AEM Tier 2 Worksheet
Nutrient Management: Manure and Fertilizer

Glossary

Animal Unit: One animal unit equals 1,000 lbs. of live animal body weight, and correlates to the amount of manure produced.

Concentrated Flow: Flow of water, greater than ½ inch that carries potential pollutants across a vegetative buffer.

Field Runoff Potential: Measurement of risk derived from soil characteristics and topography that estimates the potential for surface loss of nutrients.

Eutrophication: The process of nutrient enrichment and excess algae or plant growth in a waterbody.

Nitrogen Management Tests: Soil and plant tests such as the Pre-Sidedress Nitrate Test (PSNT), Corn Stalk Nitrate Test (CSNT), Illinois Soil Nitrogen Test (ISNT), etc.

Vegetative Buffer: A permanent strip of dense, vigorous perennial vegetation of at least 35 feet in width established and maintained along a watercourse or stream. See NRCS Standards NY 393 (Filter Strip), NY 390 (Riparian Herbaceous Buffer), and NY 391 (Riparian Forest Buffer).

Watercourse: Water flowing over a non-vegetated channel to a waterbody.

Background

Nutrient management using soil tests, crop needs based on realistic yields, and effective application of manure and fertilizer can enhance crop productivity and farm profitability while decreasing farm operating costs. Proper application method, rate, and timing optimize the uptake of nutrients by the crop and minimize nutrient loss to the environment.

If used properly, manure is an excellent crop nutrient source and soil conditioner. Bacterial and protozoan pathogens in manure can pose a human health risk when found in drinking and recreational waters. Nitrate can leach to groundwater, creating potential human and animal health risks. Nitrate, ammonia and phosphorus can also reach surface waters, stimulating undesirable algae and plant growth, and consequently damaging recreational and drinking water uses. Phosphorus is usually the limiting nutrient for plant growth in fresh water and regardless of source can accelerate eutrophication.

Nutrients in fertilizers can also leach to groundwater or be carried by runoff into surface water, degrading water quality. Excessive nitrate concentrations in drinking water can negatively affect human and animal health. In addition to the concerns associated with phosphorus, excess potassium in feed or water can cause animal health problems.

A sound and comprehensive nutrient management plan should account for nutrients from all sources, including prior nutrient applications, soil and crops; incorporate conservation practices that control erosion and manage runoff; and deliver recommendations to minimize losses to the environment through efficient nutrient use by crops.

AEM Principle

Nutrients for crop production used by farms should be applied to land in a manner that optimizes the nutrient value and soil conditioning benefits while protecting surface and ground water resources.

AEM Tier 2 Worksheet: **Manure and Fertilizer Management** **Table 1: General**		**Potential Concern**		
Factors Needing Assessment	**Lower** **1**	**2**	**3**	**Higher** **4**
Do you follow an up to date nutrient management plan based on soil tests, crop needs and nutrient sources?				
How many acres typically receive manure application?				
How many animal units do you have? (Complete calculation on page 4)				
If manure is exported off the farm, what percentage is exported?				
Based on the above information, how many animal units do you have per acre of land to which manure is applied?				
How often do you soil test?	All fields are soil tested at least every 1 or 2 years.	All fields are soil tested at least every 3 years.	Fields are soil tested regularly, but less often than every 3 years.	Soil testing is not done regularly on fields.
Does your farm manage soils for optimum pH levels?	Soils are tested for pH and amended with lime to maintain optimum pH.		Lime is applied, but not based on soil test results.	Soils are not amended with consideration of pH levels.
How often do you test manure for nutrient content?	There is a history of manure testing that characterizes variability throughout the year. **AND** Manure is tested every year.		Manure is tested at least every other year.	

AEM Tier 2 Worksheet: **Manure and Fertilizer Management** **Table 1: General**		**Potential Concern**		
Factors Needing Assessment	**Lower** **1**	**2**	**3**	**Higher** **4**
Does your farm regularly use nitrogen management tests (e.g. PSNT, CSNT, ISNT) to adjust nitrogen rates?				
Do you keep records of nutrient applications to fields?	Records are kept indicating the amount applied, source, yields, rotations, and fertilizer applications for each field.		Records are kept indicating the amount applied, only.	No records of amount applied, yields, and rotations for each field.
Do you calibrate manure and fertilizer application equipment?	All nutrient application equipment is calibrated yearly to determine the amount applied per acre.		Nutrient application equipment is calibrated occasionally to determine the amount applied per acre.	Nutrient application equipment is not calibrated.
How is the rate of manure and fertilizer application determined?	Nutrients are applied based on land grant guidelines. **AND** Commercial fertilizer applications are adjusted in order to meet crop needs.	Manure is applied based on crop needs, with nitrogen as the priority nutrient. **AND** Commercial fertilizer applications are adjusted in order to meet crop needs.	Manure is occasionally applied in rates that exceed the nitrogen needs of the crop. **OR** Commercial fertilizer applications only partially take into account nutrients in manure.	Manure is often applied at rates that exceed the nitrogen needs of the crop. **OR** Commercial fertilizer applications do not take into account nutrients in manure.
How is nitrogen application determined?	Account for past and current manure application rates, soil nitrogen supply potential, and crop history. **AND** Routinely conduct field by field nitrogen management tests.		Some consideration of previous manure application rates, soil nitrogen supply potential, or crop history.	No accounting of previous manure application rates, soil nitrogen supply potential, or crop history.

AEM ID: _____ Date: _____

Formula for Calculating Animal Units

Animal Type	Number (from Tier 1)	×	Average Weight (lbs; from Tier 1)	=	Total Weight (lbs)	÷	1000 lbs/Animal Unit	=	Number of Animal Units
		×		=		÷	1000 lbs/AU	=	
		×		=		÷	1000 lbs/AU	=	
		×		=		÷	1000 lbs/AU	=	
		×		=		÷	1000 lbs/AU	=	
		×		=		÷	1000 lbs/AU	=	
								+	
								Total Animal Units for the Farm	

AEM Tier 2 Worksheet: Manure and Fertilizer Management Table 2: Manure Application		**Potential Concern**		
Factors Needing Assessment	**Lower 1**	**2**	**3**	**Higher 4**
Have there been any concerns about manure contamination of wells on or near the farm?				
Are field runoff potentials considered in scheduling manure applications?	Manure is never spread when fields: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high **AND** Manure is applied just prior to planting or to a growing crop.	Manure is never spread when fields: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high **AND** Manure is applied during the growing season to fields with the highest runoff potential and outside the growing season to fields with the lowest runoff potential.	Manure is sometimes spread on fields that: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high **AND** Manure is applied outside the growing season to fields with the lowest runoff potential.	Manure is sometimes spread on fields that: -- are saturated or frozen -- are prone to flood; or -- when runoff risk is high **AND** Fields are not prioritized based on runoff potential.
How close is manure spread to wellheads or springs?	Manure is not spread within 200 ft. from any wellhead or spring.	Manure is not spread within 100 ft. from any wellhead or spring.	Manure is not spread within 50 ft. from any wellhead or spring.	Manure is spread less than 50 ft. from any wellhead or spring.
Are vegetative buffers maintained along watercourses in fields receiving manure?	A vegetative buffer that meets NRCS Standards is maintained along water courses in fields receiving manure.	A naturally occurring buffer of at least 35ft. exists along watercourses adjacent to fields.	A naturally occurring buffer of at least 10ft. exists along watercourses adjacent to fields.	Little or no vegetation exists along watercourses in fields receiving manure.
How close is manure spread to surface waters?	Manure is not spread within 100ft. of surface water. **OR** Manure is not spread within 35ft. of surface water where a vegetative buffer meeting NRCS Standards exists.	Manure is not spread within 35ft. of surface water where a vegetative buffer meeting NRCS Standards exists.	Manure is spread less than 100ft. from surface water where no vegetative buffer exists.	No manure spreading setbacks are used.

AEM Tier 2 Worksheet: **Manure and Fertilizer Management** **Table 2: Manure Application**		**Potential Concern**		
Factors Needing Assessment	**Lower** **1**	**2**	**3**	**Higher** **4**
How is manure incorporated after spreading?				
If the farm has soils shallow to bedrock or with a high leaching potential, how is manure spread?	Manure is never spread when fields: - are saturated or frozen or, - when runoff risk is high **AND** Manure is applied just prior to planting or to a growing crop.	Manure is never spread when fields: - are saturated or frozen or, - when runoff risk is high **AND** Manure is applied during the growing season to fields with the highest leaching risk and outside the growing season to fields with the lowest leaching risk.	Manure is never spread when fields: - are saturated or frozen or, - when runoff risk is high **AND** Manure is applied outside the growing season to fields with the lowest leaching risk.	Manure is never spread when fields: - are saturated or frozen or, - when runoff risk is high **AND** Fields are not prioritized based on leaching risks.

AEM Tier 2 Worksheet: **Manure and Fertilizer Management** **Table 3: Fertilizer Application**		**Potential Concern**		
Factors Needing Assessment	**Lower** **1**	**2**	**3**	**Higher** **4**
How is the rate of fertilizer application determined?	Fertilizer rate is based on land grant university guidance and, for P and K, by an appropriate soil test lab. **AND** Soil tests are within the past 3 years. All other nutrient sources are accounted for (e.g. crop residues and manure). **AND** Proper soil pH is maintained.			Fertilizer rate is not based on soil tests. **OR** Other nutrient sources are unaccounted for. **OR** Proper pH is not maintained.
What is the timing of application?	Nutrients are applied as close to the period of maximum nutrient uptake as possible.			Fertilizer is applied outside the growing season.
Is fertilizer spread on soils shallow to bedrock or with a high leaching potential?				
Does your farm import other sources of nutrients (e.g. manure, poultry litter, whey, or other food waste, bio solids) and are they accounted for in your applications to fields?				
Benefits to other resources can also be possible while working toward improved water quality. Taking stock of how existing and future management affect **soil, water, air, plants, animals, energy, greenhouse gases, people, and economics** can result in more effective plans and additional benefits to farms and communities both now and into the future. **Additional Comments:**				