Concentrated Animal Feeding Operation Regulations and Comprehensive Nutrient Management Planning in New York State

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Executive Summary

Concentrated Animal Feeding Operations (CAFOs) are defined as animal farms, meeting certain animal number thresholds, that confine their animals to a non-pasture area for at least 45 days per year. In New York, dairy farms who do not discharge process wastewater from their production area and who confine 300 or more cows are considered a "medium" CAFO. Those same non-discharging operations, that confine 700 or more cows, are defined as "large" CAFOs. The Environmental Protection Agency (EPA) is a federal organization that has specific regulations that large CAFO farms must follow to minimize pollution of their surrounding environment. However, New York State has issued additional requirements, beyond what EPA requires, that regulate not only large but also medium CAFOs. In New York State, multiple federal and state organizations work together to create regulations and incentive programs that have shown to reduce the environmental footprint of animal feeding operations over time, reducing risk of impacts on water and air quality, while also supporting the production of high quality, nutritious food for human consumption. Here we outline a short history of CAFO regulations in New York State and describe the requirements and implementation approach for New York State dairy and livestock farms.

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Acronyms

- AEM: Agricultural Environmental Management
- BMP: Beneficial Management Practice
- CAFO: Concentrated Animal Feeding Operation
- CCA: Certified Crop Adviser
- CNMP: Comprehensive Nutrient Management Plan
- CPS: Conservation Practice Standard
- CSNT: Corn Stalk Nitrate Test
- CWA: Clean Water Act
- DAP: Dairy Advancement Program
- ECL: Environmental Conservation Law
- NEDPA: Northeast Dairy Producers Association
- NMP: Nutrient Management Plan
- NMSP: Nutrient Management Spear Program
- NPDES: National Pollutant Discharge Elimination System
- NRCS: Natural Resources Conservation Service
- NYSAGM: New York State Department of Agriculture and Markets
- NYSDEC: New York State Department of Environmental Conservation
- PSNT: Pre-Sidedress Nitrate Test
- RUSLE2: Revised Universal Soil Loss Equation version 2.0
- SUNY: State University of New York
- SWCD: Soil and Water Conservation District
- VTA: Vegetated Treatment Area

1. Short CAFO Permit History in New York

In 1972 the United States issued the Clean Water Act (CWA) with the goal to stop point sources from polluting the waters of the United States. As part of the CWA, the EPA created the National Pollutant Discharge Elimination System (NPDES) aimed at eliminating discharges of pollutants from point sources into surface water (click here to learn more). In 1976, the "point source" definition of the CWA was amended to include CAFOs and established permitting requirements for the industry. In 1994, a dairy farm in western New York was sued by a local environmental group for polluting nearby watersheds by spreading manure onto their fields. This lawsuit addressed manure as a point source pollutant for the first time. The court ruling resulted in development of the first CAFO general permit for New York, known as the "CWA permit." That permit was initially issued in 1999, was updated and renewed several times until the 2019 version expired on July 23, 2022. In 2008, the CAFO federal regulations were revised again as a result of a lawsuit and removed EPA's ability to regulate CAFO farms where there was not a discharge to surface waters. In 2009, New York State issued a second CAFO general permit option based on the State's Environmental Conservation Law (ECL). This new "ECL permit" allowed the state to continue to regulate CAFOs based solely on the creation of a point source and did not require there to be a discharge of pollutants to surface waters. This new permit contained stricter permit conditions for farms to follow, including a "no discharge" condition. Initially, farms could choose to follow either the 2004 CWA permit or the 2009 ECL permit. Funding incentives provided by the state and federal government to update facilities enticed farmers to follow the more intensive permit. Today, all CAFO farms must follow the ECL permit guidelines, as the CWA permit was sunset in 2022 for New York State farms. New York State is one of less than 10 states to have all CAFO farms operating under stricter standards than the CWA (click here for breakdown). Several organizations work together to provide updates to the ECL permit and help ensure success for CAFO compliance on farms. The permit is enforced by the New York Department of Environment Conservation (NYSDEC). The permit has been reviewed and updated every 5 years until the most recent permit, made effective January 23rd, 2023, which now has a 10-year cycle.

2. Partnerships

Several state and federal agencies are involved in the development and updates for the CAFO permit and associated technical documents in New York. This includes the state partnership of NYSDEC, the Natural Resources Conservation Service (NRCS), New York State Department of Agriculture and Markets (NYSAGM), and Cornell University as the designated Land Grant University for New York. In addition, the CAFO workgroup, under leadership of the NYSDEC, is called upon and requested to provide feedback on renewals of the permit. The workgroup includes at least two representatives from environmental advocacy groups, NYS Department of Health, NYSAGM, Cornell University, Soil and Water Conservation District (SWCD), AEM Certified Planners, NRCS-NY, Northeast Dairy Producers Association (NEDPA), NY Farm Bureau, NYSDEC regional staff, and farmers. Each organization has a unique perspective of the CAFO permit and this working group provides an opportunity for those perspectives to be shared. In addition to feedback from the state partners and the CAFO workgroup, NYSDEC also seeks feedback from the public. Whenever the permit is up for renewal there is a public comment period of at least 30 days before publication.

The CAFO permit includes technical requirements provided by NRCS conservation practice standards. The current CAFO permit specifically references ten of these standards. NRCS conservation practice standards are developed at the national level and are updated every five years. Like NYSDEC, NRCS has a 30-day public comment period where the public can provide input regarding any upcoming revisions to the conservation standards at the national level. States are then allowed to customize the national standards and include stricter criteria in the state version if they choose. When one of these standards is up for renewal, NY-NRCS contacts the state partnership to review and provide comments. If

the core organizations find it necessary, NRCS will collaborate with additional contacts from the CAFO workgroup, including NY Farm Bureau, Soil and Water Conservation Districts, or AEM Certified Planners. This open communication ensures that conservation practice standards required by the permit are science-supported and feasible to implement. After the national revisions are finalized the state NRCS offices have one year to publish their state specific versions.

Development of Land Grant University guidelines for nutrient management, which are integral to the CAFO permit, is designated to the Cornell University Nutrient Management Spear Program (NMSP), housed in the Department of Animal Science at Cornell University. Every month, Cornell University nutrient management specialists lead a discussion with state and federal partners to discuss guidelines, the need for updates, farmer and consultant feedback, and training needs. In addition to the monthly partnership meetings, the NMSP works with two advisory committees, the NMSP Internal and External Advisory Committees. The NMSP Internal Advisory Committee consists of faculty and staff at Cornell University and Cornell Cooperative Extension educators. The NMSP External Advisory Committee includes active CNMP planners and farmers, representatives from New York Farm Bureau, the Northeast Dairy Producers Organization (NEDPA), Soil and Water Conservation Districts, SUNY Morrisville, the State Soil and Water Conservation Committee, and a representative for the poultry industry. Most exchanges with the internal advisory committee occur by email and over webinar. Larger gatherings with the external advisory committee occur 2-3 times per year, with a preference for in-person meetings. The committee and meeting structure aim to create a shared understanding and collaboration on development of CAFO regulations and Land Grant University guidelines. The structure of feedback and review by multiple organizations ensures that guidelines, standards, and permits are science-supported, practical to implement, and have a real impact on the environmental footprint of animal agriculture in New York.

3. Comprehensive Nutrient Management Plans (CNMPs)

All CAFO farms must work directly with a third party, state-certified planner to create farm-specific CNMPs that outline how nutrients on the farm will be managed. Working with a certified planner is like having a licensed professional engineer designing and certifying the construction of a bridge, a farm cannot self-certify, increasing credibility and consistency for the regulatory process in New York. Non-CAFO farms enrolled in voluntary CNMP related projects and other advanced voluntary nutrient management projects on smaller farms may use a state or NRCS certified CNMP planner. Farmers are ultimately responsible for maintaining compliance, and work tirelessly and make significant financial investments each year to ensure their farm remains successful and compliant with the CAFO permit.

3.1 AEM Certified Nutrient Management Planners

There are several steps a person must take to become certified as a nutrient management planner in New York, formally known as an Agricultural Environmental Management (AEM) Certified Planner. To start, they must be a Certified Crop Adviser (CCA). To become a CCA, a person must pass both a state and international exam to measure their competency in soil and water management, nutrient management, pest management, and crop production. In addition, the applicant must document education and crop advising experience. After becoming certified, a CCA must attend 40 hours of continuing education sessions per two-year cycle to maintain their credentials.

If a CCA decides they would like to become an AEM Certified Planner in New York, they must complete a multi-day training course to learn how to develop a proper CNMP. Next, the candidate must develop three CNMPs to be reviewed by NYSAGM AEM CNMP specialists to demonstrate their skill, understanding, and proficiency with Comprehensive Nutrient Management Planning. The specialists review each plan one at a time relative to the CNMP Checklist, co-developed and updated by the agency

partners for use on all types of livestock farms in New York State. With each review, planners receive comments and revision requirements and respond with plan updates. Once the first CNMP is accepted as meeting the requirements in the CNMP Checklist, planners use the lessons learned to develop the next plan for review, so that skill and understanding build through the process. The third plan also includes an on-farm review component. Once a planner has met the requirements of the CNMP Checklist for all three of their CNMPs, they become an AEM Certified Planner. Once they are certified, planners are subject to ongoing quality assurance of their plans and must keep their CCA certification active. The steps a person must take to become an AEM Certified Planner are proof of their dedication to environmental conservation and evidence that the most knowledgeable and qualified people are the ones preparing CNMPs.

In New York State, CAFO permitted farms pay for their nutrient management planning directly. Funding is available for smaller livestock and poultry farms voluntarily advancing their nutrient management approaches through state and federal cost-share programs. Either way, planners are monitored by NYSDEC, NYSAGM, and NRCS to ensure environmental standards are being upheld. The AEM Certified Planners also may elect to meet certain NRCS certification requirements for CNMP certification to develop and approve federally funded nutrient management projects on non-CAFO farms. Technical requirements for state and NRCS certification are very similar in terms of training and quality assurance as there is little difference in CNMP content for CAFO and non-CAFO farm projects.

3.2 Development Process

To obtain a CNMP, a farm goes through the AEM five-Tier process. The first AEM Tier is a simple inventory of information about the farm and interests of the farmers. Next, in Tier 2, a planner and farmer will meet at the farm to discuss and assess the whole farm for areas of existing environmental stewardship, resource concerns, and opportunities for improvement. The third Tier involves the formal development of the CNMP based on the second Tier's environmental assessment and leads to detailed plans for BMP systems (all based on NRCS CPSs) to further advance management. The fourth Tier is carrying out the plan. Funding support for technical assistance and BMP implementation is available via several state and federal programs. The fifth Tier involves the planner and farmer evaluating the progress of the plan, functioning of installed BMPs, and plans the next BMPs to implement as well as conservation plan updates to meet the needs of environmental conservation and farm management. The third through fifth tiers become a cycle for constant improvement on the farm.

3.3 Comprehensive Nutrient Management Plan Content

The AEM Certified Planner will create a hard copy or digital file of the plan. Plans associated with CAFOs need to be updated every year. Farmers must keep records and closely follow their plan to ensure they comply with the permit. Comprehensive Nutrient Management Plans generally have eight sections consisting of general farm information, the farmstead management plan, the nutrient management plan, the soil management plan, the operation and maintenance plan, the emergency action plan, a section for record keeping and reporting forms, and a section to archive lab test results for manure and soil, technical analyses and documents, the conservation assistance notes, and so on. Within each section, AEM Certified Planners site-specifically characterize fields and facilities, detail systems of NRCS conservation practice standards to be used to improve or maintain water quality and soil conservation and provide operation and maintenance steps for long-term function. The elements of a CNMP required by the CAFO permit, including the referenced supporting technical standards from NRCS-NY and Cornell University, are summarized in the CNMP section descriptions, below.

3.3.1 General Information and Maps

Section 1 of the CNMP is general farm information. This information includes total acres, animal numbers, and all the watersheds near the farm to consider. Animal numbers and total acreage helps the planner estimate how much manure will be produced and how many acres it can be spread on. Section 1

also outlines other state laws that need to be considered when implementing practices on the farm, such as prohibited dig areas and culturally historic zones that cannot be disturbed.

There are several maps present in every CNMP that show every field on the farm to illustrate benchmarks for the CNMP including proper setbacks from water, bedrock risks, topography, leaching potential, and runoff risk assessment. The planner will look at all watercourses and wetlands around each field and measure out the proper setbacks necessary during spreading to ensure no discharge occurs. Having maps that illustrate what the farmer needs to be aware of in each field makes it easier for them and their employees/contractors to follow their plan closely throughout the year.

3.3.2 Farmstead Management

The farm's CNMP describes NRCS conservation practices needed to ensure that all manure, process waters (e.g., from feed storage areas, milking centers), and precipitation that comingles with such nutrient sources at farmstead facilities, are properly collected, contained, and further managed to prevent discharge into nearby waterways around the farmstead. Prescriptions for recycling nutrients for crop production are detailed in the nutrient management plan section. Farmers follow their CNMP to manage nutrients not only on the land-base but also for farmstead management, including feed storage systems, manure storage facilities, milking centers, egg wash centers, and heavy use areas (e.g., barnyards) and they have to document performance to determine the system(s) are functioning properly.

3.3.2.1 Nutrient Storage and Treatment Facilities

Farmers and Planners use the NRCS Waste Storage Facility Conservation Practice Standard (NRCS-NY 313 CPS) to collect and store manure and other organic nutrient sources so they can be applied as fertilizer for crops at a later date and that nutrients do not run off into the surrounding environment. Professional Engineers licensed in New York State are required to design and certify all Waste Storage Facility projects. Per New York's CAFO permit, these waste storage facilities must be able to hold the designed volume of manure and process waters from the farm, plus the precipitation expected to be contributing to the storage during a 100-year, 24-hour storm. This ensures that even in the case of an emergency or extreme precipitation the storage facility will not overflow and discharge to the surrounding environment. A marker must be present and visible at every waste storage facility to illustrate the maximum level that the structure can properly hold under these requirements. Waste storage facilities must also have proper fencing around the entire perimeter for safety.

3.3.2.2 Feed Storage Management

Farmers store feeds, such as ensiled hay and corn (i.e., harvested as a whole plant with enough moisture to ferment and thereby preserve the nutritional quality of the plant for livestock feed) and grains harvested during the summer and fall, to ensure sufficient quality feed will be available for their livestock through the entire year, including those seasons when plants are dormant, during late fall through early spring. Ensiled forages can be stored in various ways to exclude oxygen and maintain nutritional quality until fed. Depending on the weather and growing season, hay and corn silage in storage can produce a nutrient rich liquid, called silage leachate, that must be collected and recycled as a fertilizer for crops. To capture nutrients from the liquid leachate produced by silage, most farmers in New York State use a Vegetated Treatment Area (VTA). VTAs are designated areas in accordance to the NRCS-NY 635 CPS for nutrients to flow from feed bunks, compost areas, or barns into a controlled environment that provides treatment and is considered land application. Professional Engineers licensed in New York State are required to design and certify all VTA projects. This practice prevents excess nutrients from being distributed onto fields or flowing into waterways. There are several parts to a VTA design that are essential to ensure the area will work properly. A collection system is typically installed to collect silage leachate before contacting the treatment area. When there is no rainfall, any leachate produced is often referred to as "low flow leachate" and is collected, stored, and land applied as a fertilizer for crop production. When a rainstorm occurs, the exposed leachate that has not already been collected during dry conditions, becomes

much more dilute. This product is often referred to as "high flow leachate." It is the high flow leachate that is ultimately routed to the VTA to be evenly distributed, taken up, and treated usually by a perennial grass species.

A NRCS-NY 635 Conservation Practice Standard has several criteria that must be met to minimize impacts to the environment including proper siting, construction, design, and operation. These criteria are typically based on soil types, distance to watercourses, depth to groundwater, type and size of nutrient source, VTA size, and selection of plant species.

Maintenance is crucial to allow VTAs to function as intended. The flow path to the area must remain clear and unobstructed. If distribution systems are put in place throughout the VTA they must be maintained. Grass needs to be mowed often to allow nutrients to continue being taken up, and the grass clippings should be removed from the area because they hold nutrients. As an alternative to a "low flow leachate" collection and "high flow leachate" VTA system, farms may also utilize an NRCS-NY 313 Waste Storage Facility, to collect and recycle silage leachate for fertilizer for crops and eliminate contamination risk. This system is typically referred to as a "total collection system."

3.3.2.3 Composting and Mortality Systems

Areas appointed for composting dry material must follow the NRCS-NY Composting Facility CPS (NRCS-NY 317 CPS) to minimize odor and water contamination. Professional Engineers licensed in New York State are required to design and certify all Composting Facility projects. Beyond these requirements for general composting, farmers must follow the NRCS-NY Animal Mortality Facility Conservation Practice Standard (NRCS-NY 316 CPS) or Cornell University's "Composting Animal Mortalities". These documents outline the additional requirements to be followed if the pile is being used for mortality composting. Professional Engineers licensed in New York State are required to design and certify all Animal Mortality Facility projects. Both NRCS-NY 317 and the NRCS-NY 316 have several criteria that must be met to minimize impacts to the environment including proper siting, construction, design, and operation. Again, these are based on soils, distance to watercourses, and depth to groundwater. Once composted, material can be spread onto fields in compliance with the farm's CNMP. There are other methods for handling mortality, and the best choice depends on the farm, but compost piles are most common.

3.3.2.4 Water Management

All wash water from the milking centers, egg wash centers, and so on must be properly collected and handled according to various NRCS Conservation Practice Standards and professional engineer designs depending on the site-specific characteristics of the farm. Depending on the source, the wash water may contain milk, detergents and/or manure. Any noncontact cooling water used in plate chillers or otherwise must also be collected and handled to ensure it does not get discharged to any nearby surface water. Although noncontact cooling water does not necessarily have harmful nutrients, the temperature might affect fish habitat in nearby streams. Noncontact cooling water may be discharged to groundwater with proper management.

3.3.2.5 Wet Weather Standard Operating Procedures

Wet Weather Standard Operating Procedures are management strategies, typically developed by the farm's AEM Certified Planner, which are integrated into the operation and management of the facility's farmstead to ensure no discharge will occur during a 100-year, 24-hour storm event. These strategies often include, but are not limited to, enhanced operation and maintenance schedules, designs, and markers for increased containment capacity/freeboard with waste storage facilities, and extended weather forecast considerations.

3.3.3 Nutrient Management Plan

The farmstead management section of the CNMP focuses on minimizing nutrient sources and then properly collecting and storing the remaining manure and process water sources for use as fertilizer to growing crops. The NRCS-NY Nutrient Management Conservation Practice Standard (NRCS-NY 590 CPS) provides a detailed, field-scale (often sub-field) analyses to make the most of collected on-farm nutrients and supplemental commercial fertilizers while minimizing risk of losses to surface and groundwater. This process is based on Cornell University guidelines and results in science-based recommendations about rates, sources, methods, and timing of application. Creating a nutrient management plan allows farmers to be efficient with their resources and keep nutrients from being lost to the surrounding environment, which is why it is beneficial to the farmer to carry out these practices each crop year. There are several tests that a planner must do for each field to determine the best management strategies in terms of nitrogen and phosphorus, including soil and manure testing. Other nutrients and field requirements are factored into the planning process for successful crop growth, harvest, and nutrient cycling, with an emphasis on nitrogen and phosphorus due to their potential to impair water quality.

3.3.3.1 Nitrogen Management

Cornell University develops, evaluates, and delivers research-based guidelines for nitrogen management for each crop (see here for details) and for minimizing risk of nitrate leaching. Managing nitrogen levels in a field is complicated due to the differences between inorganic and organic N and the inherently mobile nature of nitrate as a plant nutrient. Inorganic N can volatilize and cause greenhouse gas concerns if not managed properly or transform to nitrate and be lost through leaching if plant roots do not take up the nitrate. Organic N becomes available over multiple years, so previous manure applications need to be considered when deciding how much nitrogen to apply for the next rotation.

Soil type is important for nitrogen risk assessments using the New York Nitrate Leaching Index (see here for details). Well-drained soils have an elevated risk of nitrate leaching. To identify high risk fields, planners need to document the nitrate leaching potential for each field. If a field is identified as high-risk, field specific BMPs must be implemented to manage nitrogen applications. Examples of appropriate BMPs to address N leaching include planting cover crops, timing of nitrogen applications close to crop N needs, spreading lower rates or splitting applications of manure or fertilizer on higher risk fields, and performing a Pre-Sidedress Nitrate Test (PSNT) for a corn crop. Tools like the PSNT are helpful to avoid application of nitrogen fertilizer to fields that are highly unlikely to respond in yield.

3.3.3.2 Phosphorus Management

The amount of phosphorus that can be applied to a field is decided through a combination of the New York Phosphorus Index (NY-PI 2.0) assessment and crop specific Cornell Land Grant University nutrient guidelines. More information about phosphorus recommendations can be found here. The NY-PI 2.0 generates a management implication based on several field characteristics. First, it considers the risk of phosphorus transport from the field. A transport score is calculated for dissolved and particulate phosphorus based on the flow distance to a waterway (and presence/absence of vegetation), the flooding frequency of the field, the hydrologic soil group of the field (which explains water retention), the annual sheet and rill erosion loss from the field modeled using RUSLE2 (explained in the next section), and any concentrated flows present in the field.

After these risk scores are calculated for each field on the farm, they are multiplied by a coefficient which differs depending on which Best/Beneficial Management Practice (BMP) is selected. Multiplying the BMP and risk scores results in a final NY-PI 2.0 value. The BMP coefficients are indicative of a specific management practice in terms of spreading methods and ground cover plus timing of those applications. Better management practices result in a lower field risk assessment score, which incentivizes farmers to implement BMPs to further reduce runoff risk to surface waters. The final index value is paired with the Cornell Morgan soil test phosphorus results for an individual field to create the final management implication. The three management implications set upper levels for application of phosphorus and may

result in a recommendation of no additional phosphorus if the soil test results, or the field's transport risk assessment results are too high. Management implications can change each crop year, so planners run the NY-PI 2.0 assessment annually as a part of a farm's CNMP update. For more information on NY-PI 2.0, see here.

When paired together, the nitrogen and phosphorus management guidelines within the NRCS-NY 590 CPS strike an important balance by making the most of on-farm nutrients in manure, soil, and crop organic matter as well as purchased supplemental fertilizers for efficient nutrient recycling by the crops that will remain on the farm to feed livestock, while reducing risk of runoff or leaching to water resources from fields.

3.3.3.3 Maximum Spreading Rates

Once the NY-PI 2.0, Nitrate Leaching Index, crop nitrogen guidelines, and soil management assessments (see Soil Management section, below) are calculated, the planner creates manure and fertilizer spreading plans for the farmer to follow throughout the year. A planner determines spreading rates for each field using the chosen BMPs for the field and the crop grown. If per the NRCS-NY 590 CPS planning process a field needs and is allowed a high volume of manure to supply the nutrients to successfully grow the desired crop, split applications are recommended. The CAFO permit also sets maximum thresholds for single applications at 20,000 or 27,000 gallons per acre in any 7-day period, depending on the nutrient source.

3.3.3.4 Adverse Weather and At-risk Groundwater Spreading Guidelines

Farms must follow NRCS-NY 590 CPS and Cornell University guidelines including the "Revised winter and wet weather manure spreading guidelines to reduce water contamination risk" and "Groundwater Protection Guidelines for Agriculture" at all times to ensure protection of New York's water resources. The CAFO permit requires farms to develop facility specific winter and wet weather condition procedures based on guidelines in these documents. These documents outline fields that are a high risk for contaminating water sources during these conditions, such as fields with soils shallow to bedrock or karst topography, as well as strategies for storing manure during those periods and accessing very low risk fields for applications. They also reinforce that manure cannot be spread into concentrated flow channels and/or on saturated soils.

3.3.3.5 Adaptive Management

Adaptive management of nitrogen for field crops was introduced in New York State in 2013 and is supported by NRCS Conservation Practice Standards. The most recent update is from 2023. Adaptive management is an outcome-based incentive approach. Since the introduction of the first CAFO permit, a farmer who has at least three years of yield data for a specific corn field can use their own yield values instead of the values from the Cornell University yield index database to determine nitrogen application rates in a more site-specific manner. The adaptive management addition that was introduced in 2013 allowed farmers to apply higher nitrogen rates (fertilizer or manure) than those that would have been recommended without yield records, but only when followed by actual measurements of yield and an assessment of the impact of the higher nitrogen rate on the crop. There are currently several impact assessment approaches outlined in the Cornell University guidelines (click here) including taking a Corn Stalk Nitrate Test (CSNT) and managing results to be below 3000 ppm over time, conducting replicated nitrogen rate studies, or implementation of single strip trials. If the impact assessment determines there is a yield difference and the field was not overfertilized, the farm can continue to manage according to the findings, because the results indicate an efficient use of nitrogen by the crop and reduced risk of loss. In addition to the field-based incentive approach, a farm with a three-year running average of efficient, lower whole farm nitrogen balances can adjust nitrogen rates for specific fields with measured yield data without the need of the additional evaluation step, as this is also a strong indicator of efficient nitrogen use. Thus, this process incentivizes farmers to measure outcomes and act upon results, allowing for finer-scaled

nitrogen management improvements over time. For more information about adaptive management for nitrogen, click here.

In 2020, an adaptive management strategy was included for phosphorus management as well through the New York P-index. Farms with a three-year running average of efficient, lower whole farm phosphorus mass balances are allowed to apply manure at a nitrogen-based rate instead of phosphorus removal-based, as long as the fields' soil test phosphorus levels do not exceed 100 lbs/acre and the P-index score is below 100.

3.3.4 Soil Management

When creating a nutrient management plan, it is important to know the soil characteristics in each field and how to manage them appropriately. Therefore, through the NRCS-NY 590 CPS referenced in the CAFO permit, various forms of soil erosion risks are evaluated and addressed with conservation practices in the CNMP. Planners take field-specific measurements and observations to gauge the risk of subtle, barely visible sheet and rill erosion, as well as document more obvious areas of gully erosion in areas where water concentrates and flows during storm events. The Revised Universal Soil Loss Equation (RUSLE2) from NRCS is then used to determine the risk for soil loss each year in each field. RUSLE2 uses rainfall amounts/intensity, predominant soil type and associated erodibility factors, slope, and specific field management (tillage, crop, conservation BMPs, etc.) to calculate that specific field's risk for soil loss. Management strategies such as what crops to plant and proper times for spreading are decided by the RUSLE2 outcome and farmers must not go above a tolerable rate of soil erosion for their whole crop rotation. This tolerable rate is assigned to each soil type based on the inherent soil properties and the ability of a soil to withstand erosional forces, so the soil remains sustainable over time.

3.3.5 Operations and Maintenance

The CNMP also contains operations and maintenance requirements for the practices installed on the farmsteads and fields, based on the NRCS Conservation Practice Standards in use. The operation and maintenance requirements ensure the long-term function of the conservation practices. Farm staff must perform weekly inspections around the property to ensure the CNMP is being followed. These inspections include checking the waste storage facility depth marker, stormwater diversion practices, leachate collection systems and other BMPs. The findings from these inspections are recorded, and if any maintenance is necessary, farm staff performs the upkeep tasks to maintain proper function.

3.3.6 Emergency Action Plan

The CNMP includes an emergency action plan for the farm staff to follow in emergency situations. These procedures include how to handle manure spills and storage overflows, mass animal mortalities, personal injuries, fires, other spills, and even odor management. In addition to the action plan for each category, it includes emergency contact information for each event type and the relevant addresses to aid in coordinating with emergency responders. Locations for first aid kits, fire extinguishers, spill response materials, and other equipment useful for emergency response are also listed to ensure anybody on the farm can find what they need. Maps are created as part of the emergency plans to illustrate important considerations such as emergency response equipment locations, mass mortality sites, very low risk fields for emergency manure application, and the surrounding topography to ensure no discharge occurs even in the case of an emergency. Farm staff are trained in the farm's emergency response plan so that they're familiar with the resources and protocols to aid in swift and safe action in the event of an accident.

3.3.7 Recordkeeping

When spreading manure and/or nutrients onto fields, the farmer must record the amount spread and where. If products are not being spread onto fields but being used elsewhere around the facility, such as being used for bedding, or exported to another farm, those amounts must be recorded as well. All equipment that applies manure nutrients on the farm must be calibrated at least annually. In addition to what is being

spread on the fields, the weather during spreading must be recorded. All rain events that will accumulate more than 0.3 inches must be noted in the CNMP records, as well as predicted and actual precipitation the day of, the day prior to and the day after spreading.

3.3.8 Archives for Soil and Manure Test Results and Technical Documents

The nutrient management plan is based on the most up-to-date manure analysis from samples taken every year from each manure storage location on the farm. All farm-generated organic nutrient sources must be tested for percent solids, total nitrogen (organic and inorganic nitrogen), total phosphorus, and total potassium each year. Sources include manure, process wastewater, bunk leachate, and effluent from an anaerobic digester. If food waste is being used, testing for chloride must be completed as well. Current soil sample analyses for every field (taken at least once every three years for each field on the farm) are kept in this section as well. Accurate data about the field conditions and the nutrient composition of the manure is crucial for making decisions in a CNMP. This section of the CNMP often also houses key background analyses and technical documents that led to the BMP recommendations in the farmstead, nutrient management, and soil conservation sections, as well as other key documents, such as the conservation assistance notes.

4. Compliance/Enforcement

4.1 Compliance/Inspections

A CNMP must be followed throughout the year and be updated if any plans change. If a farmer knows there will be a change that is anticipated to result in non-compliance, they must report to the NYSDEC at least 45 days in advance. If an unexpected spill or discharge incident occurs, the farmer must, within 24 hours, call the NYSDEC spill hotline and file a report, where required. After addressing the issue, a CAFO incident report must be submitted electronically through the CAFO permit electronic reporting system or to the NYSDEC office within five days of the incident.

The AEM Certified Planner does an annual walkthrough around the farm to identify any potential areas needing operations and maintenance activities or additional BMPs, as well as providing updates to the NRCS-NY 590 CPS related recommendations for nutrient applications and soil conservation. The NYSDEC may also perform on-farm inspections at any point. During both the planner walk through or the report to NYSDEC and inspection, the AEM Certified Planner and/or report to NYSDEC and inspector will make sure that all recordkeeping is sufficiently completed and that the rest of CNMP is being followed. If there is cause for concern such as a complaint or an incident report filed, more inspections may take place. After becoming aware of a noncompliance issue, the NYSDEC can decide what measures are necessary for the farm to become compliant again. These follow-up actions may be required through issuance of a Notice of Violation (informal enforcement) or through an Order (formal enforcement). Orders are typically reserved for more serious offenses and often result in a monetary fine.

Farmers are also required to complete an Annal Compliance Report, due by the end of March each year. This report requires farmers to report any instances where they did not follow their CNMP and holds them accountable for any compliance concerns that get detected.

4.2 Required Trainings

In accordance with the CAFO permit, the AEM Certified Planner must meet with their farm client every year to discuss spreading plans, operations and maintenance activities, and high-risk fields. The purpose of this meeting is to allow time for the AEM Certified Planner to engage with farm staff and discuss how to manage these elements according to the farm's CNMP. These fields could include characteristics such as concentrated flow, surface water, connections to groundwater (e.g., karst areas), or subsurface

drainage. It is essential that manure applicator staff are aware of these high-risk features and know how to spread manure on them properly. In addition to this training, the AEM Certified Planner must present and discuss Cornell University's Manure Applicator webinar covering acceptable manure application techniques at least once every five years to the farm's staff. Alternatively, this training can be replaced by two or more farm members attending the NYSDEC-endorsed training led by Cornell University staff.

5. Voluntary Programs

Smaller farms that do not meet the size specifications of a CAFO also have opportunities to improve and manage their environmental impact. The state funds the Dairy Advancement Program (DAP), which is managed by staff of the PRO-DAIRY program at Cornell University. The DAP's goal is to enable small and mid-sized dairy farms to plan and design systems that will allow them to be compliant with the CAFO permit once they reach that herd size threshold. By facilitating the continued excellence in environmental stewardship on New York's dairy farms through the development of CNMPs and engineering for BMPs identified in those plans, farms can then apply to the State's Agricultural Environmental Management (AEM) programs or federal NRCS programs for further implementation funding and receive recognition for their conservation efforts.

The AEM program is a voluntary program administered by NYSAGM and the New York Soil and Water Conservation Committee at the state-level and locally led by county Soil and Water Conservation Districts (SWCDs). Since its development in the mid-1990s, addition to NYSAGM law in 2000, and statewide roll-out soon after, it's provided a key pathway for farms of all types and sizes to partner with conservation professionals and advance their environmental conservation practices and farm viability. It provides funding for technical assistance for SWCD professionals to work with farmers through the five-Tiers of CNMP development as well as cost-share funding for BMPs identified through the Tiered process. Small farms often do not have the resources to implement new practices quickly, which is why the AEM, NRCS, and DAP programs allow farmers to create conservation plans at their own pace without strict deadlines like the CAFO permit. By allowing farm specific progress, small farms are incentivized to take part in the program and create sustainable conservation practices that are adopted for the long-term. For more information about the DAP program, see here. For more information about the AEM Program, click here.

The NRCS also offers voluntary programs, including the Environmental Quality Incentive Program (EQIP), which provides incentive payments to farmers to implement BMPs that address environmental resource concerns through the same planning process and use of technical NRCS CPS as with AEM. Working with their local NRCS Soil Conservationist, they can identify which practices are a priority (either identified in the CNMP or otherwise). NRCS offers a Conservation Stewardship Program (CSP) that rewards farms that are already at a high stewardship level through past implementation of projects such as CNMPs. Farms entering this program are then willing to go to higher levels of conservation often above and beyond CNMP requirements and are paid annual stewardship payments.

6. Financial Support

There are several ways a farm can cover expenses involved with CNMP development. The first option is that the farmer pays the planner directly. It should be noted that costs for a CNMP can become quite expensive, ranging from about $6,000 to over $50,000 a year depending on the size of the farm and what they need to address. Therefore, external support is often necessary. In New York, programs through AEM at the local SWCD, DAP, and NRCS will fund conservation planning projects, including CNMP development, for farms below the CAFO threshold, but CAFO-permitted farms are responsible for covering their own CNMP development and update expenses. Implementing the BMP systems detailed in CNMPs

is more expensive, easily amounting to multiple millions of dollars for initial implementation and hundreds of thousands in annual operations and maintenance expenses by farms, especially for CAFO-permitted farms. Funding has been and is currently available for CAFO-permitted farms through AEM and NRCS programs to share in the costs of conservation practice implementation.

7. Concluding Remarks

New York State goes above and beyond what EPA requires for CAFOs. Multiple federal and state organizations work together to create an achievable set of regulations and incentive programs that have shown to reduce the environmental footprint of livestock and poultry farms over time. AEM Certified Planners work hard to develop CNMPs to help the farmer maintain efficient production while also protecting the environment. If you would like to read the other relevant NRCS standards (section 4) or have any specific questions about the permit, click here. Better management practices result in a lower field risk assessment score, which incentivizes farmers to implement BMPs and in turn further reduces the risk of losses to the environment.

8. Relevant Resources

- American Society of Agronomy. Certified Crop Adviser. https://www.certifiedcropadviser.org/.
- Bonhotal, J., Schwarz, M., Rynk, R. (2014). Composting Animal Mortalities. https://ccetompkins.org/resources/composting-animal-mortalities.
- Cornell University Nutrient Management Spear program. http://nmsp.cals.cornell.edu/.
- Czymmek, K.J., Ketterings, Q.M., Ros, M., Cela, S., Crittenden, S., Gates, D., Walter, T., Latessa, S., Klaiber, L., & Albrecht, G. (2021). The New York Phosphorus Runoff Index: Version 2.0. http://nmsp.cals.cornell.edu/publications/extension/NYPI_2_User_Manual.pdf.
- Czymmek, K, Geohring, L., Ketterings, Q.M., Wright, P., Walter, T., Albrecht, G., Lendrum, J. & Eaton, A. (2015). Revised winter and wet weather manure spreading guidelines to reduce water contamination risk. http://nmsp.cals.cornell.edu/publications/files/WinterSpreadingGuidelines2015.pdf.
- Ketterings, Q.M., & Workman, K. (2022). Phosphorus Guidelines for Field Crops in New York. http://nmsp.cals.cornell.edu/publications/extension/Pdoc2022.pdf.
- Ketterings, Q.M., & Workman, K. (2023). Nitrogen Guidelines for Field Crops in New York (2nd ed.). http://nmsp.cals.cornell.edu/publications/extension/Ndoc2023.pdf.
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- Natural Resources Conservation Service (NRCS). Conservation Practice Standard Nutrient Management 590 (2020). https://www.dec.ny.gov/docs/water_pdf/nrcsny590092020.pdf.
- Natural Resources Conservation Service (NRCS). Conservation Practice Standard Waste Storage Facility 313 (2018). https://www.dec.ny.gov/docs/water_pdf/nrcsny313032018.pdf.

- Natural Resources Conservation Service (NRCS). Conservation Practice Standard Vegetated treatment area 635 (2017). https://www.dec.ny.gov/docs/water_pdf/nrcsny635022017.pdf.
- Natural Resources Conservation Service (NRCS). Conservation Practice Standard Animal Mortality 316 (2016). https://www.dec.ny.gov/docs/water_pdf/animalmortality.pdf.
- Natural Resources Conservation Service (NRCS). Conservation Practice Standard Compost Facility 317 (2021). https://www.dec.ny.gov/docs/water_pdf/nrcsny317092021.pdf.
- Natural Resources Conservation Service (NRCS) State Programs and Initiatives https://www.nrcs.usda.gov/conservation-basics/conservation-by-state/new-york#programs
- New York Agriculture and Markets. Agricultural Environmental Management. https://agriculture.ny.gov/soil-and-water/agricultural-environmental-management.
- New York State Department of Environmental Conservation (2022). New York State Department of Environmental Conservation ECL SPDES General Permit. https://www.dec.ny.gov/docs/water_pdf/cafopermitgp022001.pdf.
- New York State Department of Environmental Conservation. Concentrated Animal Feeding Operations. https://www.dec.ny.gov/permits/6285.html.
- PRO-DAIRY Dairy Advancement Program. Cornell CALS. https://cals.cornell.edu/pro-dairy/our-expertise/dairy-advancement-program.
- United States Environmental Protection Agency (2022). NPDES permit basics |US EPA. NPDES Permit Basics. https://www.epa.gov/npdes/npdes-permit-basics.
- United States Environmental Protection Agency (2023). NPDES CAFO Permitting Status Report. https://www.epa.gov/system/files/documents/2023-05/CAFO-Status-Report-2022.pdf.
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Misconception 1:
New York's permit is less strict than the federal permit

New York works closely with federal agencies such as NRCS and the EPA to ensure their standards and permit satisfy or exceeds the federal requirements. New York takes the minimum guidelines set forth in the federal Clean Water Act (CWA) CAFO Rule and makes additional requirements for farms to follow within their Comprehensive Nutrient Management Plan (CNMP) to meet water quality and sustainability goals of the state. The following are examples where the New York CAFO permit is more environmentally protective, and thereby restrictive, than the federal CAFO rule.

- New York CAFOs must maintain no discharge from their production areas (farmsteads) through a 100-year, 24-hour storm compared to the federal no discharge standard which is for a 25-year, 24-hour storm.
- New York CAFOs must utilize an AEM Certified Planner, whereas no professional certification is required by the CWA CAFO Rule.
- New York CAFO permitted farms must follow an integrated system of NRCS Conservation Practice Standards for management of nutrients throughout their farmsteads and fields; such engineering and management standards are not required by the CWA CAFO Rule.
- Farms must sample soil for nutrient values every three years versus every five years.
- Farmer fields need to be planned and managed to conserve soil and reduce erosion, whereas this is not a CWA CAFO Rule.
- New York CAFO's must develop and maintain facility specific winter and wet weather application procedures and identify low-risk fields to be used for winter application in the case of an emergency.
- New structural practices need to be designed considering future flood risk due to climate change.
- Farm staff must be present and monitor active waste transfers from the production area (farmstead) while material is being transferred.
- The NRCS-NY 590 Nutrient Management Standard and associated Land Grant University Guidelines require New York CAFOs to account for nitrogen already present on the farm (soil, manure, crop rotation credits, etc.) when developing spreading recommendations.

Misconception 2:
Manure storages are not safe and impact drinking water

Manure storages located and operated on New York CAFOs are required to be designed and constructed by a trained, State of New York licensed professional engineer to meet national standards (Natural Resources Conservation Practice Standard – NY 313). The NRCS-NY 313 Standard requires that manure storages are designed, built, and operated to fully contain manure nutrients and any direct precipitation for future application to crops as fertilizer while remaining isolated and protected from ground- and surface waters. These standards require geological investigations, prior to the design, to properly site these structures and ensure an appropriate liner is selected to minimize any risk of leaking. To date, there has been no evidence of a certified manure storage contributing to an impact to groundwater in New York. In addition to the groundwater protections outlined in the standards, there are measures to ensure and protect against these structures overtopping. The standards themselves require maximum fill markers to help ensure that safety volume requirements are maintained. The New York CAFO permit also requires the final as-built plans, certified by a professional engineer, be maintained on site; fill levels be monitored

and recorded; and operation and maintenance measures outlined by the professional engineer be followed. Finally, no farm in New York is allowed to impact the water resources of the state, no matter the size of the farm. Any impact to Waters of the State is considered a significant violation of the Environmental Conservation Law and is subject to substantial penalties and/or fines.

Misconception 3:
Farmers can spread manure under any weather conditions

All CAFO farmers are required to have a current Comprehensive Nutrient Management Plan (CNMP) developed by an AEM Certified Planner in accordance with the permit, NRCS standards, and guidelines. The CNMP must be updated annually and prescribes how much manure and fertilizer can be spread on each field, as well as the anticipated application method and timing. In addition to their individualized plans, the New York CAFO permit sets maximum single-application spreading rates. New York's CAFO permit also contains specific requirements pertaining to winter and wet weather spreading, including a prohibition against spreading if the field is saturated or frozen-saturated.

New York does not have a calendar-based ban on winter spreading because calendar-based regulations do not take current weather and specific field conditions into account. Drivers of nutrient losses are based on specific field, soil, and weather conditions/forecasts. New York's CAFOs must assess field conditions every time they spread and follow the specific guidance outlined in the "Revised winter and wet weather manure spreading guidelines to reduce water contamination risk".

Misconception 4:
New York regulations allow phosphorus to be applied to fields even when the crop does not need it

Manure contains all 17 essential nutrients for plant growth and is a key to building soil health by providing organic matter and enhancing the soil ecosystem. Properly managed, use of manure can offset the need for purchased fertilizer, reducing the amount of imported nutrients onto farms and into a watershed. However, nutrients in manure aren't necessarily present in the balance required by a specific crop grown on a specific field. Within a farm's CNMP, the New York P-Index governs how much phosphorus can be applied to fields each year to ensure proper recycling of on-farm nutrients through crops and long-term, sustainable soil test levels for the benefit of water quality. In accordance with the New York P-Index, a farmer and AEM Certified Planner must assess the risk of phosphorus leaving the field. This needs to be done for all fields on the farm. Those assessments will determine how and how much manure may be applied and must be documented in the farms' CNMP. Farmers implement beneficial management practices to further reduce P runoff risk to lower the New York P-Index rating for fields. Making the most of manure nutrients is critical for water quality, air quality, and crop production, and to reduce N and P imports into watersheds. Most soils in New York are currently deficient in phosphorus so proper phosphorus management is needed to maintain productive and healthy soils for food production.

Misconception 5:
Farmers pay AEM Certified Planners, therefore plans are biased

New York has strict rules for who can develop and update CNMPs. A farm's CNMP needs to be written by a state-certified planner who has gone through extensive training, is required to keep

certifications current through training sessions, and has signed a code of ethics. Such a certification is akin to other state certified professionals used across sectors, such as professional engineers, architects, accountants, etc. To become an AEM planner, an individual must first become a Certified Crop Adviser (CCA), which involves passing two exams (an international and a regional exam) and meeting further educational and experience requirements to demonstrate their knowledge in agronomy and environmental conservation in agriculture. The next step is satisfying participation in the state led CNMP Training. After completing these two steps, the individual's first three CNMPs must be submitted to CNMP specialists at the New York State Department of Agriculture and Markets (NYSAGM) for review, revision, and acceptance. Once the three plans satisfy the CNMP requirements, the individual becomes an AEM Certified Planner. Certified planners must sustain their CCA status, maintain compliant work through ongoing quality assessments by NYSAGM staff, and satisfy 40 credit hours of continuing education every two years to maintain their certification. In addition to this rigorous certification and assessment process, the NYSDEC reviews CNMPs during regular CAFO inspections and pursues enforcement if deficiencies are identified.

Misconception 6:
Only large dairy farms are regulated

New York State laws and regulations require all animal feeding operations (AFOs) that meet certain animal thresholds, to obtain coverage under a State Pollutant Discharge Elimination System (SPDES) permit prior to operation. However, per Environmental Conservation Law Article 17, Title 5, Section 17-0501, no farm, regardless of size or permit coverage, is allowed to contribute to a water quality violation and impact New York's water resources. New York also funds several programs that are available to all farms, including smaller AFOs. The AEM program, Dairy Advancement Program (DAP), and NRCS's program help farms with conservation plan development (including CNMPs) and implementation of best management practices. To date, 13,500 practices on over 2,500 farms have been implemented through the AEM programs, the DAP has helped more than 300 non-CAFO farms develop CNMPs, and those NYS program accomplishments can be doubled when considering projects completed through USDA NRCS and the Farm Service Agency. These programs augment the substantial investment by farmers and ensure that farms of all types and scales have the resources to implement nutrient management practices on their farms to aid with environmental management. Roughly 1,000,000 acres of cropland are impacted annually in New York by nutrient management guidelines due to the various programs in place.