rates and high aquifer sensitivity would be addressed much differently than the Plan proposes. Groundwater protection in areas dominated by row crops and known to be highly sensitive, require immediate protection AND mitigation measures. The same immediate actions should be taken where shallow aquifers have been proven to be contaminated, where springs and base-flow in streams are above the HRL, and even where poorly constructed wells are already contamination above 3 mg/L. These conditions indicate an imminent risk of nitrate contamination that requires rule-making action under the old 1990 plan and begs for consideration for accelerated action in the new Plan. The known highly susceptible areas should not be sent back to the beginning with more monitoring. The immediate needs cannot be dismissed or ignored in this prevention and mitigation strategy.

MnWOO proposes an alternative assessment process that relies more heavily the Minnesota Geological Survey, the US Geological Survey, the MDH and MDNR data and models for sensitive areas and relies on new monitoring in the less sensitive areas. Adequate assessment has been done in the southeastern Karst and Central Sands regions and these areas should be automatically designated for prevention and be given four years to adopt mitigation strategies. To prevent degradation, water quality testing everywhere else should trigger prevention and mitigation when more than five percent of wells exceed 5 mg/L, following the lead of the MDH. In the southeastern Karst and Central Sands or any other area with springs and streams exceeding 7 mg/L or more than ten percent of wells exceed 7mg/L, Phase 2 mitigation and regulation of nitrogen use should be implemented by statute or rule to prevent further degradation.

*MDA Response: See Subjects 1, 5, 8**

Chapter 8: Prevention

The prevention and education strategies are inadequate in the southeastern Karst and Central Sands unless they are immediately adopted and implemented. MnWOO proposes that in any area where nitrate groundwater contamination is endemic with ten percent of springs, streams or wells above 7mg/L the responsibility for communication and action should be immediately transferred to the MDH and the MPCA.

The Plan's proposed prevention strategy lacks an important component: making farmers understand the water quality impact of nitrogen loss. MnWOO proposes that it is necessary to

provide farm scale estimates of annual, or even seasonal, nitrogen loss followed by a calculation or estimate of how much water is contaminated above the HRL for each farm operation. Farmers and their service providers cannot appreciate the impact of nitrogen loss without a meaningful and trustworthy estimate of the flux of nitrogen into the water as part of a farm conservation or nutrient management plan. Nitrogen flux, added to knowledge of groundwater sensitivity, would allow farmers the ability to assess their individual water quality impact. The traditional MDA approach of highlighting the tangible cost of fertilizer overuse is the most quoted farmer defense against over application but few operators actually calculate or understand the impact of their nitrogen loss. Because the University of Minnesota nutrient management recommendation calculations are a function of fertilizer price, crop price, soil productivity and economic risk all the fertilizer decisions are based only economic factors; there is no recognition of the environmental risk. The knowledge and a simple tool for estimating water contaminated per 100 pounds of nitrogen lost would be a reasonable factor to assess farm-to-farm pollution reduction efforts.

Unfortunately we never hear any farm service providers say “my nutrient management efforts preserved 25,000 acre feet of water from nitrate contamination this year”; it is not part of the paradigm, culture or even language of agriculture and farming to assess the farm-to-farm or acre-to-acre impact of nutrient loss. MnWOO strongly asserts that the Plan cannot be effective unless people understand, in common terms, the impact nutrient loss has on groundwater and surface water. If farmers could calculate potential water contamination in acre feet or gallons they could orientate themselves better toward the task of reducing nitrate loss to the groundwater, especially in the highly sensitive Central Sands and southeastern Karst. MnWOO proposes to teach the farmers and service providers how to calculate nitrate impact on water with the same manner and ease that service providers calculate soil loss. MnWOO would like to require that farm rental agreements and eligibility for farm programs require calculating and reporting nitrogen loss much in the same way erosion control is applied to farm leases or program eligibility.

Having the metrics for field-to-field and farm-to-farm nitrogen loss and water pollution should become one of the benchmark BMPs. The historic watershed nitrate yields published recently by the MPCA can be used as a benchmark to start the conversation for the nitrate flux and historic yield if every operator would answer the question, “how many gallons of water will be contaminated above the HRL when I lose (x) pounds of nitrogen per year on my farm?” If, for example, a farmer living in the Whitewater valley sees that on average his watershed yields eight pounds nitrogen per acre per year his on-farm efforts would be measured against the average. For another simplified example, a farmer cultivating a 640 acre farm in a watershed yielding nine pounds nitrogen per acre per year would lose 5,760 pounds of nitrogen per year. A reduction goal of thirty percent could retire rows crops from 192 acres of nitrogen-reducing land cover to reduce the nitrogen load to 1,728 pounds of nitrogen per year.

The Plan speaks of the difficulty of getting fertilizer use data directly from farmers, admitting the task is difficult and frequently limited. After thirty years of doubling down on BMPs, even after thirty years of accelerated and concentrated efforts in areas like Garvin Brook and the Whitewater Watershed, it is known that nitrate loads cannot be effectively reduced without retiring land from corn and soybeans. Annual row crops lose nitrogen disproportionately to almost all other land use and many current studies link nitrogen contamination to the percentage of annual row crops in a watershed. For the last twenty years, intensified row cropping has avoided having crop rotations

of small grains or grasses to remove excess nitrogen. During the same period Minnesota farmers have also accelerated the removal of thousands of acres of perennial vegetation converting grasslands, pastures, fencerows, woodlots, wetlands and forests. Because nitrogen loss is directly proportional to the percentage of land in row crop, the simplest and most effective start to abating nitrogen loss is to stop the loss of grasslands, wetlands and forests. This could be accomplished if nutrient loss is monitored and regulated and/or it can be accomplished if each farm is allowed to claim the ecological service benefits from grasslands, wetlands and forests.

If nutrient management focused on total nitrogen loss measured or estimated every year farmers would have a yardstick to measure water quality impacts and to plan nitrogen reduction strategies. Additionally if nutrient management plans could account for the benefits of non-cropland a farmer could have a mix of cropland and non-cropland to meet a nitrogen loss target. Attributing a nitrogen benefit to non-cropland needs to be a top priority for abating nitrogen loss. Nitrogen loss measured as a watershed yields will correlate to annual row crops. Without coupling nitrogen use, nitrogen loss and water pollution the nutrient management will only focus on the annual cost.

MnWOO recommends that the nutrient management plans and training programs for farmers and farm service providers sanctioned by the MSA provide better guidance in sensitive areas and should demonstrate and provide resources on how to calculate water pollution from nitrogen loss tables. Water quality certified farmers should be required every winter to analyze last year's nitrogen loss and water pollution contribution. A simple use of existing nutrient curves can estimate water quality impact by assessing the farm yield, nutrient input and the regional standards infiltration and runoff.

Every farmer in the southeastern Karst and Central Sands should be required to assess their individual impact on water quality at the end of the year, starting immediately with every protection plan. The Plan should require a water quality impact analysis at a farm scale, every year.

The Plan's prevention efforts rely a great deal on BMPs but these BMPs don't adequate address the water quality risk communication problem. We recommend a change in language for the nutrient BMP:

"Select appropriate N Fertilizer Rate using U of M guidelines and calculate the water quality impact of nutrient loss on the farm using fertilizer price, corn price, soil productivity, economic risk and environmental impact to water quality."

Additionally BMP language should include special language for southeastern Karst with similar appropriate language for the Central Sands:

"Minimize the movement of surface water and infiltration of nutrients and farm chemicals into karst and alluvial sands. Karst features include areas where there is less than 50 feet of soil over carbonate bedrock, sinkholes, shallow bedrock or sandy soils in cultivates fields, drainage to bedrock valleys and losing streams, springs and groundwater fed streams."

*MDA Response: See Subjects 10, 12**

Chapter 9: Mitigation

The mitigation goal is adequate only if action is taken before aquifers are above the nitrate HRLs. In this regard, the Plan actually allows, rather than prevent water degradation. Unless the limits are set far below the HRLs, similar to the MDH standard of 5 mg/L, the chance keeping healthy water may be impossible to achieve in the southeastern Karst and Central Sands.

*MDA Response: See Subjects 1, 5**

When Phase 1 and 2 voluntary mitigation is required, the MDA needs to lead and try to recruit or compel effective reduction measures; however, if after this last attempt to get ag- interest cooperation in sensitive or impaired areas fails, Regulatory Mitigation, Phase 3 and 4 should be established by statute or rule. Regulations to regulate nitrogen loss in sensitive areas should be administered by the MDH and MPCA.

Because of the known imminent risk of nitrate contamination in the southeastern Karst and Central Sands, significant staff resources of qualified water quality specialists should immediately be deployed to mitigate the existing nitrogen impacts and dramatically lower farm nitrogen loss. The MDA must take the lead to assure effective prevention and mitigation in the sensitive areas regardless of whether the local agriculture community and government units demonstrate willingness and capacity to reduce nitrogen loss. Based on 25 years of history in the southeastern Karst region, it is unlikely that local farm and ag-industry interests will support water protection and are more likely to try to thwart any action to abate nitrogen loss. Therefore, advisory councils in sensitive watersheds should be managed by qualified health risk and environmental risk professionals who should take and hold control and veto power over local advisory comments and actions. It is nice to say that farmer led groups can solve the nitrate loss problems, but thirty year of history in known sensitive areas have shown that the locals are simply not quaffed to assess or manage environmental water quality risks on farms or at the scale necessary to prevent further water degradation of major aquifer systems.

Historically neither the commodity groups nor local farmers have demonstrated the will to act or take responsibly for existing and ongoing water quality management in the southeastern Karst and Central Sands. MDA‘s prioritization concept of relying on local agricultural community support is inappropriate and contrary to the statutory mandate that MDA protect our water from degradation.

*MDA Response: See Subjects 1, 4**

Appendix A – MDA Lessons Learned in Responding to Elevated Nitrates in Groundwater:

Appendix A omits the first two fundamental steps in any response to environmental risks: (1) Rely on historical data and “don’t recreate the wheel”; and (2) Communicate in terms and at a scale that is understandable.

MnWOO understands the hard lessons learned about difficult public forums but it is incumbent on the MDA to assure that the process is open to the public and includes people with dissenting and opposing viewpoints. The Lessons Learned section seems to indicate that MDA and farmer’s work best together when dealing with agreeable farmers; groundwater, however, is a critical public resource where the public has a vested interest and a right to participate in government sponsored farm programs. MnWOO strongly considers the safety of the water supply to be a

public resource and current statutes do not allow willful degradation. All citizens should participate in the process of protecting groundwater and managing nitrogen fertilizers.

*MDA Response: See Subjects 1, 4, 5, 6**

The Phased Approach is flawed. The Plan should address areas with known and established contamination and high risk, such as the Central Sands and southeastern Karst. The top priority should be addressing Minnesota's most sensitive areas first. Make it known that the MDA/MDH/MPCA/MDNR know, understand and are willing to address the risks in the southeastern Karst and glacial-alluvial aquifers based on current knowledge. Any delay will assure continuing the nutrient practices that are known to contaminate groundwater above the HRLs in both the southeastern Karst and the Central Sands.

MnWOO proposes changing the priority and details of the Plan in order to demonstrate a legitimate attempt to prevent degradation of groundwater and to carry out the goals and responsibilities of the Minnesota Groundwater Protection Act.

1. Conduct protective actions on high priority areas that should be designed by formal rulemaking rule as Nitrogen Management Areas including the southeastern Karst, the Central and Northwest "irrigated and non-irrigates sandy soils." Require immediate implementation of BMPs that address water quality risks, calculate the potential impact of nitrogen loss on groundwater and advise operators on the means to prevent the loss of nitrogen to water.

2. Define the Mitigation Phase 1 and 2 action levels for water quality in any area of the state as five percent of wells with more than 5 mg/L (ppm).

3. Assign programmatic difference between the southeastern Karst, Central Sands and the other agricultural areas of the state.

a. In the southeastern Karst and Central Sands aquifer Nitrogen Management Areas will use existing water quality data from wells, springs and stream base flow and develop a network of water monitoring sites to build on existing data to develop baseline background conditions. Monitoring will concentrate of the shallowest and most venerable aquifers and sensitive areas as outlined in Chapter 3 "Groundwater Contamination and Sensitive Areas" including the areas defined by the maps that were used to make Figure 3 Water Table Aquifer Sensitivity, the County Geologic Atlas Program, the Department of Health Nitrate Contamination Probability maps (Chapter 3 and figures 3 to 5). Conduct a detailed assessment of water quality in the southeastern Karst and Central Sands watersheds.

b. For the Northwest, South West and South Central cropland areas monitor groundwater wells at a HUC 8 watershed scale for ten years to identify additional areas with nitrate concerns.

c. Conduct Phase 1 and 2 mitigation actions administered by the MDA for the southeastern Karst and Central Sands Nitrogen Management Areas and any areas exceeding five percent of springs, streams or wells greater than 5mg/L nitrate; i. set a goal for 50% nitrogen loss reduction.

d. Set a four year schedule for improvement with a requirement of annually calculating and reporting farm scale nitrogen loss.

e. Areas with more than ten percent of wells exceeding 7mg/L shall have regulatory Phase 3 and 4 Mitigation Plans required by statute or rule and administered by the MDH and MPCA.

*MDA Response: The MDA agrees that sensitive areas should be a top priority. See Subjects 1, 4, 5, 8, 12**

Minnesota Agricultural Water Resource Center

The draft NFMP provides a comprehensive assessment of the critical groundwater protection areas scattered across Minnesota and the geologic features that make them sensitive. While good nitrogen management is important wherever crops are grown, it is especially important to provide targeted education to farmers operating these sensitive lands to insure that they understand both the risk factors and the practices that can help them maintain productivity while protecting groundwater resources.

The draft plan states, twice, that some parts of the current NFMP have not been fully implemented, primarily due to limited funding. These passages should also include some description of the "lessons learned" as outlined in the appendix to the report. In our perspective, limited funding was less of a factor than the usual learning and implementation curve experienced with any new program.

MDA Response: The MDA acknowledges this comment and will take into consideration.

The mitigation section of the draft plan includes phase descriptions based on the percent of wells having nitrate-nitrogen concentrations above thresholds. While the first step in the mitigation process outline is "confirm there is a problem"… the report should also clearly spell out a process to determine well suitability as indicators of actual groundwater nitrate levels, excluding sandpoints and wells that do not meet well codes. Numerous examples can be found of poorly located and/or constructed wells dug decades ago. These cases where a new well or well location is simply in order should be excluded from analysis, but the owners of these problem wells should be notified and educated with clear delineation that their well issue is localized to their well, not an aquifer nitrate issue. The NFMP process applies to aquifers affected by nitrogen fertilizer, not localized specific well problems. The process for screening wells potential impacts should be emphasized here as well as in the monitoring section, and the protocol in Appendix H should exclude both sandpoints and hand dug wells from statistical data analysis.

*MDA Response: See Subject 5**

The plan should clearly explain that because tile drainage is very rare in the areas identified as sensitive to groundwater contamination, agricultural drainage is very rarely associated with groundwater nitrate concerns.

MDA Response: The MDA agrees but feels that it's addressed in the plan and no changes need to be made.

As stated in chapter 2, many Minnesotans rely on groundwater for their drinking water. It is true that where there are elevated nitrate levels there are costs associated with treatment or remediation. It is also true and important for readers to know that the vast majority of Minnesotans

have access to groundwater that is NOT significantly impacted by nitrates, providing greater context to the scope of the problem. This notation is especially important as readers study examples outlining remediation and treatment costs that are important but have been encountered relatively rarely.

MDA Response: The MDA agrees, however but no data exists on number of private wells requiring treatment. MDH has data on public well supplies currently treating for nitrate.

The report should also note that at low levels (<10 mg/l) nitrates are not a threat to human health, that most nitrate intake is through food rather than water and that nitrates are an essential nutrient for humans as well as plants and animals.

MDA Response: The drinking water standards are critical to ensuring safe drinking water. MDA has not evaluated the health risk from nitrate exposure through food so the issue was not discussed.

Regarding animal health risks, it is true that water can be a potential source of toxic levels of nitrate. For context, the report should also state the number of cases in which this is documented to occur. Also, the reference to shallow wells with poor casings and the NAS livestock guideline of 100 mg/l nitrate-nitrogen does not fit here. The “shallow wells with poor casings” reference fits more appropriately as a qualifier, or more accurately a dis-qualifier, of well description for analysis purposes. The reference to water being hauled to livestock using fertilizer tanks should be removed from the report as it is not related in any way to the issues of fertilizer use and groundwater contamination.

MDA Response: Disagree. The reference answers a common question.

Under the “other risks” section, we suggest a more complete description such as “An area of hypoxia (low oxygen) occurs seasonally in the Gulf of Mexico due to a combination of nutrient enrichment from agricultural and urban sources, freshwater-salt water stratification and other factors.” Alternatively, this section should be deleted from the report as it confuses readers by blurring groundwater and surface water issues. It should also be noted that the MPCA paper used as a reference here was not part of the stakeholder discussion as the draft report was being developed.

MDA Response: Disagree. It is difficult to know how much detail to include in the plan. Hypoxia is a frequently raised in discussions and so it needs to be referenced, but we do not want to go into detail for the purpose of the NFMP which is focused on actions to protect groundwater.

The Agronomic and External Sources of Nitrogen section relies heavily on an MPCA report that was not made available to the stakeholder committee, was directed at surface water (not groundwater) and provides no information relative to sensitive areas or geographic concerns relative to the NFMP. As such, these passages should be deleted.

MDA Response: It is unfortunate that the MPCA report was not available during the NFMP Advisory Committee process. However there is information in the report that is useful and relevant to the NFMP. MDA will review the references from this report that are included

in the NFMP for relevance and accuracy.

The Nitrogen Fertilizer Sales and Sources data are statewide, again providing no information specific to sensitive areas. It would be more appropriate for the report to focus on fertilizer use in the regions identified within the report as sensitive. The same is true of the Cropping Trends discussion, which provides statewide figures rather than specific to the areas primarily addressed by the NFMP.

MDA Response: The MDA agrees with the comments; however the data used for this text is only reported on a statewide basis. No change.

Figure 13 has been presented in various forms in several MDA formats. The version shown in the draft NFMP depicts a relatively flatter yield response curve and a relatively steeper nitrate loss curve, suggesting that economic risks associated with lower rates are relatively small while local environmental risks associated with higher rates are relatively large. It is also important to point out that there are potential environmental risks at a larger geographic scale associated with low nitrogen rates due to higher food prices which drive crop prices higher which lead to increased crop acreage (sometimes in areas sensitive to environmental impacts) due to inefficiencies of production. Figure 13 should be used as a tool to summarize the balance sought between environmental risks (local and global) and economic risks (local and global) and help farmers move as close as is feasible to the optimum nitrogen rate.

MDA Response: Figure 13 is conceptual and illustrates three important points; 1) Nitrogen losses will occur even with no fertilizer nitrogen put into the system; 2) Using U of M rates will typically find a balance between optimized production and leaching losses: and 3) N losses will accelerate when applying above U of M rates. It is not intended to describe production impacts on a geographic scale. Yield differences between "optimized N rates" and frequently used rates is generally less than 2%. It is unlikely that these production differences are going to drive large geographic scale changes.

Nutrient management and specifically the discussion of the 4Rs and Minnesota's nitrogen BMPs is confusing. The draft report states that Minnesota nitrogen rates are based on a grouped economic approach that determines rates by applying large sets of nitrogen response data, and then states that "this is due to the fact that there is a very weak relationship between economic optimum N rate and corn yield in the North-Central region of the United States." The draft report goes on to say that "prior to 2006, N rates were based on yield goal." It is accurate to state that the more recent BMPs incorporate economic considerations into rate recommendations, but this includes economic considerations associated with yield. In other words, yield goals have not been abandoned in the current process, economics have simply been added. Additionally it should be noted that the "very weak relationship" is due to the fact that the EONR can only be quantified at the end of the growing season, which is why an N rate range around the projected EONR is promoted.

MDA Response: The final NFMP will revisit these concerns and clarify.

The MDA Nitrate Report Findings provide much helpful information, but again are limited due to the lack of detailed diagnostic information about specific wells. It is important to gather enough

information to differentiate aquifer conditions from individual well conditions early in the NFMP process.

*MDA Response: See Subject 8**

We appreciate that the draft NFMP relies heavily on local input and decision making. Local stakeholders, including farmers, share concern for the groundwater on which they depend and are best positioned to seek the appropriate balance in addressing land use, BMPs and groundwater protection. Local stakeholders can also provide local knowledge about changes over time. As noted in the report, nitrate movement to groundwater can take years, even decades, depending on soil and precipitation conditions. Given that the process is focused on agriculture, it is critical that farmers, agronomists and fertilizer retailers be included in the makeup of the local advisory team as spelled out in section 3 of the mitigation process.

*MDA Response: See Subject 9**

Morrison-Crow Wing-Todd Corn Growers Association

After reviewing the draft 2013 NFMP, questions arise as to the need for a revision of the 1990 plan. The 1990 NFMP is as valid today as it was in 1990. The 1990 plan was written with significant input from agriculture stakeholders and was designed to accommodate future changes in agricultural practices. Nitrogen fertilizer use in Minnesota has been flat for the last 25 years, while yields have increased significantly. Nitrogen fertilizer use efficiency today is as high as scientific processes and technology allows. Minnesota farmers are not interested in using more nitrogen fertilizer than is needed to optimize economic yields for the crops they produce. Competitive pressures prevent them from doing otherwise.

*MDA Response: See Subject 2**

Farmers in Minnesota use lower rates of nitrogen per acre than farmers in any of the surrounding states with similar yield levels. This is due to the soil and climatic conditions that exist in Minnesota, as well as the need to maximize economic returns. Both over and under application of nitrogen have a negative impact on yields and quality of crops grown in Minnesota; and therefore, there is no economic incentive to over apply nitrogen. If anything, nitrogen fertilizer rates are below optimum for the yields that are now being produced. In fact, a five year MDA study indicates this. Higher economic yields were obtained from rates that were 30-40 lbs/acre higher than the existing University of Minnesota nitrogen fertilizer guidelines.

MDA Response: The U of M guidelines are designed to optimize, not maximize, yields. Frequently the additional 30-40 lb/acre will produce a small yield increase although it is not uncommon for these yield increases to be statistically insignificant. Additionally, the farmer may not be getting an adequate return on the additional fertilizer investment cost. The purpose of the MDA's Nutrient Management Initiative (NMI) is to assist farmers with the decision. We also need to factor in the environmental cost to water resources. Lastly, the U of M rates will not work if one of the other 4R's in not adequately implemented. For example, frequently in the NMI project, farmers in South Central MN were fall applying without including N-Serve. The additional N was beneficial in these cases in order to

compensate for the higher leaching losses.

There is no evidence provided in the draft 2013 NFMP to indicate that groundwater nitrate problems are increasing due to the use of nitrogen fertilizers. Therefore, we question the MDA motives in redoing the 1990 plan with the inclusion of a phased approach to regulation of nitrogen fertilizer that is outlined on pages I 0, 76, 78 & 130 of the draft. The Phase Approach being proposed is adapted from an approach used in Nebraska. The Nebraska situation is unique and there are no areas in Minnesota that are comparable to the Nebraska region which has high nitrates in groundwater. Irrigation wells in this Nebraska region are in very shallow groundwater aquifers, and an established linkage between the irrigation well high nitrate levels versus past intensive irrigation and excessive nitrogen fertilizer usage had previously been documented. The type of irrigation management and nitrogen use that helped create the Nebraska situation has never existed in Minnesota. In Nebraska, irrigation well concentrations are the triggering mechanism for phasing in regulation, not unrelated drinking water wells, as is being proposed in Minnesota.

The draft NFMP (on pages 10, 76, 78 & 130) addresses mitigation phases and criteria that are part of the proposed regulatory process. Private drinking water wells tests will be used to trigger the various phases of the process. Serious concern exists over the lack of scientifically established cause & effect linkage of high nitrate wells to nitrogen fertilizer usage. There are other well-established causes of wells testing high in nitrates. These causes include contamination from other nitrogen sources, such as nitrates produced from soil organic matter mineralization, septic systems, manure, atmospheric deposition, etc. The recently released Minnesota Pollution Control Agency (MPCA) Nitrogen Report indicates that more than 75-80% of the source nitrogen which can impact ground or surface waters is from non-fertilizer nitrogen sources. The MDA does not have statutory authority over the naturally occurring soil organic matter mineralization process.

There can be other causes of high nitrates in wells, in addition to all the non-fertilizer nitrogen sources, that can cause high nitrates. These causes include poor well construction, improper well placement, cracked or rusted out casings, dug wells and many other possible causes. Trying to relate drinking water well nitrates levels to nitrogen fertilizer use is a flawed concept. Existing drinking water well nitrate levels should not be considered as an indicator of groundwater nitrate levels because of the site-specific problems that exist with them. MNICCA is very concerned that the use of existing drinking water wells in the phased approach, as is being proposed in the 2013 NFMP, is likely to trigger negative public perceptions of nitrogen fertilizer usage and possible regulations when nitrogen fertilizer is not the problem.

There are better approaches to monitoring groundwater nitrate levels than a township well testing program. One approach might be to install properly constructed and designed monitoring wells in various groundwater aquifers around the state. These monitoring wells would need to be constructed and properly placed in order to account for all the nitrate-nitrogen sources and various pathways of nitrates to the monitoring well.

*MDA Response: See Subject 8**

In addition to the concerns regarding the township well testing program as a part of the phased

approach to regulation, MNICCA would like to point out a number of other concerns with the draft NFMP.

*MDA Response: See Subjects 2, 8**

Concern 1: On pages 18-19 the draft NFMP indicates that methemoglobinemia can develop in infants when fed high nitrate-nitrogen formula. The Plan goes on to indicate that a number of other possible negative effects of high nitrates have been suggested; however, the cause and effect relationships with these other effects have never been proven. This paragraph should be removed because unproven speculation is not appropriate for the NFMP. On the contrary, there are a number of studies that have established a positive relationship between high nitrates and human health. The positive benefits of high nitrates should be included within the NFMP, in order to provide an appropriate balance in the document.

MDA Response: The MDA will review this text with the MDH to ensure that it is appropriate and accurate.

Concern 2: Also on page 19 the first paragraph indicates that the average adult in the U.S. consumes 20-25 milligrams of nitrate every day in food, largely from vegetables. The Plan does not relate this information to the Public Drinking Water Standard of 10 ppm. This information should be converted to a concentration of nitrate-nitrogen in water for comparison, in order to put it into a perspective that is relative to drinking water levels. The 20-25 milligrams of nitrate consumed by the average adult would equate to drinking a liter (1.2 quarts) of water daily with a concentration of 20-25 parts per million (ppm) of nitrate-nitrogen. If all adults stepped it up to consume 4 times more vegetables daily as recommended, the nitrates consumed would be equivalent to drinking a liter of 100 ppm nitrate-nitrogen water daily.

MDA Response: Disagree. The text notes that most adults can consume some nitrate with no ill effects. However the health standard is based primarily on infants. The change is not necessary.

Concern 3: On pages 128-129 of the draft NFMP, there are graphs that show the increasing trend of daily nitrate-nitrogen loading from two springs in SE Minnesota. What are the concentrations of nitrates in the water? Loading is not an appropriate way to present this information. Concentrations may actually be dropping if the water discharge is increasing due to increases in precipitation. It is well established that precipitation has increased significantly in SE Minnesota over the years cited.

MDA Response: The MDA will revise text to include both concentration and loading graphs.

Concern 4: The graph on page 38 is a conceptual graph and doesn't have actual data to support it. Many different factors impact the potential for nitrate leaching losses. This graph implies that nitrogen fertilizer rate is the only factor controlling leaching losses. It is not appropriate to include this graph without discussion of the multitude of other factors that relate to leaching losses.

MDA Response: This is a conceptual illustration and will be labeled as such in the revised NFMP. The MDA agrees that other factors such as timing (fall vs spring pre-plant, etc.)

can be very important.

Concern 5: The graph on page 39 can be confusing. The ratio should be inverted and graphed as pounds of nitrogen fertilizer input per bushel of corn produced. In this way the pounds of nitrogen per bushel of grain produced can be placed on the same graph. This will allow a quick reference of how close the nitrogen input is to nitrogen uptake by the crop. When crop removal nitrogen exceeds input of nitrogen, a net mining of soil organic matter occurs. Mining of soil organic matter.is not a sustainable management practice and therefore the promotion of mining of soil organic matter nitrogen should not be a goal of this Plan.

MDA Response: Most NUE discussion uses the notation of production per pound of nitrogen fertilizer input.

Concern 6: The NFMP does not address the point that crop rooting zone nitrate concentrations need to be high in order to supply the nitrogen needs of a growing crop. Crop rooting zone water needs to be separately defined from surface water and groundwater. Crop rooting zone water supplies the crop needs and is the conduit for delivery of nitrate-nitrogen to the plant. Nitrate concentrations in crop rooting zone water are dynamic throughout the year because of the biological processes that occur in the soil. Typically nitrate- nitrogen concentrations in the crop rooting zone water need to be above 100 ppm in order to prevent nitrogen deficiency from occurring.

MDA Response: Agree with these comments, however having discussions on vadose zone concentrations are beyond the scope of this document.

Concern 7: On pages 34 & 105 references are made to the contribution of nitrogen from soil organic matter through the mineralization process. The process of mineralization and immobilization of soil organic nitrogen is continuous throughout the spring, summer and fall. Soil organic matter nitrogen when mineralized will supply the majority of nitrogen for crop growth, typically 75-80% of the nitrogen supplied to a crop. Nitrate produced by this source is just as susceptible to leaching as any other source. Why isn't it considered as a major component of groundwater contamination versus the emphasis that is placed on nitrogen fertilizer?

MDA Response: Agree. Figures 8 and 9 clearly illustrate that contributions from mineralization are the domain source. Additionally, Figure 13 illustrates that some level of nitrogen losses are typically going to occur under row crop production even without nitrogen fertilizer inputs.

Concern 8: The draft NFMP references significant portions of the recently released Minnesota Pollution Control Agency (MPCA) Nitrogen Report. This report was released in June 2013, well after the last meeting of the NFMP advisory committee meeting in 2012. This report is poorly written, portions are inaccurate and it is extremely biased against agriculture. This report should have been provided to the NFMP advisory committee so they could determine the parts that were relevant to the NFMP.

MD Response: It is unfortunate that the MPCA report was not available during the NFMP Advisory Committee process. However there is information in the report that is useful and relevant to the NFMP. MDA will review the references from this report that are included

in the NFMP for relevance and accuracy.

Concern 9: The "Other Risks" section, on page 22 of the draft NFMP references various surface water concerns that have not been confirmed or are not supported by independent scientific studies. These non-validated surface water concerns should not be included in this document because the NFMP should relate to groundwater. If speculative statements about surface waters arc included in this report, then proven positive impact of nitrate on surface water quality should also be included. These positive effects include the suppression of methyl mercury production and the suppression of blue-green algae in surface waters. Methyl mercury and blue-green algae toxins are two oftl1e most serious water quality impairments in Minnesota surface waters.

MDA Response: Disagree, because surface water concerns have been confirmed and validated by the US EPA and MPCA. The Advisory Committee recommended that the NFMP consider surface water concerns in areas where there is a groundwater concern. The issue of methyl mercury was raised and addressed on January 2012. The MDA does not believe that there is a broad enough pool of knowledge regarding the impact of nitrate reduction on mercury methylation on a watershed scale to warrant further review of the topic for the purposes of the NFMP revision. No change.

In summary, the township well testing program being proposed in the draft 2013 NFMP which would be used as part of the phased approach to regulation of nitrogen fertilizer has serious technical and scientific flaws and is likely to result in serious economic harm to Minnesota agriculture. It is also unlikely that this program would have any positive impact on groundwater quality. The MDA needs to rethink whether the 1990 NFMP needs to be revised and if so, it needs to fully engage the agricultural community as part of that revision similar to what was done in 1990.

*MDA Response: See Subjects 2, 8**

Morse, Steve

I write as the chief Senate author of the 1989 Groundwater Protection Act in support of the Minnesota Center for Environmental Advocacy's request that the Department of Agriculture move forward at this time to develop water resource protection requirements in order to prevent further degradation of the state's groundwater resources.

In 1989 when the Legislature passed the Groundwater Protection Act, our objective was to halt the pollution from agricultural activities and prevent future degradation of groundwater resources. The statute provides an opportunity to begin with voluntary measures, but should these prove ineffective, rules prescribing specific practices were expected to be put in place in a timely manner to meet the state's groundwater degradation prevention goal. The statute explicitly authorized the Department to implement such rules in order to prevent further degradation of groundwater.

As set out in the Minnesota Center for Environmental Advocacy's comment letter, the voluntary best management practices that have been pursued since the law was adopted nearly 25 years ago, have not had the desired effect. Minnesota's groundwater resources are becoming further polluted from agricultural activity. It is time for the Department to prepare and adopt mandatory

rules to ensure this resource is restored and protected for future generations.

*MDA Response: See Subject 1**

National Park Service

I have strong concerns with the plan's emphasis on adoption of BMPs over actual water quality performance. The stated purpose of the plan is to prevent nonpoint source pollution in groundwater. However, the fact that it is unlikely that producers will be held responsible for actions that negatively impact our shared water resources, as long as they have readily adopted BMPs, suggests that the plan's stated goal may be weakly held. If the MDA is not the right "home" for holding producers accountable for impacts on public water resources, that is one thing. But at a time in which so much statewide energy is being devoted to interagency coordination and to achieving demonstrable water quality improvements with public investment, it is an unwise use of both public funding and public will to invest agency energy in processes that are not designed to guarantee improved water quality outcomes.

In addition, I am concerned that the plan continues to rely so heavily on an approach—encouraging the voluntary adoption of nitrogen fertilizer BMPs—that has not had demonstrated success in the first 23 years of the plan's life. Nitrogen contamination has remained an issue since the first plan was developed in 1990, which indicates that this approach has not proven successful enough to continue to rely on it as our primary solution. We cannot afford to continue to invest so much of the state's resources in an approach that has had over 20 years to prove its success, but has not.

I agree with the suggestion made by Les Everett at the Roseville listening session that the plan's phasing and requirements should be adjusted so that areas do not have to rise to the level of critical drinking water standard exceedances before serious action is taken. Waiting to enter Phase 2 until 10% of an area's wells reach concentrations above the 10 mg/L standard seems unwise, particularly given the MDA's estimates about how long that area would stay (nonconforming) in Phase 1. I agree with Mr. Everett's suggestions that voluntary action to prevent a rise to the level of the standard should be exhausted well before reaching that level (5% of the wells at or above 10 mg/L), and that intensive BMP promotion begin when 5% of the wells exceed 7 mg/L, or some lower level.

Finally, I strongly believe that public outreach efforts need to be strategically assigned to those best equipped to achieve demonstrable, on-the-ground results. My conversations with members of the agricultural community indicate that this is rarely agency staff. As you know, Peggy Knapp and I have been digging into this issue through our work on the "FarmWise" program, and we will continue to be in touch about recommendations that come out of this work regarding the best ways to conduct outreach to agricultural communities in order to achieve meaningful water quality outcomes.

*MDA Response: See Subjects 1, 4, 5**

Pearson, Grant

Researchers have to be absolute in the identification of where or what the groundwater nitrate

contributors are. Plenty of “Steve Commerfords” out there who are still saying “prove it,” prove that ag is a polluter.

*MD Response: The MDA believes the draft NFMP includes numerous references to agricultural sources of nitrate in groundwater. See Subjects 1, 2**

If nitrogen BMPs do not work well enough in row crop production to protect groundwater nitrates in sensitive areas, then what? Who pays for nitrate treatment in drinking water? Will alternative management tools (crops) be mandated?

*MDA Response: See Subjects 1, 7, 13**

I'll be honest; I'm disappointed that the amount of 'Regulation' here is merely BMP adoption even though it's apparent that BMPs do not solve NO3 leaching problems in row crop production on coarse soils. BMPs are better than no BMPs that is for certain. I look at this revised NFMP as the 1st 'baby steps' into the realm of N fertilizer regulation; have to start somewhere. The livestock guys would have been complaining for a long time 'why don't the non-livestock/non manure crop producers have to follow the same sets of rules they have to (7020 rules) with regards to N rate planning restrictions?'

*MDA Response: See Subject 1**

Randall, Gyles

Nitrogen application rates used for corn in Minnesota have been increasing (the report used “slightly”) rather steadily in the last 20-30 years as shown in Figs. 22 & 27. The rate of increase was greater than IA, IL, and WI (Fig. 22). This seemed to be down played in the presentation. If source reduction is the primary and most effective method to reduce nitrate concentrations in water (excluding switching from corn to perennials), the fact that N rates are steadily increasing. Remove ND from Fig. 27 because no ND data are shown.

Figures 14 & 29 are bothersome. These figures suggest farmers are producing more corn from each pound of fertilizer N used and NUE is increasing with time. That is good, but that is not the whole story. These data imply to the uninformed that more N is being used by the corn crop and is being removed/exported in the grain, resulting in less N left over and available for leaching and loss to groundwater. Unfortunately, with higher grain yields, N concentration in the grain has decreased. We used to get 1.5 to 1.6% N in the grain (9.4 to 10.0% protein), and Iowa used a standard value of 1.53%. With today’s high yields, we are fortunate to get 1.2% N. A few years ago, with very high yields at Waseca, we didn’t even get 1.0% N. So in reality, just because more grain is being produced, doesn’t mean we are removing more N from the field. Thus, from a WQ standpoint (N available for loss) the issue today is similar to the years when grain yield potential was lower. I feel this fact has to be pointed out to growers so they don’t come away with the interpretation “if I grow greater corn yields, my N loss potential will be less”.

MDA Response: Agree. Will add supporting comments following the discussion on Figure 14 (p. 39) and also the following related sentence “However at this time, it is not clear the causative factors or the direct environmental implications” (p. 118).

The prevention action seems to be the weakest of the four actions. It relies on the adoption of BMPs and on educational programs to accomplish prevention. After more than 20 years of BMP education since the 1991 efforts, it appears that we have not made a lot of headway. Much time can pass when trying to measure the effects of BMPs on nitrate concentration in well water >100' deep. Shouldn't prevention be measured on the basis of the amount of nitrate percolating beneath rooting depth --- maybe nitrate losses at 8 to 10' instead of nitrate concentrations in deep wells? Furthermore, using the 4R's may not meet nitrate goals, especially when corn follows corn or is in rotation with soybeans and where livestock manure is commonly produced/used.

*MDA Response: See Subject 6**

Can't the movement to phases 3 and 4 be averted or at least delayed substantially by just drilling deeper wells? In Nebraska, I don't believe drilling deeper wells occurs in their irrigated corn production area because of the nature of the water source. However, in SE Minnesota this could be a tool to be used to circumvent the process.

*MDA Response: See Subjects 1, 8**

Based on the Rochester meeting, I'd like to see a bit more emphasis on linking surface water concerns to groundwater, especially with respect to the BMPs. I got the feeling that producers felt they were "off the hook" if they did not live in the Karst area. This also relates to fall application in SE MN. Seems as though dealers, farmers, and even MDA feel okay about fall N applied to "heavier" soils in SE MN. These soils are generally well drained and susceptible to leaching in the top 3 to 4 feet of soil before reaching the underlying Illinoisan till. With respect to well water, maybe so. But WRT to surface water, fall application is not a sound practice on these soils. Moreover, MDA and others are reporting escalating nitrate concentrations in SE MN Rivers fed by groundwater springs.

*MDA Response: See Subjects 4, 11**

The NFMP dwells a lot on prevention, assessment, monitoring, and mitigation but does not emphasize regulations enough. Regulation is mentioned but is not emphasized. Going back to the 1991 plan, much attention was given to BMPs. But when it came to Water Resource Protection Requirements, which were to implement restrictions when BMPs did not protect the water, very little was done. The current plan has many of the same similarities as the 1991 plan. We don't want the same to occur again. Even though regulating N usage is very difficult (except for time of application) and could contain significant bureaucracy, I hope that restrictions and regulations are clearly viewed as "sticks" to protect our ground and surface waters.

*MDA Response: See Subject 1**

Rehm, George

Perception: Throughout the introductory sections and suggestions for mitigation, any reference to elevated levels of nitrate-nitrogen in groundwater leaves the perception that these levels are the consequence of inappropriate use of fertilizer nitrogen. Yet, this perception is not reality. Figure 9, page 4 correctly lists various sources of nitrate-nitrogen that can move through soils to the groundwater. Although the percentages shown can be debated, there is no question that there are

several sources of nitrate-nitrogen. Although the various sources are briefly mentioned in the document without discussion, there should be a very prominent statement that fertilizer nitrogen is not the only source of nitrates in the groundwaters of the state.

MDA Response: Agree. All sources of nitrogen can ultimately contribute to groundwater contamination as pointed out on page 108. Authors will emphasize in the final revisions of Chapter 4.

Data do not match: Examination of nitrogen fertilizer sales data (Figure 10, page 35) easily leads to the conclusion that these sales have not changed substantially from 1990 through 2012. Yet, crop yields have increased during the same time interval. This leads to the general conclusion that fertilizer N is now used more efficiently. Indeed, fertilizer N guidelines have been reduced. From 1.25 lb. per bushel of intended yield efficiency has improved to approximately 0.6 lb. per bushel of intended yield. This increase in nitrogen efficiency is not mentioned in the document.

The documented trend toward improved efficiency raises important questions about changes of nitrate-nitrogen in the groundwater. These changes measured over a similar period of time are not provided in the document. It is important to recognize that downward movement of nitrate-nitrogen through the soil profile is not rapid. Nebraska research with very sandy soils has shown that such movement can take as long as 14 years. If this is true, fertilizer nitrogen applied several years in the past may just now be reaching groundwater. This fact is not stated in the document and should be considered in any plan for mitigation.

MDA Response: Disagree. Nitrogen Use Efficiency (NUE) is discussed in the "Trends in Nitrogen Fertilizer Use on Major Crops, Production, and Fertilizer Use Efficiency (p. 37-39). Travel times of nitrogen are discussed throughout the NFMP and because of the uncertainty and lack of uniformity across landscapes; the NFMP uses adoption of BMPs to guide future response activities.

Fertilizer Nitrogen BMPs: It's appropriate that the approach to improved use of fertilizer nitrogen be based on the use of Best Management Practices (BMP's). Emphasis on choice of the correct rate is the cornerstone of these practices. The draft should emphasize that a reduction in rate of nitrogen applied cannot be the optimum economic rate unless other Best Management Practices are followed. This important linkage is not mentioned in the draft.

MDA Response: Highly agree and this important point will be emphasized in the revised NFMP. This is stated on Page 41 "If one of the 4Rs is not followed, the effectiveness of the system will be comprised, and there will be agronomic and/or environmental consequences.

Public Water Supply Standards: There is general knowledge that concentrations of nitrate-nitrogen in groundwater in excess of 10 mg/kg (10 ppm) should be cause for concern. The origin of this standard can be questioned. Nevertheless, all action seems to be based on this value. Yet this action standard has been reduced to 5 mg/kg (5 ppm) for public water supplies (page 61). A justification for this lower standard has never been explained. However, this explanation should be a part of any nitrogen management plan.

MDA Response: The 5 mg/L standard was related to Safe Drinking Water requirement for

*increased monitoring, see also Subject 5.**

Mitigation: As described in the document, there are 16 steps in the mitigation process divided into four phases. Phases 1 and 2 are voluntary. Phases 3 and 4 being regulatory. Apparently, the percentage of wells having various concentrations of nitrate-nitrogen is the criteria used to differentiate one phase from another. What is the basis for using these percentages? They appear to be arbitrary.

Although documentation may not exist, it seems that distribution of nitrate-nitrogen concentration in groundwater might not follow a normal distribution curve. Considering the distribution, although it may be skewed, might be a better method for determining the breaks between phases 1, 2, 3, and 4. For example, determinations between phases 2 and 3 or 3 and 4 may be one or two standard deviations from the mean.

Also, there are no guidelines for distinguishing the wells to be considered in determining the criteria for proposed . For example, if high nitrate-nitrogen values are detected in a well, is this nitrate-nitrogen caused proximity to a feedlot or septic tank or poor well construction or an outdated well. If the document is a plan for the management of nitrogen fertilizer, wells having other causes for high levels of nitrate-nitrogen should be removed from the data base before deciding if a mitigation procedure should be put in place.

MDA Response: Appendix H in the plan outlines criteria for screening wells that appear vulnerable to other sources of nitrate. The MDA will consider adding additional detail to Appendix H. Decisions on the potential sources of nitrate in groundwater will be made after careful consideration of other potential site specific sources. Note that the mitigation criteria are based on a percent of wells exceeding a value well above an expected background level of 1-3 ppm nitrate. This provides a margin for error in the event that there might be sources of nitrate other than nitrogen fertilizer.

Local Advisory Teams: The formation of these teams is described on pages 78 and 79. Responsibilities of these teams are not clearly defined. Are these teams advisory only or is there some definition of authority? There should be some uniformity in the formation of guidelines and responsibilities of these teams. Otherwise, it's easy to envision chaos among local units of government.

It's also important that membership on these teams be balanced. Otherwise, a person or persons who are not farmers could dominate the agenda. It would be a major mistake if this should happen. It is also important that membership on these task forces include someone who has an in-depth understanding of the complexity of nitrogen in soils and waters.

*MDA Response: See Subject 9**

Stearns County Soil and Water Conservation District

P. 8, last paragraph: Seems like a limited timeframe to develop a mitigation response. Will other data help support the decision?

*MDA Response: See Subject 5**

P. 43, Figure 15: Irrigated and non-irrigated sandy soils nitrogen BMP region – much of Stearns doesn't fit. Can't we come up with better BMPs than these regions, i.e. BMPs by soil type?

MDA Response: Agree. Some counties have significant diversity and may require a modified design the next time the BMPs are revised.

P. 44, Table 1: Fall application in SW/SC MN – Agrotain protects nitrogen sources from volitization, no groundwater benefit.

MDA Response: The table should denote that in the SW/WC BMP region, an acceptable practice for corn production (but with greater risk) is fall applications with ESN, Agrotain or N-Serve. The correction will be made.

P. 47, BMP Region Course Textured Soils – too general to fit Stearns into this region.

MDA Response: Agree. Some counties have significant diversity and may require a modified design the next time the BMPs are revised.

P. 52 Interview Section: "MDA has developed a diagnostic tool called Farm Nutrient Management Assessment Process (FANMAP)… Question – a tool to use for other projects?

MDA Response: Over the years, the FANMAP approach has been modified for providing additional details on pesticide and tillage information. The general concept is to systematically collect detailed information on a field-by-field basis to successfully document the significant knowledge level of the farmer.

P. 53, Future BMPs and Refinement of Existing BMPs – Not sure where to address, but most leaching occurs during spring rain events before crops are planted. How will this plan account for weather viability?

MDA Response: Most Midwestern research suggests that approximately 75% of the nitrate leaching occurs during the non-cropping season or very early after planting. The BMPs therefore are designed to minimize residual soil nitrates which remain in the soil profile after harvest. BMPs will continually need to be reevaluated as climate changes are defined and better understood.

P. 66, figure 19, Will mitigation be at the township level?

MDA Response: Generally yes, along with wellhead protection areas. But the draft NFMP provides that other geographic boundaries including groups of townships, counties, and groundwater management areas as defined by the DNR could be used if appropriate.

P. 75, Prioritizing Mitigation Efforts – highest priority should be based on the resources not voluntary participation especially under mitigation

*MDA Response: See Subjects 1, 5**

P. 76 paragraph 3, is there a timeframe for voluntary compliance? How long until regulation is the driver?

*MDA Response: See Subject 4**

P. 77, paragraph 1, What tools are available other than tracking tritium for dating? Is that realistic for this program?

MDA Response: The MDA is open to technically defensible tools or methods for estimating groundwater travel times and leaching. There are a variety of tools such as modeling, field hydraulic tests, field sampling, tracers, etc. that might be useful in certain settings.

P. 77, paragraph 2, MDA should advance NTT for this purpose.

*MDA Response: See Subject 4**

P. 78, Mitigation Process #1, How can MDA definitively state nitrate is a result of ag activities? MDH can't say with certainty that ag is the source of nitrate in the Cold Spring DWSMA. Should MDA move forward with regulation, who, if anyone, is responsible for negating other nitrate sources in the recharge area?

*MDA Response: These decisions will be made after careful consideration of other potential site specific sources of nitrate in groundwater. Wells that may be vulnerable to other contaminants should be screened and removed from consideration. However the mitigation criteria are based on a percent of wells exceeding a value well above an expected background level of 1-3 ppm nitrate. This provides a significant margin for error in the event that there might be sources other than nitrogen fertilizer. See Subject 2**

P. 78, Mitigation Process #2, Are LGU's expected to carry out the work plan?

MDA Response: A local entity will have the opportunity to lead the mitigation process. A work plan will help define and guide this work.

P. 95, Major Step #3, both options are no longer funded.

P. 95, Major Step #4, This can be challenging with lack of equipment/market and lower revenue with CRP.

P. 115, 1st paragraph, that seems much lower than what I have seen in Stearns

Sunnyfield Farms Partnership

After attending the meeting at Cascade Meadows in Rochester and reading the draft online I would like to comment on a BMP I don't see mentioned. That is Soil Organic Matter Generation. We farm about 20 miles North of Cascade Meadows and for the last 13 years have done so using no-till/strip-till. In that time we have raised our tested soil organic matter in a 6" core sample on average 2%. So long as the ground isn't frozen precipitation that falls on our soil soaks in where it falls. Our purchased Nitrogen has been reduced to .6 lbs. N per anticipated bushel corn yield. We feel the reason this works is that all residue is kept on the surface and not incorporated. This residue is then either consumed by earthworms and the castings distributed down into the soil extending the root zone, or converted into humus by the microbes on or near the surface

sequestering the Nitrogen for latter use. Another benefit of S.O.M. Generation is that CEC is raised from the additional humus. Most Nitrogen fertilizer sources are converted to ammonium with a +charge and will stay in the root zone so long as there are enough – charge sites available. We feel most leaching of N from soils comes not from proper rates of fertilizer, but from the mineralization of residue that is buried in the soil and is broken down into base components such as nitrate. each 1% increase in S.O.M. sequesters 1000 lbs. of N of which 2% or 20 lbs. will be available to the crop each year. Page 34 of the draft shows cropland mineralization as the major contributor of available N to the soil. That is why we feel sequestering this N not mineralizing it is the best way to reduce leaching of N into the ground water.

If you would like more information on how we farm you could talk with Ryan Lemickson, he has been to our place several times and told me before the meeting he was hoping to stop out soon to look at some cover crops and a Nitrogen rate plot we are doing.

MDA Response: Agree with the comments that understanding soil organic matter is important for managing nutrients and water.

Washington County

The county requests notification to its Department of Public Health and Environment if any townships within the county are selected for targeted private well sampling (Chapter 7 of the NFMP). The southern portion of the county in particular contains hydrogeologically sensitive areas, and significant historic (and some current) agricultural land use, particularly in Denmark Township. In addition, the county requests receiving data that is collected from this additional sampling, in order to complement existing well data collected through the county-wide resident well testing program. In turn, the county would be willing to provide historic well test data for affected townships, if MDA would find this information useful.

Regarding the protocol for sampling and screening private wells for potential impacts from non-fertilizer sources of nitrate contamination (Chapter 7 and Appendix H), the county asks how MDA will communicate with well owners who may have high nitrate levels from non-fertilizer determined sources. The county requests this information be shared with the Washington County Department of Public Health and Environment and other relevant local governments (such as the Washington Conservation District) so that these residents can be assisted with alleviating any non-fertilizer source of nitrogen contamination.

*MDA Response: This sampling is generally conducted cooperatively with a county and the MDA shares the data. See Subject 8**

Zimmerman, Dean

After reviewing the draft 2013 NFMP, questions arise as to the need for a revision of the 1990 plan. The 1990 NFMP is as valid today as it was in 1990. The 1990 plan was written with significant input from agriculture stakeholders and was designed to accommodate future changes in agricultural practices. Nitrogen fertilizer use in Minnesota has been flat for the last 25 years, while yields have increased significantly. Nitrogen fertilizer use efficiency today is as high as scientific processes and technology allows. Minnesota farmers are not interested in using more

nitrogen fertilizer than is needed to optimize economic yields for the crops they produce. Competitive pressures prevent them from doing otherwise.

*MDA Response: See Subject 2**

Farmers in Minnesota use lower rates of nitrogen per acre than farmers in any of the surrounding states with similar yield levels. This is due to the soil and climatic conditions that exist in Minnesota, as well as the need to maximize economic returns. Both over and under application of nitrogen have a negative impact on yields and quality of crops grown in Minnesota; and therefore, there is no economic incentive to over apply nitrogen. If anything, nitrogen fertilizer rates are below optimum for the yields that are now being produced. In fact, a five year MDA study indicates this. Higher economic yields were obtained from rates that were 30-40 lbs/acre higher than the existing University of Minnesota nitrogen fertilizer guidelines.

MDA Response: The U of M guidelines are designed to optimize, not maximize, yields. Frequently the additional 30-40 lb/acre will produce a small yield increase although it is not uncommon for these yield increases to be statistically insignificant. Additionally, the farmer may not be getting an adequate return on the additional fertilizer investment cost. The purpose of the MDA's Nutrient Management Initiative (NMI) is to assist farmers with the decision. We also need to factor in the environmental cost to water resources. Lastly, the U of M rates will not work if one of the other 4Rs in not adequately implemented. For example, frequently in the NMI project, farmers in South Central MN were fall applying without including N-Serve. The additional N was beneficial in these cases in order to compensate for the higher leaching losses.

There is no evidence provided in the draft 2013 NFMP to indicate that groundwater nitrate problems are increasing due to the use of nitrogen fertilizers. Therefore, we question the MDA motives in redoing the 1990 plan with the inclusion of a phased approach to regulation of nitrogen fertilizer that is outlined on pages I 0, 76, 78 & 130 of the draft. The Phase Approach being proposed is adapted from an approach used in Nebraska. The Nebraska situation is unique and there are no areas in Minnesota that are comparable to the Nebraska region which has high nitrates in groundwater. Irrigation wells in this Nebraska region are in very shallow groundwater aquifers, and an established linkage between the irrigation well high nitrate levels versus past intensive irrigation and excessive nitrogen fertilizer usage had previously been documented. The type of irrigation management and nitrogen use that helped create the Nebraska situation has never existed in Minnesota. In Nebraska, irrigation well concentrations are the triggering mechanism for phasing in regulation, not unrelated drinking water wells, as is being proposed in Minnesota.

The draft NFMP (on pages 10, 76, 78 & 130) addresses mitigation phases and criteria that are part of the proposed regulatory process. Private drinking water wells tests will be used to trigger the various phases of the process. Serious concern exists over the lack of scientifically established cause & effect linkage of high nitrate wells to nitrogen fertilizer usage. There are other well-established causes of wells testing high in nitrates. These causes include contamination from other nitrogen sources, such as nitrates produced from soil organic matter mineralization, septic systems, manure, atmospheric deposition, etc. The recently released Minnesota Pollution Control Agency (MPCA) Nitrogen Report indicates that more than 75-80% of

the source nitrogen which can impact ground or surface waters is from non-fertilizer nitrogen sources. The MDA does not have statutory authority over the naturally occurring soil organic matter mineralization process.

There can be other causes of high nitrates in wells, in addition to all the non-fertilizer nitrogen sources, that can cause high nitrates. These causes include poor well construction, improper well placement, cracked or rusted out casings, dug wells and many other possible causes. Trying to relate drinking water well nitrates levels to nitrogen fertilizer use is a flawed concept. Existing drinking water well nitrate levels should not be considered as an indicator of groundwater nitrate levels because of the site-specific problems that exist with them. MNICCA is very concerned that the use of existing drinking water wells in the phased approach, as is being proposed in the 2013 NFMP, is likely to trigger negative public perceptions of nitrogen fertilizer usage and possible regulations when nitrogen fertilizer is not the problem.

There are better approaches to monitoring groundwater nitrate levels than a township well testing program. One approach might be to install properly constructed and designed monitoring wells in various groundwater aquifers around the state. These monitoring wells would need to be constructed and properly placed in order to account for all the nitrate-nitrogen sources and various pathways of nitrates to the monitoring well.

In summary, the township well testing program being proposed in the draft 2013 NFMP which would be used as part of the phased approach to regulation of nitrogen fertilizer has serious technical and scientific flaws and is likely to result in serious economic harm to Minnesota agriculture. It is also unlikely that this program would have any positive impact on groundwater quality. The MDA needs to rethink whether the 1990 NFMP needs to be revised and if so, it needs to fully engage the agricultural community as part of that revision similar to what was done in 1990.

*MDA Response: See Subjects 2, 8**