Nutrient Management Policy:

Pennsylvania Stakeholders' Views About Progress, Challenges, and Future Directions

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Executive Summary

Pennsylvania's leadership in conservation policy was marked almost a decade ago by passage of a law requiring farms above a certain animal density threshold to manage their nutrients. The Nutrient Management Act (NMA)-Act 6 of 1993-took effect in 1997. The Act required review of the density-based criteria for defining Concentrated Animal Operations (CAOs) after five years of implementation. **This report provides an analysis of the NMA and its regulations as the rules for the Act are undergoing review.**

This report describes the NMA's legislative history and progress in implementation, provides insight into nutrient management policy challenges, identifies key indicators of program performance and success, offers broad conclusions about nutrient management policy-making in the Commonwealth, and identifies future policy directions.

The publication is based on analysis of information collected from interviews with a diverse set of knowledgeable people from Pennsylvania agencies and organizations. Our goal was to identify perspectives about critical nutrient management issues in the Commonwealth and provide a report that contributes to more informed discussions and policy decisions. While we strived to include representatives of stakeholders to nutrient management issues, we were not able to be exhaustive in terms of including all possible groups and individuals. However, from a state-wide perspective, the findings are believed to be comprehensive and balanced.

Key Findings:

- Protecting water quality was perceived to be the ultimate goal, but not the only goal of the Act. Other goals include providing assurance that agricultural nutrients are properly managed; creating practical and understandable regulations; protecting the environment without putting farmers out of business; balancing nutrients at the farm level with crop needs; and creating uniform state-wide nutrient management standards.

- Most interviewees believed Pennsylvania's water quality is better protected with the Nutrient Management Act in place, but there is more that could be done to reduce nutrient pollution.

- The majority of interviewees supported preemption of local manure storage, handling, or land application ordinances or regulations that are more stringent than the state requirements. Support was based on perceptions of local officials' limited knowledge of agriculture and the practical need for requirements to be uniform and consistent across municipalities.

- Most interviewees viewed the movement of manure off CAOs as a necessary part of the solution to protecting water quality. In principle, exporting and redistributing manure geographically to achieve on-farm nutrient balances was acceptable to them. Most interviewees supported manure export, but believed additional tracking of where the manure is going and assurance that it is being applied properly was needed.

- The majority of interviewees acknowledged the need for phosphorus management, but raised concerns about managerial and financial impacts of implementing a standard that included both nitrogen and phosphorus. Some interviewees believed the P-Index, a tool that identifies farm fields with a high nutrient pollution risk, is the appropriate tool to reduce these impacts. They believed this tool may make phosphorus management more acceptable in Pennsylvania.

- Most interviewees viewed erosion and sediment control plans as critical to nutrient management and support verification that a plan exists during the nutrient management plan approval process.

- Interviewees identified four emerging issues related to Pennsylvania's Nutrient Management Program: small farms are not participating in the program; pasture and barnyard areas on all farms need to be addressed; conservation districts' challenging role in the nutrient management program and limited capacity; and off-farm impacts of animal agriculture operations (e.g. water quantity, air quality).

- Most interviewees agreed the Nutrient Management Act program has been successful. Inclusiveness, leadership, education, and funding were viewed as key to this success. However, most interviewees identified at least one factor limiting this success. Examples of these perceived barriers include a regulatory implementation process viewed by some as non-inclusive; a lack of education to segments of the agricultural community; and conservation districts perceived by some as too friendly toward agriculture.

- Interviewees envisioned an ideal nutrient management program to be comprehensive addressing all farms causing water quality problems, adapting to new problems such as phosphorus, using a broader systems or watershed approach, and addressing all nutrient sources.

- The key indicators of program success identified were water quality improvement, farm-level compliance and implementation, economic acceptability, and public acceptance.

It is our view that improvements in policy come about through exchange of facts and perspectives about issues and solutions, effective participation by all interested and affected parties, and when public decision-makers carefully consider this input. The results of the analysis should be useful to citizens and public decision-makers in deliberating the issues, options and future policy directions for nutrient management in the Commonwealth.

SECTION 1: SETTING THE STAGE

Pennsylvania's leadership in conservation policy was marked almost a decade ago by passage of a law requiring farms above a certain animal density threshold to manage their nutrients. The Nutrient Management Act-Act 6 of 1993-took effect in 1997. The State Conservation Commission is responsible for implementing and enforcing this law. To help with implementation, the Commission has delegated many responsibilities to county conservation districts.

The Act required review of the density-based criteria for defining Concentrated Animal Operations (CAOs) after five years of implementation. The State Conservation Commission decided to do an overall update of the regulations at the same time as it reviewed the criteria for determining CAOs. Legislative hearings were held during spring 2001, and discussions about the achievements and shortcomings of the NMA and its regulations continue. Changes to the state's nutrient management rules will likely occur in the near future, although the scope of these changes, their timing, and form (legislative or administrative), are uncertain at present.

This report provides an analysis of the Pennsylvania Nutrient Management Act (NMA) and its regulations as the rules for the Act are undergoing review. It focuses on the workings and performance of the Act-past and present-and discusses possible directions for the future. The specific aims are to:

- Describe the NMA's legislative history and progress in implementation
- Document present and emerging issues
- Identify possible future policy directions for nutrient management
- Offer broad conclusions about nutrient management policy-making in the Commonwealth.

SECTION 2: METHODS AND RATIONAL

This report is based on analysis of information collected from interviews with knowledgeable people from Pennsylvania agencies and organizations. A total of 28 interviews (22 in person, 6 phone) were conducted in July and August 2002. The names of those interviewed and their organizations have been kept confidential (See Table 1 for a list of interviewees categorized by organization type). The information or views obtained are used without identifying the source. Also, all interviewees were given the opportunity to review a draft version of this report.

In addition to this report, results are published in Penn State Cooperative Extension's *Farm Economics* newsletter, Issue No. 6, 2002. The aim is to create resource materials of use to citizens and decision-makers concerned with these issues as changes and refinements are made in nutrient management policy.

Table 1: Categories and number of representatives interviewed.

Categories	Number of Representatives
State Government Agencies	3
Local Government Agencies	3
Local Government	3
Agribusiness	4
Farmer	5
Environmental/Water Quality/Land Use	4
Sustainable Agriculture	1
Public/Citizens	1
Manure Hauler	1
Consultants	2
Legislative	1
Education	2
TOTAL	30*

***Note: A total of 28 interviews were conducted with one interview including three representatives.**

Background and History of the Nutrient Management Act

The Commonwealth of Pennsylvania uses state law to regulate nutrient management by selected animal operations. Act 6 of 1993-the Nutrient Management Act (NMA)-regulates these operations with the goal of protecting water quality from agricultural nutrients in Pennsylvania. The Act aims to do this by requiring state approved nutrient management plans on high-density concentrated animal operation (CAO) farms.

A central strategy of the Act was to create statewide, uniform nutrient management criteria. The regulations to implement the Act were approved by the State Conservation Commission (SCC), with input and recommendations from the Nutrient Management Advisory Board and the general public (though public hearings and meetings held throughout the state) in 1997.

The State Conservation Commission

The Commission is an 11-member (9 voting, 2 non-voting) government body charged with the oversight of the state's 66 county conservation districts, oversight and enforcement of the Pennsylvania NMA program, the Dirt and Gravel Roads Maintenance Program (a pollution prevention program), and several leadership development and public outreach and education programs.

Commission Members

Commission members include the secretary of the PA Department of Agriculture, the secretary of the PA Department of Environmental Protection, the dean of the Pennsylvania State University College of Agricultural Sciences, four active farmers and two non-farmer members. These members are complemented by two non-voting associate members-the state conservationist for the Pennsylvania office of the USDA Natural Resources Conservation Service and the director of the Pennsylvania State University Cooperative Extension Services.

Chairmanship of the Commission

Initially, chairmanship resided with the former Pennsylvania Department of Environmental Resources when NMA was passed in 1993. However, as a result of a new law passed in 1995, chairmanship of the Commission alternates annually between the secretary of the Department of Environmental Protection and the secretary of the Department of Agriculture.

The Nutrient Management Advisory Board

The Board consists of 15 members-one veterinary nutrition specialist; one hydrologist; one academic agronomist or plant scientist; two non-farmer citizens; five commercial farm owners or operators from the beef, swine, poultry, and dairy industry; and representatives from the feed industry, the fertilizer industry, commercial agricultural lenders, local government, and environmental organizations. The members are appointed by the Commission chairman and approved by a two-thirds vote of the Commission membership.

How the Law Works

A central feature of the NMA is that it requires CAOs to develop and implement nutrient management plans. These plans are prepared by a certified specialist and reviewed and approved by government agencies. In addition to the SCC, most county conservation districts have been delegated implementation responsibilities by the SCC and are authorized to approve nutrient management plans.

Who is Affected by the NMA?

The NMA applies only to those intensive livestock operations that are defined as concentrated animal operations (CAOs). CAOs are farms that have more than two animal equivalent units (2,000 pounds of live weight) for each acre of land on which animal manure can be applied. In addition, while animal production facilities that do not meet the definition are not affected by the law, they are encouraged to comply with it voluntarily.

Review Requirement and Focus

The Act requires the SCC to reevaluate the density-based definition of a CAO after 5 years. The NMA regulations became effective in 1997. Therefore, the 5-year review has begun. In addition to the CAO definition, the Commission has also decided to review the nutrient management plan content requirements, the plan review and approval process, implementation and record keeping requirements, and enforcement procedures.

SECTION 3: GOALS OF THE ACT

The ultimate goal of the NMA, as set forth in the Act's initial paragraph (p. 12, Act 6 of 1993), was to:

> "Provide for the management of nutrients on certain agricultural operations to abate non-point source pollution…"

The four legislative purposes of the bill, which relate to how the above overall goal was to be accomplished, are presented below:

- Establishing criteria, planning requirements, and implementation schedule for application of nutrient management measures
- Developing education programs for the agricultural community in order to prevent nutrient pollution of surface and ground water
- Provision of technical and financial assistance for nutrient management and alternative uses of animal manure
- Assessing the extent of non-point source pollution from non-agricultural sources, determining the adequacy of authorities and programs to manage these sources, and providing recommendations for abatement of pollution from these sources

Interviewees were asked to state the goal (or goals) of the NMA in their own words and their opinion about whether the goals had been met. A wide range of goals were stated:

- Protect water quality
- Balance nutrients at the farm-level with crop needs
- Provide assurance that agricultural nutrients were properly managed
- Protect the environment without putting farmers out of business
- Create practical and understandable regulations
- Create a level regulatory "playing field" through preemption

The majority of interviewees identified the NMA's ultimate goal as protecting water quality, while several others expressed the goal of achieving farm-level nutrient balances with crop needs. A fairly significant number of interviewees did not focus on water quality protection, but instead emphasized other goals not stated in the Act that they believed to be important. The goal of protecting the environment while maintaining farm economic viability was frequently mentioned. A related idea was creating a practical and reasonable program that farmers could understand. Several interviewees from the agricultural community focused on the importance of establishing a "level playing field" (through local preemption) and providing assurance that farmers were meeting their nutrient management responsibilities. Finally, only a few interviewees identified the fourth goal stated in the Act: assessing non-agricultural non-point source pollution.

Were the NMA's Goals Reached?

The answer to this question varied widely depending on which goal was being discussed. Table 2 generally categorizes the goals and the degree to which interviewees believed the goal was reached.

Protect Water Quality. The majority of interviewees identified water quality as a goal. Most believed progress was being made, but the goal was not reached. Only one person believed the goal had been met. Reasons for not reaching this goal included the program focuses on large farms and overlooks smaller farms contributing to water quality problems; and the program's focus on nitrogen and not phosphorus. Other reasons not directly related to the program rules included the difficulty of measuring water quality changes and lag-times in water quality improvements; the difficulty of tracing improvements back to the Act's requirements; a lack of understanding about the contribution of sources other than

agriculture; and conflicting water quality trend information.

Overall, most interviewees identifying this goal believed Pennsylvania's water quality is better protected with the NMA in place, but there is more that could be done to reduce nutrient pollution.

Table 2: Summary of Answers About Goals Being Reached.

Goal	Have We Reached the Goal?
Protect water quality	**Some progress, but how much?**
Provide assurance that agricultural nutrients were properly managed	**Some progress, yet major problems still exist.**
Create practical and understandable regulations	**Not reached.**
Protect the environment without putting farmers out of business	**Achieved, but some concerns about the future.**
Balance nutrients at the farm-level with crop needs	**Some progress, yet major problems exist.**
Create a level regulatory "playing field" through preemption	**Some progress, yet major problems exist.**

Provide Assurance That Agricultural Nutrients Are Properly Managed. There were mixed responses among the interviewees who identified this goal. Several interviewees believed the Act provides assurance that nutrients are managed properly. They pointed out that the Act is an enforceable law, there is a high compliance rate among the regulated community, and a number of farms have voluntarily developed and implemented plans under the program. However, several others believed this goal has not been reached. They raised concerns about enforcement of the Act, that the majority of CAO manure is exported to smaller farms with no requirement to implement an approved Act 6 nutrient management plan, and that the vast majority of Pennsylvania farms are not covered under the Act. One interviewee was unsure if the goal was reached.

Create Practical and Understandable Regulations. The goal of creating practical and understandable regulations was mentioned by a few interviewees. Some believed the goal has not been reached even though many individuals worked hard through the Nutrient Management Advisory Board to create practical and clear rules. A few interviewees view the nutrient management planning process as too bureaucratic and believed time was wasted on technical details that may not reduce agricultural nutrients. In some cases, they believed the plans were too detailed and were impractical.

However, the above conclusion should be considered along with the fact several interviewees listed creation of practical and understandable regulations in response to the question about the "successes" later in the interview. Considering responses to questions in both interview sections together, it is apparent that some stakeholders believed much progress has been made toward making practical and understandable rules while others believed the goal was not reached.

Protect the Environment Without Putting Farmers Out of Business. Several interviewees mentioned the goal of environmental protection without imposing a heavy financial burden on the farmer. Several believed the goal was met. A few interviewees believed adequate funding was available for farmers to implement plans. Others mentioned some farms profit as a result of the plan because nutrients are managed more effectively, reducing the need for commercial fertilizers. Additionally, the current CAO definition results in a regulated community dominated by larger swine and poultry operations. A few interviewees were unsure if the goal was met.

Overall, interviewees identifying this goal believed the program is meeting this goal, but concerns were raised that funding may not be adequate in the future as Pennsylvania moves towards an increased emphasis on phosphorus management.

Balance Nutrients at the Farm-level with Crop Needs. Several interviewees identified a goal of balancing nutrients at the farm-level with crop needs. Mixed feelings exist about whether this goal was reached. A few considered the goal met because CAO farms have written and are moving toward implementing plans as required under the Act. However, a few believed the goal was not met since most farms are not covered under the Act; CAOs are exporting manure to smaller farms with no nutrient management plans and may be over applying nutrients; the Act does not place any restrictions on the use of commercial fertilizer; and enforcement is lacking.

Overall, these interviewees agreed the Act has heightened farmer awareness of nutrient management, but there are concerns about farmers following the application rates included in plans and the lack of assurance concerning application of CAO manure exported off the farm.

Create Uniform Statewide Standards. Several interviewees identified the goal of creating a level regulatory "playing field" through preemption of local ordinances. Interviewees readily offered the reasons why preemption is needed for Pennsylvania farmers to operate efficiently with so many local government units. A few believed the goal was met through the development of statewide standards and criteria for nutrient management plans. One interviewee described numerous instances of local ordinances on nutrients and related issues, indicating the goal was not achieved.

SECTION 4: VIEWS TOWARD CURRENT ISSUES

During the spring 2001 Pennsylvania House of Representatives Agriculture and Rural Affairs Committee hearings, several major issues were raised during testimony by individuals representing various agencies and interest groups. Written testimony from the hearings was reviewed, and interviewees were specifically asked to expresses their opinions about the following issues:

- Preemption of local ordinances
- Definition of a concentrated animal operation (CAO)
- Exclusion of non-production agricultural operations
- Manure export
- Phosphorus management
- Erosion and sediment control plans
- CAO on-site status reviews
- Technical assistance
- Financial assistance
- Existing or missing links between federal and state programs

Each issue is introduced below with a short description of the law, regulatory requirement, or a general statement in italics. One main reference was used, the Pennsylvania Department of Environmental Protection's "Nutrient Management Program Administrative Manual" (November 2000, Doc.# 3600-BK-DEP2585), unless otherwise noted. In addition to the ten specific issues, interviewees were asked to identify new or emerging issues related to the Act.

① Preemption of Local Ordinances

The NMA preempts local governments from enacting manure storage, handling, or land application ordinances or regulations that are more stringent than the state requirements. Local governments may enact requirements that are "consistent with" the Act's requirements.

The majority of interviewees believed preemption of local ordinances was appropriate for Pennsylvania. Support was based on perceptions of local officials' limited knowledge of agriculture and the science of nutrient management; the risk of local officials making decisions based on emotion rather than science; and a practical need for requirements to be uniform and consistent among municipalities. Several interviewees considered preemption appropriate, but not effective for various reasons. Some thought enforcement of nutrient management plan requirements was lacking, while others mentioned confusion surrounding the Act's language which allows local ordinances "consistent with" state requirements. Several interviewees opposed preemption based on the belief that local people have a better understanding of their environment and values and could respond more effectively to nutrient management and water quality issues than state government.

In summary, the majority of interviewees supported preemption of local manure storage, handling, or land application ordinances. However, several interviewees opposed preemption.

② Definition of a Concentrated Animal Operation (CAO)

CAOs are defined as agricultural operations where the animal density exceeds 2,000 pounds of live animal weight per acre of land suitable to spread manure. Suitable land can be owned or rented.

Several interviewees believed the current CAO definition was appropriate, while several others considered the definition generally appropriate, but raised concerns. A few interviewees raised concerns about including rented or low quality land in "land suitable to spread manure." Others were concerned with the state's density-based CAO definition being inconsistent with the federal definition of a "concentrated animal feeding operation" (CAFO) that is based solely on animal numbers. A few raised the concern that dairy and smaller operations not falling under the density definition may also be a significant part of the water quality problem. Several interviewees who thought the current definition was not appropriate stated the issues above, adding the concern that the current definition does not address geographic areas, where several small farms may be contributing to water quality problems.

In summary, the majority of interviewees agreed Pennsylvania's density-based CAO definition is appropriate for addressing agricultural nutrients, but several acknowledged the program implementation challenges of using the definition. A few interviewees believed moving to a definition based on animal units or numbers may be easier for farmers to understand since it is consistent with federal CAFO regulations and easier for the SCC to enforce.

③ Exclusion of Non-production Animals

The NMA applies to "agricultural operations" defined as animal operations using "farming resources for the production of crops, livestock or poultry." Operations that operate solely for maintaining and boarding are not considered to be engaged in "production" and would not be considered CAOs. Therefore, non-production animal operations such as horse-boarding facilities are excluded from the Act.

Several interviewees considered the exclusion of non-production animal operations inappropriate, referring to a need for equity and uniformity among all animal producers. Several considered the exclusion inappropriate, but raised concerns that lifting the exemption may shift financial resources away from traditional animal agriculture or that regulatory administration of the program would be time-intensive and costly. However,

several believed the current exclusion was appropriate, stating that horse operations are typically small; handle their manure differently from traditional animal agriculture producers; and would be difficult to monitor.

In summary, although there was mixed support for excluding non-production animal operations, several interviewees believed the exclusion is appropriate. Several others mentioned it was unclear how much these operations contribute to water quality problems and recommended more investigation before including these operations in the program.

④ Manure Export

CAOs may export manure off the farm to a known landowner for agricultural application or other use, a broker, or an open market system as part of the nutrient management plan. If CAO manure is exported to a known landowner, the nutrient management plan must specify the amount exported, name and location of importing farm, number of acres available for land application on importing farm, and intended season for the transfer. If manure is exported to a broker, the CAO nutrient management plan must include the broker's name, estimated amount transferred, and intended season.

Most interviewees viewed the movement of manure off CAOs as a necessary part of the solution to protecting water quality. In principle exporting and redistributing manure geographically to achieve on-farm nutrient balances was acceptable. The major concern surrounding manure export was over-application on non-CAO farms that are not required to have an approved Act 6 nutrient management plan.

The majority of interviewees believed there was a need for additional tracking of where manure is exported and how it is being applied to the land. However, some are concerned about imposing too much responsibility, liability, record keeping, and costs on importing farms. A few interviewees did not consider manure export an acceptable best management practice, but if additional requirements were included, they believed it would be appropriate for Pennsylvania.

Several interviewees recognized the possibility that a CAO could take advantage of manure export to shift environmental responsibility and liability to smaller operations subject to less stringent environmental requirements. While a few interviewees believed there is not enough information to document this concern as a problem, the majority believed the lack of accountability and management requirements regarding exported manure allowed citizens to criticize the credibility of the nutrient management program. Most interviewees believed additional requirements are needed to increase the credibility and ease concerns related to improper management of exported manure.

In summary, most interviewees support manure export off CAO farms, but believed additional tracking of where the manure is going and assurance that it is being applied properly is needed. There were a number of proposals of how to address the issue from agricultural interest groups, environmental groups, agencies, and others. Those most frequently mentioned were (1) broker/hauler certification, (2) imposing plan requirements on importers, (3) and a manure manifest (i.e. a complete system for tracking manure production, handling, and application).

⑤ Phosphorus Management

Currently, the nutrient application rates are based on nitrogen (N), meaning nutrient application is not to exceed the amount of available N necessary to achieve expected crop yield.

The majority of interviewees considered the current N-based application rates inappropriate and believed Pennsylvania needs to increase phosphorus controls. Some believed this change is needed because the federal government (U.S. Department of Agriculture-USDA, Natural Resources Conservation Service-NRCS) is moving in this direction and Pennsylvania needs to be proactive and get farmers "on-board." Others mentioned new scientific discoveries related to phosphorus mobility; new lower cost tools available to increased phosphorus emphasis in nutrient management plans; and the need for Pennsylvania to continue to be a leader in nutrient management.

Several interviewees considered the current N-based requirement appropriate. Major reasons for not including phosphorus management in nutrient management plans included farm-level economic and managerial hardships (record keeping, rewriting plans); the science does not fully support the change; nitrogen (unlike phosphorus) is a human health concern; and a better understanding of the success of the current program is needed. A small group of interviewees recognized the need for increased phosphorus management in certain geographic areas of the state, but did not think statewide phosphorus controls were needed for Pennsylvania.

The majority of interviewees raised concerns about managerial and financial impacts of implementing a management standard that included both nitrogen and phosphorus. There has been a perception for more than a decade that full phosphorus-based planning would lead to farm-level economic hardships due to increased transportation costs, the costs would be born by particular sectors of the animal agricultural industry (dairy), and the costs would vary geographically across the state. Some interviewees believed the P-Index, a tool that identifies farm fields with a high nutrient pollution risk, is the appropriate tool to reduce these impacts, making phosphorus management more acceptable in Pennsylvania.

In summary, the majorities of interviewees acknowledged the need for phosphorus management to be added to Pennsylvania's nutrient management program, but were concerned with farm-level financial impacts. Several policy options were suggested to reduce the financial impacts of implementing a management standard including nitrogen and phosphorus. A few suggested new operations should be required to meet the nutrient management standard including phosphorus, but the standard could be phased in over time for existing operations. One interviewee suggested phasing in phosphorus management geographically.

⑥ On-Site Status Reviews

On-site status reviews are required for all CAOs annually. In most counties, the conservation districts are responsible for the review.

Most interviewees believed more frequent inspection of CAOs and greater monitoring and enforcement of the NMA regulations were needed. Several believed annual on-site reviews of CAOs were appropriate. Reasons for supporting annual reviewed included increased visibility of conservation districts; the credibility of the program; public assurance; accountability; and implementation and help farmers ensure they are complying with the Act, decreasing liability. A few interviewees believed annual on-site status reviews were not needed.

Of those in favor of greater inspection and enforcement, several believed that additional concerns or issues must be addressed. Some raised concerns over the quality and extent of on-site reviews. Specifically, some were concerned that the reviews were announced, while others mentioned they believed no standard review procedure or quality control was used at the local level. The cost of on-site reviews was a concern for those who believed conservation districts were

overworked and under-funded. Concerns and questions were raised about districts' authority to enforce the regulations. Finally, some were concerned that on-site reviews unfairly burdened "good" farmers who were already following the law.

Several interviewees recognized the frequency of on-site reviews as important, but only one tool to ensure farmers are developing and implementing approved nutrient management plans. One interviewee suggested a regional coordinator shared by several conservation districts as a way to reduce the cost to county districts and increase uniformity of review. Also, a few interviewees suggested less-frequent inspections aimed at targeting specific-sized operations or those with past violations could reduce the cost to county districts while at the same time rewarding farms that meet the requirements.

As the SCC moves toward more inspection and compliance monitoring, one interviewee brought up the issue of liability. A few interviewees had concerns with the review role of conservation districts and the possibility of being held accountable in some way. Also, farmers may have biosecurity concerns and be wary of additional outside personnel on their farms.

Several interviewees raised concerns over the confusion surrounding enforcement of the NMA regulations. Citizens are not sure whom to call with concerns, become frustrated, and see the program as reactive and lacking credibility. Some identified the need to clarify who enforces regulations, asking: Is the conservation district, the State Conservation Commission, or the Department of Environmental Protection responsible?

In summary, most interviewees expressed support for increased monitoring and enforcement of the NMA requirements, but there was mixed support for annual CAO inspections. Several interviewees question the quality and effectiveness of on-site reviews, while others see the reviews as critical for program credibility. A few interviewees considered reviews important for justifying public subsidies for nutrient management planning and implementation.

⑦ Erosion and Sediment (E&S) Control Plans

Every Pennsylvania farm that plows and tills is required to develop, implement, and maintain an E&S plan (in accordance with 25 PA Code Chapter 102). For agricultural plowing or tilling activities, the E&S plan is that portion of a conservation plan identifying best management practices to minimize accelerated erosion and sedimentation. Act 6 nutrient management plan requirements do not include verification that an E&S control plan (or a conservation plan) exists on the farm.

Most interviewees believed an Act 6 nutrient management plan should include a verification that the farm has an E&S control plan or a current conservation plan. Most believed that comprehensive nutrient management requires attention to conservation practices in the field and that the nutrient management plan and the conservation plan build upon one another. Additionally, a few interviewees mentioned the implementation of a conservation plan is even more important as Pennsylvania considers a nutrient management standard which increases emphasis on phosphorus.

Interviewees held differing perceptions of the prevalence of conservation plans on farms, what is included in a plan, and implementation. While all farms tilling more than five acres are required as part of Pennsylvania law (Ch. 102) to implement an E&S plan, no government agency is tracking implementation of plans.
Several interviewees believed there is a lack of enforcement of Chapter 102 requirements and accountability. A few interviewees attribute part of the enforcement problem to

the conservation districts role and its relationship to the Department of Environmental Protection. Some interviewees are concerned that farmers voluntarily meeting the current requirement are placed at a disadvantage. There is also legal uncertainty as to how to link the verification of an E&S control plan with the nutrient management plan without having one law enforce the other. A few others raised questions about equity of enforcing the E&S requirements on farms when other sectors (such as residential development and industry) were not being enforced.

In summary, there is widespread recognition of the benefits of conservation planning. Most interviewees viewed E&S control plans as critical to nutrient management and support verification that the plan exists. However, several were uncertain about what a conservation plan should include since agencies use different terminology, standards, and requirements.

⑧ Technical Assistance

Conservation districts, USDA-NRCS personnel, and private consultants provide technical assistance to CAOs.

Several interviewees believed that the amount of technical assistance was adequate. Several people with regional and statewide vantage points indicated the amount of technical assistance was adequate, but were concerned about the quality of technical assistance. Several interviewees believed that technical assistance was not adequate. Several others answered "not sure".

Two individuals made an effort to differentiate the question further. For example, one noted that enough technical assistance was available for planning, but not for implementation (engineering and construction). In addition, one person with a statewide perspective noted the possible quality problems in the public sector and a general shortage of private sector assistance.

Overall, there were mixed responses about availability of technical assistance. We concluded the quantity of technical assistance available is probably not a crucial policy issue at present, but several interviewees were concerned about the quality and/or variability of assistance across counties or regions. Several interviewees, both agricultural and non-agricultural, are not sure if the current amount of technical assistance available is appropriate.

⑨ Financial Assistance

CAO operations and volunteers developing Act 6 nutrient management plans may apply for financial assistance. The Plan Development Incentive Program (PDIP) is designed to provide one-time funding to existing operations for initial plan development costs. Once the plan is approved, existing CAO and volunteer operations may apply for financial assistance to implement the plan under the Nutrient Management Grant Program or receive low interest loans under the Agri-Link program.

Interviewees gave mixed responses concerning the appropriateness of current levels of financial assistance. When asked if the current amount of financial assistance was appropriate several responded "no," several responded "yes," and others were unsure. Several people tended to have complex answers. For example, some interviewees distinguished between plan development and plan implementation dollars. A few held opposite opinions about the shortage of planning grants versus a shortage of implementation grants.

Overall, interviewees were less certain about the appropriateness of current levels of financial assistance than technical assistance. In addition to the environmental and public

group representatives, several agriculture-oriented interviewees were uncertain about the level of financial assistance.

⑩ Links to Other Federal and State Programs

Most comments related to this question were positive in terms of a good or excellent degree of integration, overlapping linkages, or consistency of the NMA with federal or state programs. The following programs were mentioned: U.S. Environmental Protection Agency (EPA)/Pennsylvania Department of Environmental Protection (DEP) Concentrated Animal Feeding Operation (CAFO) permitting program, USDA–NRCS's programs (590 Nutrient Management Standard), Pennsylvania Clean Streams Law, and the Chesapeake Bay Program. However, several of those who commented positively suggested that the good linkages that existed needed to be monitored closely as changes occur, particularly in the EPA CAFO program.

A second category of responses were from those somewhat happy with program linkages, but saw further opportunities to strengthen linkages in some areas. These comments included the need for simplification (one-plan) of nutrient and other conservation requirements, further streamlining, or greater need for program consistency. Two specific examples were the USDA-NRCS 590 nutrient management standard and the Environmental Quality Incentives Program (EQIP).

A third important group of responses regarded missing links. The most common missing link identified was a connection to the Pennsylvania Clean Streams Law. Erosion and sediment control plan requirements and enforcement of the Clean Streams Law were mentioned. There was also concern that NMA activities were not coordinated with the Total Maximum Daily Load (TMDL) program. Another category of missing linkages was to non-water quality programs or problems. Examples included air quality regulations, from which agriculture is currently exempted, and flies, which are not regulated.

Several individuals believed the NMA program, under the SCC's control, had been set up in a way that left the regulation of agricultural nutrients isolated from other water quality programs overseen by DEP. This was discussed in both positive and negative ways. Positives include independence of the program from DEP and the Pennsylvania Department of Agriculture (PDA) because of the structuring of the SCC rotating chairs. Perceived negative aspects of a separate program included the inability to make linkages to related DEP nutrient programs (e.g. biosolids). Some believed the public participation opportunities would have been greater if the program had closer connections to DEP.

One interviewee generally believed that as the agricultural community has operated on its own in the nutrient management/water quality area, it has lost opportunities in new and emerging activities and programs, such as the 21st Century Commission and Growing Greener. Some other related comments included the need to close gaps between the NMA and other initiatives, such as economic development. The above comment about the 21st Century Commission, which addressed a host of environmental and economic development issues, is also related to this concern.

In general, most interviewees believed the NMA links well with other state and environmental programs. However, several interviewees believed there were missing links among programs or that links could be strengthened. These interviewees suggested strengthening the program by looking to incentives contained in programs that benefit farmers, such as land use programs (i.e. farmland preservation and Growing Greener).

Emerging Issues

Interviewees were asked to identify emerging issues related to the nutrient management program that were not addressed at the Pennsylvania House of Representatives Agricultural and Rural Affairs hearings in spring, 2001. Interviewees identified four major issues: the small farm problem; the pasture and barnyard management problem; conservation districts' challenging role in the nutrient management program and limited capacity; and off-farm impacts of animal agriculture operations.

Small farms are not participating in the program. Concerns raised by several interviewees related to small farms not participating in the program center around perceived versus actual contribution to nutrient pollution. With only a small portion of farms covered under the Act (about 975), interviewees questioned how the remaining 30,000+ animal operations are managing nutrients. Several interviewees believed CAOs represent water quality risk while non-CAOs cause chronic water quality problems. This statement is based on the idea that large farms are more willing to do inspections while a number of fundamental water pollution issues, like cows in the stream and erosion, still exist on small farms.

Pasture and barnyard areas on all farms need to be addressed. One interviewee raised concerns of pasture areas and their contribution to water quality problems. Pastures are currently considered a crop, as opposed to an animal confinement area were nutrients must be managed. Additionally, a few interviewees commented that barnyard areas on small farms not covered under the Act's CAO definition may be significantly contributing to water quality problems.

Conservation districts face many challenges. Several interviewees identified the conservation district's role, capacity, and staffing as an issue. Some interviewees believed the conservation districts review role in nutrient management plan approval process is perceived by a portion of the public as a conflict of interest. The middle role conservation districts play, between the SCC and farmers, was not necessarily viewed negatively. In some counties, districts have overseen negotiations aimed at appeasing all interested parties. Negotiations where parties agree may include additional information or management practices that may be considered above and beyond the Act's requirements. In these counties, interviewees believed that farmers were willing to meet higher standards to appease the public and maintain working relationships with local agencies and groups. While citizens and members of the farming community may view negotiations positively, it does raise questions about districts interpreting requirements differently and whether the Act has reached the goal of establishing standard statewide criteria (or a "level-playing field") for nutrient management across the state.

A few interviewees mentioned the districts are on the "front lines" of local controversies surrounding nutrient management plan approvals, and few district staff are trained in conflict management for situations where citizens may feel they Do not have a place to voice concerns. A few interviewees believed local controversies at times stem from public misunderstanding about conservation districts' authority to approve, monitor, and enforce plans.

A few interviewees viewed the conservation districts as staffed by young individuals with limited experience. A high staffing turnover rate is widely acknowledged. As Pennsylvania moves toward phosphorus management, the review and approval process for nutrient management plans may become more time consuming, leading to a backlog at the local level. One recommendation to address some of these challenges is to create regional positions to provide additional technical support for nutrient management.

The off-farm impacts of animal agriculture operations. Several interviewees see off-farm impacts, such as declines in property value, health impacts, odors, and flies, as legitimate and tied to manure management. While effects are sometimes difficult to quantify, these interviewees agreed that they need to be addressed. Several other interviewees see these off-site impacts as issues outside of the nutrient management act. This latter group supports a narrow agenda focused on nutrients and water quality. In essence, these individuals believed the Nutrient Management Act should only address water quality and not other manure related issues.

SECTION 5: LESSONS LEARNED OVER 10 YEARS

Most interviewees agreed the Nutrient Management Act program has been successful. Inclusiveness, leadership, education, and funding (for farmers and agencies) were viewed as key to success and need to continue to be part of the mix. However, most interviewees identified at least one factor limiting this success.

Inclusiveness was key to passing the Act, but the implementation process is viewed by some as noninclusive. Several interviewees saw the original coalition among government agencies, environment, public, and agricultural interest groups, and the agricultural industry as key to the Nutrient Management Act's initial success when passed in 1993. Without this broad-based support, these interviewees believed it is unlikely the Act would have been passed. However, a few interviewees viewed the rule-making process that followed as imbalanced. They suggested that better representation of environmental and public interest groups in the Nutrient Management Advisory Board would have improved the rules and overall success.

Farmer stewardship was key, but some are fearful or unaware. Several interviewees view farmers as stewards of the land who want to protect water resources. The agricultural community's acceptance and support of the Nutrient Management Act was identified as a key factor. However, several interviewees believed that a small segment of the agricultural community is fearful of, or unaware, of the program requirements.

Education was viewed as critical, but some groups have been overlooked. Education was identified by several interviewees as a key factor of success. Conservation districts, Penn State Cooperative Extension, and industry personnel were seen as instrumental in educating farmers about the Act's requirements and available financial and technical assistance. Several interviewees identified a lack of education to small farmers, Amish and Mennonites, and the general public as a barrier limiting success. Some interviewees believed there is a need to educate these specific groups in order to bring all farming operations into compliance and to help citizens who participate in agricultural land use controversies.

Local implementation and public participation were key, but sometimes perceived by the public as uneven or too friendly to agriculture. A majority of interviewees believed local implementation of the NMA was a key factor of success. Conservation districts were identified as essential to identifying, educating, and working with the regulated community. Yet a few interviewees went on to describe the conservation districts' tradition of working with agriculture, its voluntary approach, and limited resources as barriers. Conservation districts may be perceived by the public as too "farmer-friendly," resulting in decreased public confidence in the Nutrient Management Act. Also, differences among county level staff and available resources may lead to uneven implementation of the Act across the state.

A mandatory program was seen as key, but the credibility of the self-regulating program is being questioned. Several interviewees considered Pennsylvania's regulatory approach to nutrient management as an advantageous element to highlight the seriousness of nutrient pollution and to get the program started. Yet several interviewees viewed the largely self-regulating nature of the program as a threat to its long-run credibility. At the state level, some environmental and public interviewees suggest moving the SCC into the Department of Environmental Protection, which would emphasize the water quality protection goal underlying the Act and lead to greater enforcement of the requirements.

Science was critical, but resulted in a complicated program. Science was a key factor of success. The CAO density-based definition was based on science, but it is a challenge to implement. The current program is complex from both a nutrient management planning and regulatory program viewpoint. A few interviewees believed the detail included in nutrient management plans is too great. There is concern that by focusing on details and micro-management of only a portion of the total water quality problem (manure), the big picture and other parts of the problem are lost (for example, barnyard and pasture management). Additionally, identifying the regulatory community, costs of monitoring and enforcement, and lack of visible indicators of success are issues. As Pennsylvania moves into new areas, such as phosphorus management, decision-makers may need to create simpler, more transparent approaches.

SECTION 6: MOVING TO THE FUTURE

This section presents interviewees opinions on the direction that nutrient management should move in the future. The section is divided into three parts: first, the attributes of a "successful" program as defined by the interviewees; second, a categorization of the type of indicators that interviewees mentioned that would measure their definitions of success; and third, the most frequent responses mentioned when interviewees were asked: "What single action could be undertaken to move Pennsylvania toward the goal or interest that they had identified for a successful program?"

Elements of a Successful Program

The most frequently mentioned attribute of a successful program was comprehensiveness. A number of interviewees strongly believed that all farms known to cause water quality problems should be covered by the program. Older, known water quality problems, such as use of riparian areas, barnyard management, and lack of conservation plans, would be addressed. A second dimension of comprehensiveness related to the program's ability to adapt in a timely way to new problems, such as phosphorus. Third, interviewees believed the program should be comprehensive in terms of using a watershed-based, broader systems approach rather than looking at the problem in a fragmented farm by farm approach. Fourth, some interviewees believed that non-agricultural nutrient sources, such as septic systems and improperly constructed wells, should be included. Finally, a factor related to comprehensiveness was that of equity. Those commenting about this factor emphasized that there should be no "good" or "bad" farms, that for a program to be consistent, it should treat all farms the same, and address non-agriculture contributors to water quality degradation.

The second most frequently identified attribute was that of accountability. Many of those who mentioned this also mention follow-through, implementation, and compliance by the targeted regulated

community as part of a successful nutrient management program. Other specific dimensions of accountability included being outcome-based, both in terms of farm-level practice change and water quality; being administratively simple and clear about who is responsible; involving monitoring and tracking of manure; and involving penalties for those out of compliance and rewards for those who comply.

A third frequently mentioned attribute was the use of science-based tools. This includes tools available to all farmers, ones that provide efficient use of nutrients, as well as policy tools that are capable of distinguishing large farms and small farms based on the environmental risk they pose. An important thread in this discussion was the use of a systems approach in terms of recognizing cumulative impacts, viewing nutrient sources and contributions at a watershed scale, and using ecological concepts, such as carrying capacity, stocking rates, and a farm's "ecological footprint."

Additional important dimensions of success are listed below in terms of the frequency with which they were mentioned:

- Good working relationships between all parties
- Appropriate and able leadership
- Having necessary resources (financial, technical, scientific, educational)
- Legitimacy though broad-based and balanced support/satisfaction from the agricultural and environmental communities
- Technologically effective yet economically feasible best management practices (BMPs)
- Practical and flexible BMPs suited to local conditions

Other less frequently mentioned dimensions of success included:

- Motivates and gives incentives to farmers
- Cohesive–integrated federal and state programs
- Targeted, mandatory approach
- Reasonable local control
- Voluntary
- Conservation plans
- Maintain economic competitiveness of Pennsylvania agriculture
- Inclusive in terms of concerns addressed

In summary, three factors-comprehensiveness, accountability, and the use of science-based tools–stood out among the many facets of a successful program. These factors clearly meant the most to those interviewed and should be given close examination in reviewing and making changes to Pennsylvania's Nutrient Management policies and programs.

In terms of the additional factors, two observations can be made. First, good working relationships among and within agencies, as well as with producers, and environmental interest groups, were frequently mentioned as key to a successful program. Clearly, successes have been achieved in this regard as Pennsylvania's program has evolved, and this success can be leveraged into the future. A second interesting point is that given the emphasis placed on comprehensiveness and lack of attention to targeting, there appears to be a shift occurring in the fundamental way that interviewees feel that agricultural nutrients should be managed. This is a significant shift as one of the cornerstones of the Act 6 in 1993 was its approach to targeting farms based on animal density-based definition. If policy-makers are to heed this shift in opinion, it suggests they would begin considering significant changes in the approach to managing agricultural and non-agricultural nutrients in the commonwealth.

After the interviewees responded to the question of how they would define a successful nutrient management program, they

were asked how success might be measured. The most frequently mentioned "indicators" of success were:

- Water quality
- Compliance and farm-level implementation
- Resource adequacy
- Farmer participation
- Economic acceptability
- Public acceptance of program

More detail on the above indicators as well as additional indicators are in Table 3.

Priority Actions for the Future

The interview closed with a comprehensive question: "What would be the single action that could be undertaken to move Pennsylvania toward the goal or interest that they had identified for a successful program?" The responses most frequently mentioned are presented along some major themes.

Educate All Parties. Several interviewees said more education would lead to a more successful nutrient management program. Within the group, two said education should focus on the farmer and how he/she can benefit from nutrient management, two mentioned the need to education the public and said there is a need to educate both the farmer and the public, and one said there is a need to educate the educators before the information gets to the farming community.

Reduce Inequities. A few interviewees stated that all manure-generating farms and all land receiving manure should develop and implement a nutrient management plan. One interviewee took an even broader view and suggested the need for a more balanced program that includes stronger recognition of nonagricultural sources of nutrient pollution.

Table 3: Indicators of a successful nutrient management program.

Water Quality Indicators • Improved water quality (in Pennsylvania and Chesapeake Bay) • Clean water • Water quality/watershed protection • Decreased runoff • Stream assessment data/monitoring • Long term–watershed and nutrient and sediment levels
Farm-level Compliance and Implementation Indicators • All farms implementing optimum BMPs based on current technical knowledge • All farms implementing holistic nutrient management programs • Nutrient balance approach on farm • Number of farms with nutrient management plans • Quality of nutrient management plans • Degree of nutrient management plan implementation • Erosion • Changes in farm-level management • Degree of compliance
Adequate Resources • Increased private sector available to meet technical needs • Service and availability of conservation district staff
Farmer Participation • Attendance at education meetings • Increased overall farmer participation
Measure of Economic Acceptability • Economics are acceptable-reasonable • Cost of production information can begin to be measured and then look at cost of compliance • Migration of PA agriculture-Where is it going and why? • Profit margins-Does it save the farmer money?
Measures of Public Acceptance of Program • Decrease in number of appeals during the nutrient management plan approval process • Decrease number of conservation district meetings with angry citizens • Decreased time in court • Decrease in complaints • Citizens feeling safe • Less media coverage • Neighbors of farms able to accept animal operations • Meshes well with community values • Increased understanding of non-agricultural citizens
Other • Reduced inequity among all farming operations • Land in productive farmland/sustainability • Penn State says it is the best science • Clean air • Healthy soil • Reduced ecological impact on the community • A future for our children

Increase Agency Enforcement and Oversight. A few interviewees suggested changes to the requirements under the Act. One mentioned the need for increased monitoring to ensure plans are appropriate and are being implemented. Another suggested moving to a permitting process with increased record-keeping requirements and agency oversight. One interviewee suggested moving the program into the Department of Environmental Protection would steer Pennsylvania toward a more successful nutrient management program.

Improve Working Relationships. Several interviewees suggested actions that aim to improve working relations among those developing and implementing the nutrient management program. One person suggested developing a work group inclusive of all stakeholders. Others suggested the need to maintain and foster working relationships and meaningful communication among all concerned parties.

Change Selected Program Requirements. Several interviewees suggested changes to the current requirements. One mentioned that agriculture should go beyond the current requirements and address other issues like odor, flies, and water-use impacts on local water supplies. Two interviewees suggested a need to go "back to the basics" by simplifying nutrient management and restricting cows' access to streams.

Evaluate Progress. A few interviewees suggested a need to evaluate progress. One interviewee said there is a need to track progress so we know how well the nutrient management program is working. Another mentioned the need to develop clear measurable goals at the farm-level.

Invest in Research. For a few interviewees, the answer for a more successful nutrient management program is new technology. These interviewees believed there is a need for more research and development of effective alternative technologies that are financially and environmentally sustainable.

SECTION 7: STRENGTHS AND LIMITATIONS OF THE STUDY

This report has provided an analysis of the Pennsylvania NMA and its regulations. Information about the Act's legislative history and implementation progress, present and emerging public policy issues, and possible future policy directions for nutrient management was presented. These final sections offer several broad conclusions about the report, including its strengths and limitations, and also encourages additional debate and discussion about the issues, topics and policy directions that were raised.

A strength of this report is its attempt to be as balanced as possible. To reach this goal, a diverse set of agencies and individuals representing as many facets of the issue as possible were interviewed. At the end of each interview, requests were made for additional interview contacts. Therefore, from a statewide perspective, the findings are believed to be comprehensive and balanced. However, two kinds of limitations exist. First, county-level conclusions may be biased to south-central Pennsylvania as this is where the three interviews of county-level agencies were conducted. Some observations about local organizations, including conservation districts or local cooperative extension offices, may not be reflective of situations elsewhere in the state. Secondly, while we strived to include representatives of stakeholders to nutrient management issues, we were not able to be exhaustive in terms of including all possible groups and individuals. For example, the foci were three key species and related waste issues (poultry, swine and dairy) and at least one individual representing each industry sector was interviewed. Another related omission was related to certain functions.

For example, farmers who imported CAO manure were a key aspect of the manure exporting problem. However, a suitable producer in this category could not be identified. Some aspect of this perspective was captured by interviewing a manure hauler.

SECTION 8: CONCLUDING THOUGHTS

Overall, many of the individuals interviewed expressed a feeling of pride in relation to Pennsylvania's groundbreaking approach to nutrient management. Most were sincere with their praise or criticism. All presented thoughtful insights into the successes and challenges of the program. It is our view that suggestions for improving Pennsylvania's nutrient management program are based on the belief that there is a need to learn from history and policy changes are incremental. Hence, there is a need for analysis, reflection, and then action.

We hope the results of the analysis will be used by citizens and public decision-makers in deliberating the issues, options, and future policy directions for nutrient management in the Commonwealth. Improvements in policy come about through exchange of facts and perspectives about issues and solutions, effective participation by all interested and affected parties, and when public decision-makers carefully consider this input.

While the review process has begun and some steps have been taken, it is not yet clear how and when changes to Pennsylvania's Nutrient Management Act will occur. Effective participation will require interested parties to follow developments closely. Refer to one of these Penn State Cooperative Extension web sites to stay abreast of developments in nutrient management policies and how you can shape them.

Penn State Web Sites

- Nutrient and Water Policy Update: **http://agenvpolicy.aers.psu.edu**
- Pennsylvania Interagency Nutrient Management Web Site: **http://panutrientmgmt.cas.psu.edu**
- Penn State Nutrient Management Web Site: **http://www.nutrient.psu.edu**

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This report (staff paper #355, November 2002) is available on the **Penn State Nutrient and Water Policy Update Web Site: http://agenvpolicy.aers.psu.edu.** The report is also available from Dr. Charles Abdalla, Department of Agricultural Economics and Rural Sociology, Penn State University, University Park, PA 16802. Phone: (814) 865-2562. E-mail: CAbdalla@psu.edu.

This publication is available in alternative media on request.