Changes Made in the proposed Iowa 590 Standard

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Changes made in the proposed 2013 Iowa 590 Nutrient Management Standard using the 2008 Iowa 590 standard as a baseline and incorporating the 2012 National 590.

1. General changes
    a. Changed wording to bring language into compliance with the Plain Writing Act of 2010
        i. Changed from passive voice to active voice as appropriate
        ii. Created more bulleted lists out of paragraph lists
        iii. Provided more headings to facilitate finding topics
    b. Re-organized to align better with the planning process
    c. More consistent use of 4Rs language (**R**ight amount, **R**ight source, **R**ight placement, and **R**ight timing) to describe nutrient management planning .
    d. Manure and commercial fertilizer management are treated more similarly than different.
2. Adds "reducing odor" to the air quality purpose.
3. Adds municipal and industrial biosolids management as sources of plant nutrients as a purpose plus related criteria.
4. Adds criteria for organic crop production and precision agriculture.
5. Adds organic matter analysis to each soil test (previously every 12 years)
6. Switches from "yield goal" language to "realistic yield potential" and provides simpler methodologies to estimate.
7. Adds manure with high ammonium content and MAP/DAP to the current anhydrous criteria for fall application (50 degrees or colder)
8. Adds a "Rescue Nitrogen Application" section to the criteria, which allows over-application of N when weather causes a loss of N. Specifies evaluating the cause of the N loss, and formulating and evaluating management alternatives.
9. Adds Iowa State University as a source of nutrient "book values" for manure.
10. Eliminates the requirement that sheet and rill erosion be controlled to Tolerable Soil Loss or "T". Requires that when "T" is not met the P-Index be used and met.
11. Removes the reference to using the 303d list to trigger the use of the P-Index. The old criteria "Directly draining into…" a 303d listed water body was difficult to define and implement. The placement trigger criteria are designed to require the use of the P-Index when there is a potential that the risk of P runoff is high.
12. Adds a Leaching Index report which estimates the likelihood that water will leach through the field. Interpretations will be used for educational purposes.
13. Besides nutrient management, indicates that to meet water quality goals, additional conservation practices may need to be installed to control and trap nutrients preventing them from being delivered to surface or ground water. This was indirectly part of the criteria previously through the P-Index. Now it is explicit. N trapping conservation practices are added.
14. Sensitive area nutrient application restrictions apply to all P & N nutrient sources. Emphasis before was on manure.
15. Adds tile inlets to the list of water quality sensitive areas
16. Specifies that fields within well source water protection areas be identified. Previously criteria was generic.
17. Adds that manure testing will be done by a certified lab.
18. Adds guidance to use adaptive nutrient management.
19. Some of the important topics which have no functional change, though the language is different, include:
    a. Applications of manure to frozen, snow covered, or saturated soils is precluded except for some emergency situations.

b. The Iowa Phosphorus Index and interpretations remain the same.

20. Additional relevant guidance for nutrient management is in:
    a. NRCS Title 190, General Manual (GM), Part 402, National Nutrient Management Policy
    b. NRCS National Instruction (NI) 190- 302, Nutrient Management Policy Implementation which provides guidance for the risk assessments (e.g. P-Index).
21. The addition of considerations to improve soil quality.

The draft 590 document file and this document with a side-by-side comparison of the current Iowa 590 standard, the national standard, and the proposed Iowa standard are available at:
http://www.ia.nrcs.usda.gov/technical/draftstandards.html

Please send review comments to:
Eric G. Hurley (eric.hurley@ia.usda.gov)

Criteria: Compare 08IA590, 12Nat590, & Proposed 13IA590

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The order is based on proposed 2013 Iowa 590. To see the orders of the other versions see:

a. 2008 Iowa 590 http://efotg.sc.egov.usda.gov/references/public/IA/Nutrient_Management_590_STD_2008_12.pdf
b. 2012 Nat 590 http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046896.pdf

2008 Iowa 590	**2012 National 590**	**Proposed 2013 Iowa 590** (Order based on this version)	**Explanation, Justification, Notes, Concerns**
DEFINITION	**DEFINITION**	**DEFINITION**	
Managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendments.	Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.	Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.	No substantive change. There is a concern that using the word "amount" is confusing. "Rate" is probably a better word. However, it was not considered important enough to request a variance.
PURPOSE	**PURPOSE**	**PURPOSE**	
•To budget and supply nutrients for plant production. •To properly utilize manure or organic by-products as a plant nutrient source. •To minimize agricultural nonpoint source pollution of surface and ground water resources. •To protect air quality by reducing nitrogen emissions (ammonia and NOx compounds) and the formation of atmospheric particulates. •To maintain or improve the physical, chemical and biological condition of soil.	•To budget, supply, and conserve nutrients for plant production. •To minimize agricultural nonpoint source pollution of surface and groundwater resources. •To properly utilize manure or organic by-products as a plant nutrient source. •To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates. •To maintain or improve the physical, chemical, and biological condition of soil.	• To budget, supply, and conserve nutrients for plant production. • To minimize agricultural nonpoint source pollution of surface and groundwater resources. • To properly utilize manure, municipal and industrial biosolids, and other organic by-products as a plant nutrient source. • To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates. • To maintain or improve the physical, chemical, and biological condition of soil.	- 2012 Nat 590 added "reducing odor" to air quality. - Added "municipal and industrial biosolids, and other" to the manure and organic by-products purpose. The reason for this is that: ○ "municipal and industrial biosolids" provides more clarity that these products are now included in the 590 standard. ○ "municipal and industrial biosolids" are well understood terms. The term "biosolid" is referenced in materials which describe the changes to the 590 (i.e. NHCP Notice 157) and ***is used consistently in the 590 criteria and other sections***. (Note, however, that "biosolid" is not defined in the GM). ○ The use of "municipal and industrial" recognizes the different regulations impacting these products. ○ "Organic by-products", as defined in the General Manual (GM_190_402` - Part 402 - Nutrient Management .402.1(10)), excludes sewage sludge, so without the change, this could cause confusion. ○ The changes from "or" to "and" indicate that all sources should be properly used.

CONDITIONS WHERE PRACTICE APPLIES	CONDITIONS WHERE PRACTICE APPLIES	CONDITIONS WHERE PRACTICE APPLIES	
This practice applies to all lands where plant nutrients and soil amendments are applied.	This practice applies to all lands where plant nutrients and soil amendments are applied. This standard does not apply to one-time nutrient applications to establish perennial crops.	This practice applies to all lands where plant nutrients and soil amendments are applied.	Removed the sentence "This standard does not apply to one-time nutrient applications to establish perennial crops.". The sentence could cause confusion for those planting alfalfa or other perennial crops in a rotation and so was removed. **Other Notes:** This change makes the standard more restrictive, so does not require a variance.
CRITERIA	**CRITERIA**	**CRITERIA**	
General Criteria Applicable to All Purposes	**General Criteria Applicable to All Purposes**	**General Criteria Applicable to All Purposes**	The criteria section was reorganized to: - Better follow the decision making process - Group items under the 4R paradigm - Eliminate some redundancy.
A nutrient management plan for nitrogen, phosphorus, and potassium shall be developed that considers all potential sources of nutrients including, but not limited to: •legume credits, •animal manure and organic by-products, •waste water, •commercial fertilizer, •crop rotation, •soil nutrient availability, •and irrigation water.	A nutrient budget for nitrogen, phosphorus, and potassium must be developed that considers all potential sources of nutrients including, but not limited to, green manures, legumes, crop residues, compost, animal manure, organic by-products, biosolids, waste water, organic matter, soil biological activity, commercial fertilizer, and irrigation water.	Develop a nutrient management plan for nitrogen, phosphorus, and potassium that considers the crop requirements and all potential sources of nutrients including, but not limited to: • commercial fertilizer • animal manure • legume credits and green manure, • crop rotation • municipal and industrial biosolids and other organic by-products • compost • waste water • organic matter and soil nutrient availability • removal of crop materials • irrigation water.	Changed list modestly. - Highlighted commercial fertilizer by listing first - Biosolid language reflects change in Purpose
All commercial nutrient applications shall be based on ISU recommendations for		Documents cited in this standard may be periodically updated or replaced. Use the	External documents, especially technical papers from ISU, are referenced extensively. This statement was added to recognize that these documents change.

the soil type and crop to be grown. Use the most recent publications.		most recent version available. Find additional technical information on nutrient management at www.agronext.iastate.edu/soilfertility.	
Soil and Tissue Sampling and Laboratory Analyses (Testing)	**Soil, Manure, and Tissue Sampling and Laboratory Analyses (Testing).**	**Soil Sampling, Testing, and Analysis.**	Split the manure and tissue analysis. They are procedurally very different, are used at a different time in the planning process, and the information is used very differently. Moved manure analysis to the manure section.
At a minimum, obtain soil test analyses for phosphorus, potassium, and pH. All soil samples shall be collected according to Iowa State University (ISU) for sampling methods based on soil maps, management zones, or grid sampling. See ISU PM 287 "Take a Good Sample to Help Make Good Decisions." The minimum frequency for soil testing shall be once during a four-year period for continuous row crop or once during the cycle of other crop rotations that consists of close grown crops such as grasses and legumes. The sampling frequency can be less frequent for organic matter, however no greater than every 12 years.	Nutrient planning must be based on current soil, manure, and (where used as supplemental information) tissue test results developed in accordance with land-grant university guidance, or industry practice, if recognized by the university. Current soil tests are those that are no older than 3 years, but may be taken on an interval recommended by the land-grant university or as required by State code. The area represented by a soil test must be that acreage recommended by the land-grant university. Where a conservation management unit (CMU) is used as the basis for a sampling unit, all acreage in the CMU must have similar soil type, cropping history, and management practice treatment. The soil and tissue tests must	Base the nutrient plan on soil test results for, at a minimum, organic matter, phosphorus (P), potassium (K), pH, and buffer pH. Test, at a minimum, every 4 years of row crops or once during an extended rotation which includes perennial crops. For initial plans use tests no older than 2 years and account for nutrients applied at rates in excess of crop replacement since the last soil test. Use Iowa State University's (ISU) PM 287 "Take a Good Soil Sample to Help Make Good Decisions" for detailed soil testing guidance.	Substituted specific ISU references which cover the national criteria. There are minimal substantive changes from Iowa's current language. Organic matter testing was made standard rather than every 12 years.

	include analyses pertinent to monitoring or amending the annual nutrient budget, e.g., pH, electrical conductivity (EC) and sodicity where salts are a concern, soil organic matter, phosphorus, potassium, or other nutrients and test for nitrogen where applicable. Follow land-grant university guidelines regarding required analyses.		
All soil tests shall be analyzed by a soil test lab that is certified according to Iowa Department of Agriculture and Land Stewardship (IDALS) soil test lab certification standards.	Soil test analyses must be performed by laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program-Performance Assessment Program (NAPT-PAP) under the auspices of the Soil Science Society of America (SSSA) and NRCS, or other NRCS-approved program that considers laboratory performance and proficiency to assure accuracy of soil test results. Alternate proficiency testing programs must have solid stakeholder (e.g., water quality control entity, NRCS State staff, growers, and others) support and be regional in scope.	For soil analysis, use a lab that is certified by the Iowa Soil Testing Laboratory Certification Program, Commercial Feed and Fertilizer Bureau of the Iowa Department of Agriculture and Land Stewardship (IDALS).	The Iowa Laboratory Certification Program meets the 2012 Nat 590 standard.
Nutrient application includes form, source, amount, timing and method of application on each field. Plant nutrients may be applied as broadcast, starter, surface band other	Nutrients must be applied with the right placement, in the right amount, at the right time, and from the right source to minimize nutrient losses to surface and	**The 4Rs** Consider the 4Rs of nutrient management – apply the **R**ight nutrient source at the **R**ight rate at the **R**ight time in the **R**ight place – to improve	New language is more explicit about naming "The 4Rs" to provide a more consistent message with the Fertilizer Institute and throughout this document. The other ideas in the IA590 are included elsewhere.

than starter, or injected band applications. Nutrients shall be applied to achieve realistic production goals, while minimizing nitrogen and/or phosphorus movement to surface and/or ground waters.	groundwater.	nutrient use efficiency by the crop and to minimize nutrient losses to the surface and groundwater and to the atmosphere.	
Nutrient Application Rates	**Nutrient Application Rates**	**Nutrient Application Rates**	
	At a minimum, determination of rate must be based on crop/cropping sequence, current soil test results, realistic yield goals, and NRCS-approved nutrient risk assessments.	Determine the nutrient application rate to: • Meet the crop's nutrient requirements for production • Account for nutrient credits and rotational effects • Account for removal of crop materials • Conserve resources as indicated by the erosion and nutrient risk assessments, and • Integrate the management of manure, municipal and industrial biosolids, and other waste products as crop nutrients.	Introduction consolidates ideas previously dispersed to better reflect the stepwise process of determining the nutrient rate.
All commercial nutrient applications shall be based on ISU recommendations for the soil type and crop to be grown. Use the most recent publications.	Planned nutrient application rates for nitrogen, phosphorus, and potassium must not exceed land-grant university guidelines or industry practice when recognized by the university.	Plan to meet the crop nutrient requirements for nitrogen, phosphorus, potassium, and other nutrients according to Iowa State University recommendations.	- Chose "nutrient requirements" instead of "nutrient application rates" to distinguish between what the crop needs and what will be applied, which will be calculated in a subsequent step. - Based on an CNTSC Agronomy Conference Call, the 2012 Nat 590 language does not set a nutrient cap based on the agronomic needs of the crop independent of other considerations in the plan (i.e. if soil test P is high, may still be able apply manure even if not agronomically needed as long as the resource conservation concerns are met).
See ISU-Extension Publications PM1714 "Nitrogen Fertilizer Recommendations for Corn		<u>Nitrogen Application Rates</u> To determine nitrogen rates for corn in a continuous corn or corn-soybean rotation, use	

in Iowa",...		ISU's Corn Nitrogen Rate Calculator or use PM1714 "Nitrogen Fertilizer Recommendations for Corn in Iowa."	
Where the Late Spring Nitrate Test is not applicable, use the general recommendations for nitrogen found in Iowa State Publications ISU PM-1714 "Nitrogen Fertilizer Recommendations for Corn in Iowa", ISU PM-869 "Fertilizing Pasture", ISU PM-1584 "Cornstalk Testing to Evaluate Nitrogen Management".		For within season sampling to determine sidedress nitrogen application rates, follow ISU procedures for the late-spring soil nitrate test in PM1714 or leaf chlorophyll values in PM2026 "Sensing Nitrogen Stress in Corn."	Split the in-season testing where the results are used immediately from the end-of-season testing which evaluate the current year N management and could be used in the future to modify standard rates.
		For additional nitrogen rate information and recommendations use ISU publications: • PM 2015 "Concepts and rationale for regional nitrogen rate guidelines for corn", • PM-1714 "Nitrogen Fertilizer Recommendations for Corn in Iowa", • PM-869 "Fertilizing Pasture", • PM-1584 "Cornstalk Testing to Evaluate Nitrogen Management", • PM 2026 "Sensing nitrogen stress in corn".	
		Use of the end-of-season cornstalk test especially in conjunction with on-farm field trials is encouraged to	This section points to adaptive management. However, actual criteria to make a decision using this data is still not available.

		evaluate the nitrogen management program. See ISU publication PM 1584 "Corn Stalk Test to Determine Nitrogen" and NRCS Agronomy Technical Note No. 6, "Adaptive Nutrient Management". The corn stalk test provides post season feedback on nutrient management that can be used to adjust the nutrient source, rate, timing, and/or placement. Document how results will be reviewed and incorporated into future management.	
The amount of nitrate-nitrogen that moves below the crop root zone is directly related to nitrogen application rate. Therefore, over-application in an attempt to produce unrealistic yields or offset anticipated losses shall be avoided.			Removed as not needed. Over-application does not meet the standard.
...PM-1688 "General Guide for Crop Nutrient Recommendations in Iowa", and PM 869 "Fertilizing Pasture". Phosphorus and potassium application for crop and forage production (including non-crop areas) shall be based on soil test results. All nutrient values for		<u>Phosphorus and Potassium Application Rates</u> For P_2O_5 and K_2O requirements for most common crops, use soil test results and PM 1688 "General Guide for Crop Nutrient and Limestone Recommendations in Iowa". Use PM-869 "Fertilizing Pasture" for pasture nutrient requirements. Express phosphorus and potassium	- Split P & K from N above for clarity as recommendations are derived differently and from different sources.

phosphorus and potassium should be expressed in pounds of P2O5 and K2O.		nutrient values in pounds of P_2O_5 and K_2O.	
		P_2O_5 and K_2O can be managed annually or for multiple years. Sum the nutrient requirements for all the crops in the years planned (i.e. a rotation) and apply once or split as convenient.	- This clarifies that P & K can be planned annually or for multiple years up to the entire rotation. Currently, this applies only for manure. This would shift it clearly to any nutrient source.
		Phosphorus and potassium application rates may exceed the crop's nutrient requirements when manure, municipal and industrial biosolids, and other organic by-products are applied based on the N rate or need to be disposed. See Additional Criteria Applicable to Properly Utilize Manure Municipal and Industrial Biosolids, and Other Organic By-Products as a Plant Nutrient Source for management criteria.	
For new crops or varieties, industry yield recommendations may be used until documented yield information is available.	If the land-grant university does not provide specific guidance that meets these criteria, application rates must be based on plans that consider realistic yield goals and associated plant nutrient uptake rates. For new crops or varieties, industry- demonstrated yield, and nutrient utilization information may be used until	For crops without specific ISU guidance, base nutrient application rates on university recommendations from neighboring states and/or plant nutrient removal.	This provides clearer guidance on how to proceed in these cases.

	land-grant university information is available.		
All nutrient applications shall be based on realistic yield potential for the field. Guidance for estimating realistic yield potentials is outlined in ISU-Extension Publication PM-1268 (rev) "Establishing Realistic Yields." Realistic yield potentials can be established based on soil productivity information, historical yield data, climatic conditions, level of management and/or local research on similar soils, cropping systems, and soil and manure/organic by-products tests.	Realistic yield goals must be established based on historical yield data, soil productivity information, climatic conditions, nutrient test results, level of management, and local research results considering comparable production conditions.	<u>Realistic Yield Potential</u> Estimate the field's realistic yield potential using: • an average of two or more years of field yield data using producer records plus 10%, or • the crop yield estimate for the dominant soil in the field as found in the Electronic Field Office Technical Guide plus 10%, or • PM 1268 "Establishing Realistic Yields" (1986) to calculate a more precise estimate if desired.	- "Realistic yield potential" is substituted for the term "yield goal" as it implies what realistically can be achieved based on available data rather than "goal" which implies what we would like to see achieved in production. This is consistent with current ISU usage. - The changes reflect less emphasis on producing a precise yield estimate. P and K recommendations are generally made in broad categories and do not require the level of precision previously required when it was used to calculate N rates.
All nutrient additions shall be adjusted for contributions from legumes, manure or other organic nutrient sources. Legume contributions are shown in ISU Publication PM-1714 "Nitrogen Fertilizer Recommendations for Corn in Iowa".		<u>Nutrient Credits</u> To determine the nutrient application rate subtract the nutrient credits for legumes, manure, municipal and industrial biosolids, and/or other organic sources from the crop's nutrient requirements. Note that ISU nitrogen recommendations already accounts for the rotational effects and legume credit for corn following soybeans. Legume credits can be found in ISU Publication PM-1714 "Nitrogen Fertilizer	Both the Corn Nitrogen Rate Calculator and PM-1714 account for rotational effects and legume credits in the recommendations.

		Recommendations for Corn in Iowa". Use PMR 1003 "Using manure nutrients for crop production" to determine the 2nd and 3rd year manure credits.	
	Applications of biosolids, starter fertilizers, or pop-up fertilizers must be accounted for in the nutrient budget.	<u>Other Rate Criteria</u> Account for all applied nutrients including starter, in-furrow starter (pop-up), biosolids, and the N in MAP and DAP.	Identifies specific nutrient applications which are, at times, left out of the nutrient management plan.
	Estimates of yield response must consider factors such as poor soil quality, drainage, pH, salinity, etc., prior to assuming that nitrogen and/or phosphorus are deficient.	Consider the impact on yield of poor soil quality, drainage, pH, weather, and other factors that influence production, as well as the source, timing, and placement of nutrients before concluding that nutrients are deficient.	
	Lower-than-recommended nutrient application rates are permissible if the grower's objectives are met.	Nutrients and lime may be applied at lower-than-recommended rates if the grower's objectives are met.	
<No such section>	**Nutrient Sources**	**Nutrient Sources**	
	Nutrient sources utilized must be compatible with the application timing, tillage and planting system, soil properties, crop, crop rotation, soil organic content, and local climate to minimize risk to the environment.	Use nutrient sources compatible with the application timing, tillage and planting system, soil properties, crop, crop rotation, soil organic content, and local climate to minimize risk to the environment.	
	Enhanced efficiency fertilizers, used in the State must be defined by the Association of American Plant Food Control Officials (AAPFCO) and be	Use fertilizers which have been verified by IDALS Feed and Fertilizer Bureau to contain the nutrients claimed on the label. For Enhanced	There are two issues: 1) Verify that the product contains what it claims. 2) Verify that the product does what it claims. Iowa verifies the label content claims of fertilizers, so this was

	accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.	Efficiency fertilizer products use the Association of American Plant Food Control Officials definitions for these products.	included. AAPFCO provides categorical definitions of EEFs (i.e. nitrification inhibitor, etc.) Iowa does not verify the efficacy of "enhanced efficiency fertilizer" (EEF). AAPFCO does not verify the efficacy of EEF. There does not appear to be an institution that will in the near future verify the efficacy or lack of efficacy of the various fertilizer products. The only exceptions are a few university studies and many industry field trials. Unfortunately, there is a bias against publishing negative results which adds to the difficulty of evaluating the efficacy of these products.
	On organic operations, the nutrient sources and management must be consistent with the USDA's National Organic Program.	On Certified Organic or Certified Transitional Organic operations, use nutrient sources and manage nutrients consistent with the USDA's National Organic Program.	Moved from the first section. Made statement more specific. "Organic operations" is unclear.
		See Additional Criteria Applicable to Properly Utilize Manure, Municipal and Industrial Biosolids, and Other Organic By-products as a Plant Nutrient Source section below for criteria for these nutrient sources.	
	Nutrient Application Timing and Placement	**Nutrient Application Timing and Placement**	
Timing and method of nutrient application (particularly nitrogen) shall correspond as closely as possible with plant nutrient uptake characteristics, while considering cropping system limitations, weather and climatic conditions, risk assessment tools, (e.g., P-index) manure storage capacity and field	Timing and placement of all nutrients must correspond as closely as practical with plant nutrient uptake (utilization by crops), and consider nutrient source, cropping system limitations, soil properties, weather conditions, drainage system, soil biology, and nutrient risk assessment results.	Consider the nutrient source, cropping system limitations, soil properties, weather conditions, drainage system, soil biology, and nutrient risk assessment to develop optimal timing and placement of nutrients. • For nitrogen, timing and placement should correspond as closely as practical with crop uptake.	Timing criteria changed from national to account for differences in P management versus N.

accessibility.		• For phosphorus avoid surface application when the runoff potential is high. • For anhydrous ammonia, to avoid losses during application apply when soil moisture conditions are conducive to proper injection and sealing.	
		<u>Fall versus Spring Application</u> Corn nitrogen rate guidelines for Iowa (see the Corn Nitrogen Rate Calculator website for rates and PM 2015: "Concepts and Rationale for Regional Nitrogen Rate Guidelines for Corn" for an explanation of the method) are based on spring or sidedress N application research trials. In comparison to fall application, spring N application improves crop uptake efficiency and reduces the loss of nitrate. Fall application increases the risk for nitrogen loss and reduces nitrogen use efficiency. However, with some manure and biosolid sources, such as bedded manure, fall application increases the mineralization of organic N and improves early season N supply.	New. Provides some background on the complexities of making fall versus spring timing decisions.
No fall application of commercial nitrogen shall be made with the following exceptions:		In general, plan to apply N in the spring for most nutrient sources. If for logistical or other reasons N is fall	**Significant change**. Adds some manures, MAP, and DAP to the criteria to apply in colder soils. Applying ammoniacal fertilizers to colder soils rather than earlier in the fall when soils are warm reduces the rate of nitrification and decreases the

Anhydrous ammonia if: (1) mid-day soil temperatures, at 4"soil depth, is not greater than 50oF and trending lower; (2) soil moisture conditions are conducive to proper application and sealing and (3) soil texture conditions favor the retention of applied nitrogen. Application of nitrogen associated with products that contain phosphorus and/or potassium.		applied – such as anhydrous ammonia, manure with high ammonium content, or MAP/DAP – plan to apply late in the fall when the mid-day soil temperatures, at 4" soil depth, is below 50°F and trending colder. The actual application timing may occasionally vary due to fall weather, the weather forecast, soil conditions, and logistics. Do not fall apply urea and urea-ammonium nitrate solutions (UAN) due to the high risk for N loss.	likelihood that nitrate leaching will occur. The intent of the additional variance language is meant to recognize the need for flexibility to deal with weather and contractors, but will still maintain the planning expectation that fall N will be applied in a way that optimizes N availability for the crop. Hopefully, over time, we can build our capacity to apply N during this smaller optimal window in the same way we have built our capacity to plant and harvest so much more quickly. The Urea and UAN statements are new. Fall application of these products have a high risk of volatilization and leaching.
Nitrogen associated with the production of winter grains.		For small grains planted in the fall, part of the N can be applied in the fall, typically in conjunction with phosphorus application, with the remainder applied topdress in the spring.	
		<u>Rescue Nitrogen Application</u> Nitrogen applied at any time is subject to leaching if the fertilizer contains nitrate or converts to nitrate and excess soil wetness occurs before crop uptake. This risk increases with fall application, especially early fall application, due to greater conversion to nitrate by the springtime. If losses are suspected, use the Late Spring Soil Nitrate Test (ISU publication PM-1714, "Nitrogen Fertilizer Recommendations for Corn in	**Significant change.** Section added to address the concern that previous standards did not allow for weather conditions which could cause a loss of N even when the N is being managed in a way that otherwise meets the standard. With proper testing, rescue N applications can be made.

		Iowa") or the crop canopy sensing technique outlined in ISU publication PM 2026, "Sensing Nitrogen Stress in Corn" to assess the loss and determine the application rate of rescue N. New in-season nitrogen assessment technologies are being developed. As they are proven, these can be chosen as alternatives.	
		If rescue N is needed on fields in which a full rate of N is applied in the fall, evaluate the likely causes and formulate and consider alternative nitrogen management options. Consider testing N management alternatives using strip trials over multiple years and fields. See NRCS Agronomy Technical Note 6: "Adaptive Management" for guidance. Especially consider switching to split, spring, and/or sidedress application to reduce the loss of N from fall application.	Stipulates that rescue N should not be a standard practice. If it is needed, perhaps the N management should change. At a future date, this criteria should be evaluated to make sure it is effective.
Plant nutrients may be applied as broadcast, starter, surface band other than starter, or injected band applications.			IA language from lead-in to the 2008 rates section. Information is dealt with elsewhere to a point.
For more information consult Iowa State University website on nitrogen management. http://extension.agron.iastat			Site dead. General citation made near the beginning.

e.edu/soilfertility/nutrienttopics/nutrienttopics.html			
Nutrients and organic nutrient sources shall not be surface applied to frozen, snow covered ground, or saturated soil if a potential risk for runoff exists. A potential risk for runoff exists on slopes greater than 5% unless erosion is controlled to soil loss tolerance levels ("T") or less. Manure may be surface applied to frozen, snow covered or saturated ground if a potential risk for runoff exists only under one of the following conditions. •Where manure storage capacity is insufficient and failure to surface apply creates a risk of an uncontrolled release of manure. •On an emergency basis.	Nutrients must not be surface-applied if nutrient losses offsite are likely. This precludes spreading on: • frozen and/or snow-covered soils, and • when the top 2 inches of soil are saturated from rainfall or snow melt.	Surface application of Nutrients to Frozen, Snow-Covered, and Saturated Soils Design the manure and fertilizer storage and management system to avoid the need to surface apply nutrients when the risk of runoff is high, including when: • the soils are frozen and/or snow-covered or • the top 2 inches of the soil are saturated. Manure may be surface applied to frozen, snow covered or saturated soils on an emergency basis if storage capacity becomes insufficient due to a natural disaster, unusual weather conditions, equipment or structural failure, or other similar events and failure to apply creates a risk of an uncontrolled release of manure.	Criteria is not changed. However, the language was extensively rewritten to be more clear. The national criteria is not changed from previous national versions.
Manure surface applied to frozen, snow covered, or saturated ground shall be based on a manure disposal plan. That plan shall include: •Under what circumstances the manure may be applied to frozen, snow covered, or saturated ground. (Ex: storage capacity exceeded).	Exceptions for the above criteria can be made for surface-applied manure when specified conditions are met and adequate conservation measures are installed to prevent the offsite delivery of nutrients. The adequate treatment level and specified conditions for winter	For such emergency cases, prepare a manure disposal plan which includes the: 1) Circumstances the manure may be applied to frozen, snow covered, or saturated ground (Ex: storage capacity exceeded); 2) Rates of application; 3) Areas of application which	Received from IDNR -- DNR regs require use of fields with <2.0

• Rates of application. • Area of application. • Other requirements such as runoff control as indicated through the use of the Iowa Phosphorus Index assessment tool	applications of manure must be defined by NRCS in concurrence with the water quality control authority in the State. At a minimum, the following site and management factors must be considered: • slope, • organic residue and living covers, • amount and form of nutrients to be applied, and • adequate setback distances to protect local water quality.	excludes slopes greater than 5% and sensitive areas and their setbacks; 4) Which demonstrates that all other nutrient management criteria are met including the erosion and nutrient risk assessment criteria; and 5) Meets state law.	Pindex and plugging of downgradient tile intakes. Could possibly incorporate similar language in 590. These items will be required in many cases due to requirement 5, "meet state law.
		<u>Other Timing and Placement</u> For pasture fertilization consult PM-569: "Warm-Season Grasses for Hay and Pasture" and PM-869: "Fertilizing Pasture" for guidance. Time nitrogen applications to pastures when crop demand is the greatest.	
	To avoid salt damage, the rate and placement of applied nitrogen and potassium in starter fertilizer must be consistent with land-grant university guidelines, or industry practice recognized by the land-grant university.	To avoid salt damage, follow ISU guidelines for the rate and placement of applied nitrogen and potassium in starter/pop-up fertilizers.	Moved from the first page.
Conservation Management Unit (CMU) Risk Assessment	**<u>Additional Criteria to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater</u>**	**<u>Additional Criteria to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater</u>**	
	When there is a high risk of transport of nutrients, conservation practices must be coordinated to avoid,	Use the tools below to assess the risk that the management system will impact water quality. When there is a high	

	control, or trap manure and nutrients before they can leave the field by surface or subsurface drainage (e.g., tile). The number of applications and the application rates must also be considered to limit the transport of nutrients to tile.	risk of transport of nutrients, apply conservation practices to control or trap manure, biosolids, and nutrients before they can leave the field by surface or subsurface (e.g., tile, groundwater) drainage.	
In areas with identified or designated nutrient related water quality impairment, a CMU (which is defined as a portion of a field, field, group of fields, or other land units of the same land use and having similar treatment needs and management plans) shall be assessed for the potential phosphorus transport risk from the area. See Agronomy Technical Note 25, Iowa Phosphorus Index. Any one of the following threshold factors will trigger CMU risk assessment: •The CMU is located in a watershed directly draining into waters identified in the Iowa Department of Natural Resources (DNR) Iowa Integrated Report as impacted by phosphorus. http://wqm.igsb.uiowa.edu/wqa/303d.html •Manure or organic by-products are applied •Soil loss exceeds the tolerable level •The average soil test phosphorus level in the very	For nutrient risk assessment policy and procedures see Title 190, General Manual (GM), Part 402, Nutrient Management, and Title 190, National Instruction (NI), Part 302, Nutrient Management Policy Implementation. The NRCS-approved nutrient risk assessment for nitrogen must be completed on all sites unless the State NRCS, with the concurrence of State water quality control authorities, has determined specific conditions where nitrogen leaching is not a risk to water quality, including drinking water. The NRCS-approved nutrient risk assessment for phosphorus must be completed when: • phosphorus application rate exceeds land-grant university fertility rate guidelines for the planned crop(s), or • the planned area is within a phosphorus- impaired watershed (contributes to 303d-listed water bodies), or	**Erosion and Nutrient Risk Assessment.** On each field calculate the risk to soil and water resources using the: • Revised Universal Soil Loss Equation 2 (RUSLE2) to estimate soil erosion, • Leaching Index (LI) to determine the relative risk of N leaching to ground or surface water, and Phosphorus Index Use the Iowa Phosphorus Index (P-Index) to estimate the risk that P will contaminate surface water. The P-Index is required when one or more of the following applies: • The phosphorus application rate exceeds land-grant university fertility rate guidelines for the planned crop(s) in the rotation, or • Manure, municipal and industrial biosolids, and/or organic by-products are applied, or • Soil loss exceeds the tolerable level, or • The average soil test	The leaching index will be recorded, but no planning criteria based on it are included. **Leaching Index (LI) Interpretations** We will be releasing a technical note about the Leaching Index (LI), however it will not be ready at the release of the 590. The LI value will be calculated by RUSLE2 and the interpretations will likely look like: • An LI > 10 inches indicates a HIGH risk that nitrate will leach below the rootzone. • An LI of 2 to 10 inches indicates a MEDIUM risk that nitrate will leach below the rootzone. • An LI < 2 inches indicates a LOW risk that nitrate will leach below the rootzone. No planning criteria will be based on these interpretations. An initial analysis indicates that over 97% of Iowa soils meet the MEDIUM risk category. Some LI interpretations split MEDIUM from LOW at LI=5. In this case 44% of the soil acres are medium risk and 58% low risk. It is presumed that for tile drained fields there is a HIGH risk that nitrate will leach into the tile lines. The trigger criteria for the P-Index referencing the 303d list is removed. The criteria "Directly draining into..." is difficult to define and implement. The remaining and replacement trigger criteria are designed to require the use of the P-Index when the risk of P runoff from a specific field is high. IDNR approved this change. For reference, here is the language from the P-Index interpretations that have to be met (no change): VERY LOW– 0-1 A field in which movement of P off site will be

high range as shown in ISU Publication PM-1688 "General Guide for Crop Nutrient Recommendation in Iowa".	• the NRCS and State water quality control authority have not determined specific conditions where the risk of phosphorus loss is low. A phosphorus risk assessment will not be required when the State NRCS, with concurrence of the State water quality control authority, has determined specific conditions where the risk of phosphorus loss is low. These fields must have a documented agronomic need for phosphorus; based on soil test phosphorus (STP) and land-grant university nutrient recommendations. Planners must use the current NRCS-approved nitrogen, phosphorus, and soil erosion risk assessment tools to assess the risk of nutrient and soil loss. Identified resource concerns must be addressed to meet current planning criteria (quality criteria). Technical criteria for risk assessments can be found in NI-190-302.	phosphorus for the field is in the very high range for corn based on ISU PM-1688. Meet the criteria of the Iowa Phosphorus Index as stated in the P-Index interpretations of site vulnerability ratings.	VERY LOW. If soil conservation and P management practices are maintained at current levels, impacts on surface water resources from P losses from the field will be small. LOW – >1-2 A field in which movement of P off site will be LOW. Although the P delivery to surface water bodies is greater than from a field with a very low rating, current soil conservation and P management practices keep water quality impairment low. MEDIUM – >2-5 A field in which movement of P off-site will be MEDIUM. Impacts on surface water resources will be higher than for the field with a low rating, and the P delivery potential may produce some water quality impairment. Careful consideration should be given to further soil conservation and P management practices that do not increase P delivery to surface water. HIGH – >5-15 A field in which movement of P offsite will be HIGH. Water quality impairment will be large. Remedial action is required to reduce P movement to surface water bodies. New soil and water conservation and/or P management practices are necessary to reduce offsite P movement and water quality degradation. VERY HIGH – >15 A field in which movement of P offsite will be VERY HIGH. Impacts on surface water resources are extreme. Remedial action is required to reduce P delivery to surface water. All necessary soil and water conservation practices plus a P management plan, which may require discontinuing P applications, must be put in place to reduce water quality impairment. **Other notes:** - A Nutrient Management Plan does not have to meet "T", but does have to meet the P-Index. A CNMP has to meet "T". - Criteria for specific risk assessment tools precludes need for General Manual or National Instruction reference. - CMU language removed as the term is not generally understood, nor does it provide additional function.
Land receiving nutrients shall		<u>Municipal Well Protection</u>	New language provides guidance on how to identify these

be evaluated for environmentally sensitive areas such as, but not limited to: … • wellhead protection areas …		Determine if the field is in a municipal well capture zone. Water infiltrating soil in these areas is likely to flow to the wellhead in 10 years or less. There is an elevated risk that nitrogen and other products applied on this land will contaminate the public well. To reduce the pollution risk, consider additional measures listed below.	areas. The risk assessment's primary function is educational for the producer. No additional criteria is required. IDNR is providing a GIS layer for this.
To minimize nutrient losses: • Apply nutrient materials uniformly to application area(s). • Nutrients shall be applied considering the plant growth habits, irrigation practices, and other conditions so as to maximize availability to the plant and minimize the risk of runoff, leaching, and volatilization losses.	Nutrients must be applied with the right placement, in the right amount, at the right time, and from the right source to minimize nutrient losses to surface and groundwater. The following nutrient use efficiency strategies or technologies must be considered: •slow and controlled release fertilizers •nitrification and urease inhibitors •enhanced efficiency fertilizers •incorporation or injection •timing and number of applications •soil nitrate and organic N testing •coordinate nutrient applications with optimum crop nutrient uptake •Corn Stalk Nitrate Test (CSNT), Pre-Sidedress Nitrate Test (PSNT), and Pre-Plant Soil Nitrate Test (PPSN) •tissue testing, chlorophyll	**Nutrient Management Strategies to Reduce Nonpoint Source Pollution** Consider using the following nutrient-use efficiency strategies or technologies: • include crops in the rotation which require less added nitrogen • more efficient timing and number of applications • incorporation or injection • calibrate application equipment and apply nutrient materials uniformly • coordinate nutrient applications with optimum crop nutrient uptake • slow and controlled release fertilizers • nitrification and urease inhibitors • late-spring soil nitrate test and chlorophyll meters (SPAD) • end-of-season cornstalk test • other ISU demonstrated technologies that improve	"other ISU…" statement provides the option to use new technologies as they become proven without changing the

	meters, and spectral analysis technologies •other land-grant university recommended technologies that improve nutrient use efficiency and minimize surface or groundwater resource concerns.	nutrient-use efficiency and minimize surface or groundwater resource concerns.	590.
		Strategies to Control and Trap Phosphorus Use the P-Index to formulate and evaluate conservation alternatives to control phosphorus and sediment runoff and/or to trap it before it can reach surface water. Some conservation practices to consider are: • 329 Residue and Tillage Management, No-Till/Strip Till/Direct Seed • 345 Residue and Tillage Management, Mulch Till • 330 Contour Farming • 340 Cover Crops • 393 Filter Strip • 391 Riparian Forest Buffer • 412 Grass Waterway • 638 Water & Sediment Control Basin • 600 Terrace	Points to guidance to control and trap P. Adding these conservation practices here is meant to encourage making nutrient management a part of a conservation plan. It recognizes that nutrient management is not a panacea to control non-point source pollution. These practices are already in the P-Index. This makes them a more explicit part of the decision making process.
		Strategies to Trap Nitrogen Agronomically appropriate nitrogen rates still often lead to surface and groundwater pollution. Consider the following conservation practices to trap the nitrogen not utilized by the crop. • 340 Cover Crops	New. Adds these *considerations* to trap N. Recognizes that nutrient management alone will not fully solve the problem of N delivery to surface and groundwater. Included here to better fit with the planning process as these are analogs to the P control and trapping strategies above.

		• 393 Filter Strip • 332 Contour Buffer Strips • 656 Constructed Wetland • 554 Drainage Water Management • 747 Denitrifying Bioreactors • 739 Vegetated Subsurface Drain Outlet	
Land receiving nutrients shall be evaluated for environmentally sensitive areas such as, but not limited to: • perennial water bodies, • areas of concentrated flow, • surface inlets, • Karst topography, • wellhead protection areas, • flood plain, • coarse textured soils			Moved from an earlier section. Most are addressed elsewhere in this section. Areas of concentrated flow, Karst topography, and coarse textured soils are poorly defined and/or have no implementation criteria. They have been moved to considerations.
C. Sensitive Areas. Manure and other organic nutrient sources shall not be applied to the following areas unless injected or incorporated within 24 hours: • Within 200 feet of sinkholes, drainage wells, or other direct conduits to the groundwater. • Within 200 feet of lakes, ponds, or other perennial water bodies.	Areas contained within minimum application setbacks (e.g., sinkholes, wellheads, gullies, ditches, or surface inlets) must receive nutrients consistent with the setback restrictions.	**Sensitive Area Restrictions.** A sensitive area is water we are trying to protect from pollution or direct conduits to that water. If a sensitive area is protected by a minimum 50 foot Filter Strip (NRCS Conservation Standard 393) then surface, unincorporated application of phosphorus and nitrogen can be made to the edge of the filter strip. Otherwise, do not apply phosphorus and nitrogen to the following sensitive areas unless injected or incorporated within 24 hours: • Within 200 feet upslope of sinkholes, drainage wells, wells, classic gullies, drainage	Note the shift from organic nutrients to all nutrients. This is new and designed to recognize the value of filter strips to reduce the need for a setback. **Significant change.** Addition of tile line surface inlets. Specified "upslope".

		ditches, tile line surface inlets including blind inlets, or other direct conduits to surface or groundwater. • Within 200 feet of lakes, ponds, streams, other perennial water bodies, or Iowa Designated Wetlands. • Within 800 feet of state designated High Quality Water Resources. See DNR 117 "High Quality Water Resources" for listing. Additional application restrictions may apply. See Iowa Department of Natural Resources (DNR) document DNR 113 "Separation Distances for Land Application of Manure" and DNR 117 "High Quality Water Resources."	
• During the peak flood periods (April, May, June, July) on land that floods more than once every 10 years.		**Other Nonpoint Source Pollution Criteria** During the peak flood periods (April, May, June, July) do not apply phosphorus and nitrogen on land that floods more than once every 10 years.	NRCS is attempting to develop a GIS layer approximating this.
• Nutrient applications associated with irrigation systems shall be applied in a manner that prevents or minimizes resource impairment.	Applications of irrigation water must minimize the risk of nutrient loss to surface and groundwater.	Apply irrigation water and use fertigation and chemigation in a manner which minimizes the risk of nutrient loss to surface and groundwater.	
Additional Criteria Applicable to Manure and Organic By-Products or	**Additional Criteria Applicable to Properly Utilize Manure or Organic By-Products as a**	**Additional Criteria Applicable to Properly Utilize Manure, Municipal and**	Information is significantly reorganized in this section.

Biosolids Applied as a Plant Nutrient Source	**Plant Nutrient Source**	**Industrial Biosolids, and Other Organic By-products as Plant Nutrient Sources**	
When animal manures or organic by-products are applied, the Iowa Phosphorus Index will be used as the risk assessment tool to evaluate the potential for phosphorus transport from the CMU and to adjust the amount, placement, form and timing of application of phosphorus sources.			Covered in water quality section.
	Crop production activities and nutrient use efficiency technologies must be coordinated to take advantage of mineralized plant-available nitrogen to minimize the potential for nitrogen losses due to denitrification or ammonia volatilization.	Coordinate manure storage and management with the cropping system so that manure can be applied at the right time and in the right place (surface, incorporated, or injected) so that: • the rate of mineralization releases nutrients when the crop can use them; • the loss of N due to denitrification or ammonia volatilization is minimized; and • P runoff is minimized.	Moved this general statement from near the end of the section to create an introduction which outlines the framework for making decisions. Focused statement on manure management and made it inclusive of both N and P.
Unless specific nutrient content for animal manure has been obtained through sample analysis, the nutrient value of animal manures will be estimated using the Agricultural Waste Management Field Handbook (AWMFH), Chapter 4.	Nutrient values of manure, organic by-products and biosolids must be determined prior to land application. Manure analyses must include, at minimum, total nitrogen (N), ammonium N, total phosphorus (P) or P2O5, total potassium (K) or K2O,	**Nutrient Content Analysis of Manure, Municipal and Industrial Biosolids, and Organic By-products** Analyze or estimate the nutrient content of manures, municipal and industrial biosolids, and other organic by-products prior to land application. At a minimum,	Manure testing was moved here from nutrient application rates section.

<In later manure section> Manure shall be analyzed for nutrient content of total nitrogen, phosphorus and potassium, percent moisture, and or percent solids. This analysis shall be done at least annually for each different source of manure being generated at the animal feeding operation. Methods for sampling manure are discussed in ISU Publication PM-1558 "How to Sample Manure for Nutrient Analysis".	and percent solids, or follow land-grant university guidance regarding required analyses. Samples must be collected, prepared, stored, and shipped, following land-grant university guidance or industry practice.	analyze for total nitrogen (N), ammonium N, total phosphorus (P) or P_2O_5, total potassium (K) or K_2O, percent moisture, and percent solids. For manures, use ISU's PM 1588 "How to Sample Manure for Nutrient Analysis" for detailed guidance. To interpret the results and estimate the plant availability of nutrients use ISU's PM 3014 "How to Interpret Your Manure Analysis" and PMR 1003 "Using Manure Nutrients for Crop Production."	
	Manure, organic by-products, and biosolids samples must be collected and analyzed at least annually, or more frequently if needed to account for operational changes (feed management, animal type, manure handling strategy, etc.) impacting manure nutrient concentrations. If no operational changes occur, less frequent manure testing is allowable where operations can document a stable level of nutrient concentrations for the preceding three consecutive years, unless federal, State, or local regulations require more frequent testing.	Test annually, at a minimum, to build a test history. If test values are stable for three consecutive years, testing can then be done every three to five years. Retest when operational changes occur (feed management, animal type, manure handling strategy, storage time, etc.) which might change the nutrient content or concentration in the manure.	
	Manure testing analyses must be performed by laboratories	Use a laboratory certified through the Minnesota	**Significant change.** May require outreach to the labs.

	successfully meeting the requirements and performance standards of the Manure Testing Laboratory Certification program (MTLCP) under the auspices of the Minnesota Department of Agriculture, or other NRCS-approved program that considers laboratory performance and proficiency to assure accurate manure test results.	Department of Agriculture Manure Testing Laboratory Certification program (MTLCP).	
In planning for new animal feeding operations, acceptable "book values" for the nutrient content and volume of manure that are recognized by the NRCS may be used for the proposed animal feeding operation (NRCS Agricultural Waste Management Field Handbook, Chapter 4). In the alternative, nutrient content and volumes for proposed animal feeding operations may be based on historic nutrient content and volumes from existing animal feeding operations utilizing similar design and management as the proposed animal feeding operation.	When planning for new or modified livestock operations, acceptable "book values" recognized by the NRCS (e.g., NRCS Agricultural Waste Management Field Handbook) and the land-grant university, or analyses from similar operations in the geographical area, may be used if they accurately estimate nutrient output from the proposed operation.	When planning for new or modified livestock operations, use "book values" from the NRCS Agricultural Waste Management Field Handbook (Chapter 4), analyses from similar operations in the geographical area, or ISU estimates to estimate nutrient output from the proposed operation.	Adds the use of ISU book values.
For additional information on manure and other organic nutrient management refer to Standard and Specification Waste Utilization (633) and			No longer applicable

the Agricultural Waste Management Field Handbook.			
Biosolids (sewage sludge) shall be applied in accordance with USEPA regulations. (40 CFR Parts 403 (Pretreatment) and 503 (Biosolids) and other state and/or local regulations regarding the use of biosolids as a nutrient source. **Heavy Metal Monitoring** When sewage sludge or biosolids are applied, the application of potential heavy metal pollutants (including arsenic, cadmium, copper, lead, mercury, selenium, and zinc) in the soil shall be in accordance with the Iowa Administrative Code (IAC) IA567—67 and IAC567--121.	<Nothing> <National put this in Operations and Maintenance >	Municipal and, especially, industrial biosolids can be sources of heavy metals. Test, land apply, and ensure records are kept for biosolids according to state and federal law. Account for N, P, and K applied with the biosolids.	The two IA paragraphs are from different sections. This USEPA reference was eliminated in the national at EPA's request and not replaced. This section could not be interpreted in the IA2008 version as the citations were no longer available.
	When manures are applied, and soil salinity is a concern, salt concentrations must be monitored to prevent potential crop damage and/or reduced soil quality.		Does not apply to Iowa.
When animal manures or organic by-products are applied, the Iowa Phosphorus Index will be used as the risk assessment tool to evaluate the potential for phosphorus transport from the CMU and to adjust	Nitrogen and phosphorus application rates must be planned based on risk assessment results as determined by NRCS-approved nitrogen and phosphorus risk assessment tools.		Redundant (see P-Index interpretation below)

the amount, placement, form and timing of application of phosphorus sources.			
Manure and Organic By-Product Nutrient Application Rates Planned application rates of nitrogen and phosphorus shall be determined based on the following guidance: A. Nitrogen Application. When determining allowable nutrient application rates from manure or other organic sources, nitrogen may be applied based on crop nitrogen needs for that crop year. This may allow application of more phosphorus and potassium than required by the crop. This practice may continue as long as the risk of phosphorus moving to surface waters based on the Iowa Phosphorus Index is very low, low or medium. When the plan is being implemented on a phosphorus standard, manure or other organic by-products shall be applied at rates consistent with the phosphorus standard. In such situations, an additional nitrogen application from nonorganic sources may be required to supply the recommended amounts of	Manure may be applied at a rate equal to the recommended phosphorus application, or estimated phosphorus removal in harvested plant biomass for the crop rotation, or multiple years in the crop sequence at one time. When such applications are made, the application rate must not exceed the acceptable phosphorus risk assessment criteria, must not exceed the recommended nitrogen application rate during the year of application or harvest cycle, and no additional phosphorus must be applied in the current year and any additional years for which the single application of phosphorus is supplying nutrients.	**Manure, Municipal and Industrial Biosolids, and Organic By-Products Application Rate** Generally, apply manure, municipal and industrial biosolids, and organic by-products up to a rate equal to the recommended phosphorus application, or up to the estimated phosphorus removal in harvested plant biomass for the crop rotation, or up to the cumulative rate for crops over multiple years. Do not exceed the recommended nitrogen application rate during the year of application or harvest cycle. Do not apply additional phosphorus during the years for which the rate is calculated.	Significant stylistic changes to be more clear. The paradigm informing this restructuring is that much of the nutrient management has been determined above. This section exists to provide guidance on how to use manure and biosolids to meet nutrient needs and otherwise also properly use these resources. Prior language tended to start with manure management and then figure out how to manage the nutrients available to apply to land. The reality is that management and planning is based on multiple goals and is iterative. But, keeping the paradigms straight makes the standard clearer.

nitrogen.			
B. Phosphorus Application. When manure or other organic by-products are used, the planned rates of phosphorus application shall be determined with reference to the Iowa Phosphorus Index (Agronomy Technical Notice 25). The Iowa Phosphorus Index (Iowa PI) assesses the potential for phosphorus movement from a field to surface water, and designates fields as very low risk, low risk, medium risk, high risk, and very high risk. Conservation practices and/or phosphorus management practices can be adopted that reduce the risk of phosphorus movement and may reduce the risk rating on the field. See Agronomy Technical Notice 25, Iowa Phosphorus Index.			Redundant.
• If a field is rated very low risk, low risk, or medium risk by the Iowa PI, the application of manure or organic by-products may be made based on the nitrogen needs of the crop as set forth in subpart A above.	For fields receiving manure, where phosphorus risk assessment results equate to LOW risk, additional phosphorus and potassium can be applied at rates greater than crop requirement not to exceed the nitrogen requirement for the succeeding crop. For fields receiving manure, where phosphorus risk assessment	However, if the **Iowa Phosphorus Index** rates the risk that P will move offsite as **Very Low** risk, **Low** risk, or **Medium** risk, the application of manure, municipal and industrial biosolids, or organic by-products may be made based on the nitrogen application rates. *Applied P may exceed crop needs and removal rates and will*	The language is changed for clarity, but the effective criteria is not changed from IA2008 590 and is consistent the interpretations of the Iowa P-Index. For reference, here is the language from the Iowa P-Index interpretations: VERY LOW– 0-1 A field in which movement of P off site will be VERY LOW. If soil conservation and P management practices are maintained at current levels, impacts on surface water resources from P losses from the field will be small. LOW – >1-2 A field in which movement of P off site will be LOW. Although the P delivery to surface water bodies is greater than from

• If a field is rated in the medium risk category, planned conservation and phosphorus management practices should not increase the rating of the field above the medium risk category. • If a field is rated high risk or very high risk by the Iowa PI; Manure or organic by-products may be applied to meet the needs of the planned crop rotation for phosphorus removal if conservation practices and/or phosphorus management practices are adopted to reduce the risk of phosphorus movement.	results equate to MODERATE risk, additional phosphorus and potassium may be applied at a phosphorus crop requirement rate for the planned crops in the rotation. When phosphorus risk assessment results equate to HIGH risk, additional phosphorus and potassium may be applied at phosphorus crop removal rates if the following requirements are met: • a soil phosphorus drawdown strategy has been implemented, and • a site assessment for nutrients and soil loss has been conducted to determine if mitigation practices are required to protect water quality. • any deviation from these high risk requirements must have the approval of the Chief of the NRCS.	*accumulate in the soil. This practice will not be sustainable over the long term.* If the Iowa P-index rating is **Medium** risk, avoid accumulating phosphorus to levels that will increase the rating of the field above the medium risk category. If the Iowa P-index rating is **High** or **Very High** risk, implement practices to reduce that risk to Medium or below. Do not apply P until the risk is reduced.	Although the P delivery to surface water bodies is greater than from a field with a very low rating, current soil conservation and P management practices keep water quality impairment low. MEDIUM – >2-5 A field in which movement of P off-site will be MEDIUM. Impacts on surface water resources will be higher than for the field with a low rating, and the P delivery potential may produce some water quality impairment. Careful consideration should be given to further soil conservation and P management practices that do not increase P delivery to surface water. HIGH – >5-15 A field in which movement of P offsite will be HIGH. Water quality impairment will be large. Remedial action is required to reduce P movement to surface water bodies. New soil and water conservation and/or P management practices are necessary to reduce offsite P movement and water quality degradation. VERY HIGH – >15 A field in which movement of P offsite will be VERY HIGH. Impacts on surface water resources are extreme. Remedial action is required to reduce P delivery to surface water. All necessary soil and water conservation practices plus a P management plan, which may require discontinuing P applications, must be put in place to reduce water quality impairment. "Requirement" substituted for "removal " in a 2012 National version.
Nitrogen application limits of Subpart A above should not be exceeded.			Redundant
Manure or other organic by-products may be applied on legumes at rates equal to the estimated removal of nitrogen in the harvested portion of the crop that is removed from the field in that growing season.	Manure or organic by-products may be applied on legumes at rates equal to the estimated removal of nitrogen in harvested plant biomass, not to exceed land grant university recommendations.	**Manure Application on Legumes** Manure, municipal and industrial biosolids, and/or organic by-products may be applied on legumes at rates up to the estimated annual removal of nitrogen in the harvested portion of the crop.	

	The total single application of liquid manure: • must not exceed the soil's infiltration or water holding capacity • be based on crop rooting depth • must be adjusted to avoid runoff or loss to subsurface tile drains.	**Manure Application Criteria** When applying liquid manure: • do not exceed the soil's infiltration or water holding capacity at crop rooting depth • avoid runoff or loss to subsurface tile drains.	It was not clear what was intended by "The total single application of liquid manure…be based on crop rooting depth." Adding "crop rooting depth" to the previous bullet point makes sense.
<None>	**<u>Additional Criteria to Protect Air Quality by Reducing Odors, Nitrogen Emissions and the Formation of Atmospheric Particulates</u>**	**<u>Additional Criteria to Protect Air Quality by Reducing Odors, Nitrogen Emissions and the Formation of Atmospheric Particulates</u>**	
	To address air quality concerns caused by odor, nitrogen, sulfur, and/or particulate emissions; the source, timing, amount, and placement of nutrients must be adjusted to minimize the negative impact of these emissions on the environment and human health. One or more of the following may be used: • slow or controlled release fertilizers • nitrification inhibitors • urease inhibitors • nutrient enhancement technologies • incorporation • injection • stabilized nitrogen fertilizers • residue and tillage management • no-till or strip-till • other technologies that	To address air quality concerns caused by odor, nitrogen, sulfur, and/or particulate emissions, adjust the source, timing, amount, and placement of nutrients to minimize air pollution and negative human health impacts. One or more of the following may be used: • urease inhibitors for surface applied urea fertilizers • incorporation • injection • residue and tillage management • no-till or strip-till • other technologies that minimize the impact of these emissions	- "Slow or controlled release fertilizers" and "nitrification inhibitors" were removed as I can't find research evidence that they impact air quality. - "Nutrient enhancement technologies" and "stabilized nitrogen fertilizers" were removed as the terms are too general and redundant to be useful. .

	minimize the impact of these emissions		
	Do not apply poultry litter, manure, or organic by-products of similar dryness/density when there is a high probability that wind will blow the material offsite.	Do not apply poultry litter – or manure, municipal and industrial biosolids, or organic by-products of similar dryness/density – when there is a high probability that wind will blow the material offsite.	
Additional Criteria to Improve the Physical, Chemical and Biological Condition of the Soil	**Additional Criteria to Improve or Maintain the Physical, Chemical, and Biological Condition of the Soil to Enhance Soil Quality for Crop Production and Environmental Protection**	**Additional Criteria to Improve or Maintain the Physical, Chemical, and Biological Condition of the Soil**	Removed the final clause as language is not the same as the Purpose. Put clause into criteria below.
Nutrients shall be applied and managed in a manner that maintains or improves the physical, chemical and biological condition of the soil.		Manage or apply nutrients to maintain or improve the physical, chemical, or biological condition of the soil to enhance soil quality for crop production and environmental protection.	Criteria lacks the specificity needed to actually change anyone's management. Still looking at additions to this section to acknowledge the value of soil quality in nutrient management and to be more consistent with the NRCS emphasis on soil quality. For instance may look at listing allied conservation practices such as: Cover crops Use organic fertilizers when available Reduce the use of nitrogen fertilizers Reduce tillage Etc.
To the extent practicable nutrients shall not be applied when the potential for soil compaction and rutting is high.	Time the application of nutrients to avoid periods when field activities will result in soil compaction.	When possible, avoid applying nutrients when the potential for soil compaction and rutting is high.	
Soil pH shall be maintained at levels shown in ISU Publication PM-1688 "General Guide for Crop Nutrient Recommendations in Iowa". All recommendations are based	Soil pH must be maintained in a range that enhances an adequate level for crop nutrient availability and utilization. Refer to State land- grant university documentation for guidance.	Maintain soil pH at levels indicated in ISU Publication PM-1688 "General Guide for Crop Nutrient Requirements in Iowa." All recommendations are based on Effective Calcium	Moved from earlier section.

on Effective Calcium Carbonate Equivalents (ECCE). For soil tests requiring less than 2000 pounds per acre ECCE, the lime requirement may be waived.		Carbonate Equivalents (ECCE). For soil tests requiring less than 2000 pounds per acre ECCE, the lime requirement may be waived.	
	In areas where salinity is a concern, select nutrient sources that minimize the buildup of soil salts.		Not appropriate for Iowa

Considerations: Compare 08IA590, 12Nat590, & Proposed 13IA590

Thursday, January 03, 2013
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2008 Iowa 590	2012 National 590	Proposed 2013 Iowa 590	Explanation, Justification, Notes, Concerns
CONSIDERATIONS	**CONSIDERATIONS**	**CONSIDERATIONS**	Significantly re-ordered.
Considerations are items to be considered during the planning process, however, are not a required component of the nutrient management plan. The use of management activities and technologies listed in this section may improve both the production and environmental performance of nutrient management systems. The addition of these management activities, when applicable, increases the management intensity of the system and is recommended in a nutrient management system.			
Action should be taken to protect National Register listed and other eligible cultural resources.			
For sites on which there are special environmental concerns, other sampling techniques may be appropriate. These include soil profile sampling for			I can't think of where soil profile sampling for N would be used in Iowa as part of nutrient management. The PSNT/LSNT is pretty standard, not unique to special sites. Removed.

nitrogen, Pre-Sidedress Nitrogen Test (PSNT).			
Soil test information should be no older than one year when developing new plans, particularly if animal manures are to be used as a nutrient source.	Soil test information should be no older than 1 year when developing new plans.		This is dealt with adequately in the criteria
	Use nutrient management strategies such as cover crops, crop rotations, and crop rotations with perennials to improve nutrient cycling and reduce energy inputs.	Use nutrient management strategies such as cover crops, crop rotations, and crop rotations with perennials to improve nutrient cycling and reduce energy inputs.	
	Use no-till/strip-till in combination with cover crops to sequester nutrients, increase soil organic matter, increase aggregate stability, reduce compaction, improve infiltration, and enhance soil biological activity to improve nutrient use efficiency.	Use no-till/strip-till in combination with cover crops to sequester nutrients, increase soil organic matter, increase aggregate stability, reduce compaction, improve infiltration, and enhance soil biological activity to improve nutrient-use efficiency.	
	Use legume crops and cover crops to provide nitrogen through biological fixation and nutrient recycling.	Use legume crops and cover crops to provide nitrogen through biological fixation and nutrient recycling.	
	Elevated soil test phosphorus levels are detrimental to soil biota. Soil test phosphorus levels should not exceed State-approved soil test thresholds established to protect the environment.	Elevated soil test phosphorus levels are detrimental to soil biota. Avoid building P in the soil to excessive levels.	This is a good consideration, but we have no state-approved STP thresholds (the Iowa threshold is embedded in the P-Index and is based on actual risk to water quality), so the consideration is left generic.
Excessive levels of some nutrients can cause induced deficiencies of other nutrients.	Excessive levels of some nutrients can cause induced deficiencies of other nutrients, e.g., high soil test	Excessive levels of some nutrients can cause induced deficiencies of other nutrients, e.g., high soil test	

	phosphorus levels can result in zinc deficiency in corn.	phosphorus levels can result in zinc deficiency in corn. Avoid over-applying nutrients.	
If increases in soil phosphorus levels are expected, consider a more frequent (annual) soil testing interval.		If increases in soil phosphorus levels are expected from, for instance a large application of biosolids or manure, consider retesting the soil prior to the next nutrient application.	
	Use soil tests, plant tissue analyses, and field observations to check for secondary plant nutrient deficiencies or toxicity that may impact plant growth or availability of the primary nutrients.	Use soil tests, plant tissue analyses, and field observations to check for secondary plant nutrient and micronutrient deficiencies or toxicity that may impact plant growth or availability of the primary nutrients.	
	Use the adaptive nutrient management learning process to improve nutrient use efficiency on farms as outlined in the NRCS' National Nutrient Policy in GM 190, Part 402, Nutrient Management.	Use the adaptive nutrient management learning process to improve nutrient-use efficiency on farms as outlined in the NRCS Agronomy Technical Note 6: "Adaptive Management."	
	Potassium should not be applied in situations where an excess (greater than soil test potassium recommendation) causes nutrient imbalances in crops or forages.	Do not apply potassium where an excess (greater than soil test potassium recommendation) causes nutrient imbalances in crops or forages.	Not sure this is an issue in Iowa. Not sure what these nutrient imbalances are. In some cases producers will starve alfalfa of K to reduce milk fever problems. K applications tend to be more of an economic issue. And over application tends to promote luxury uptake which is wasteful.
		Variable Rate Nutrient Management	
	Use variable-rate nitrogen application based on expected crop yields, soil variability, soil nitrate or organic N supply levels, or	Use variable-rate nitrogen, phosphorus, and potassium application rates based on site-specific variability in crop yield, soil variability, soil test	Combined paragraphs.

	chlorophyll concentration. Use variable-rate nitrogen, phosphorus, and potassium application rates based on site-specific variability in crop yield, soil characteristics, soil test values, and other soil productivity factors.	values, and/or other factors as proven.	
	Develop site-specific yield maps using a yield monitoring system. Use the data to further diagnose low- and high- yield areas, or zones, and make the necessary management changes. See Title 190, Agronomy Technical Note (TN) 190.AGR.3, Precision Nutrient Management Planning.	Develop site-specific yield maps using a yield monitoring system. Use the data to further diagnose low- and high- yield areas, or zones, and make the necessary management changes. See Title 190, Agronomy Technical Note (TN) 190.AGR.3, Precision Nutrient Management Planning.	Check reference.
		Safety	
The owner/client is responsible for safe operation and maintenance of this practice including all equipment.			
Workers should be protected from and avoid unnecessary contact with plant nutrient sources. Extra caution must be taken when handling ammoniacal nutrient sources, or when dealing with organic wastes stored in unventilated enclosures.	Workers should be protected from and avoid unnecessary contact with plant nutrient sources. Extra caution must be taken when handling anhydrous ammonia or when dealing with organic wastes stored in unventilated enclosures.	Protect workers from and avoid unnecessary contact with plant nutrient sources. Take extra precaution when handling anhydrous ammonia or when dealing with organic wastes stored in unventilated enclosures.	
Material generated from cleaning nutrient application equipment should be utilized in an environmentally safe	Material generated from cleaning nutrient application equipment should be utilized in an environmentally safe	Utilize material generated from cleaning nutrient application equipment in an environmentally safe	

manner. Excess material should be collected and stored or field applied in an appropriate manner. Nutrient containers should be recycled in compliance with state and local guidelines or regulations.	manner. Excess material should be collected and stored or field applied in an appropriate manner. Nutrient containers should be recycled in compliance with State and local guidelines or regulations.	manner. Collect and store or field apply excess material in an appropriate manner.	
	Nutrient containers should be recycled in compliance with State and local guidelines or regulations.	Recycle nutrient containers in compliance with State and local guidelines or regulations.	
Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Ground Water	**Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater**	**Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater**	
Erosion control and runoff reduction practices can improve soil nutrient and water storage, infiltration, aeration, tilth, diversity of soil organisms and protect or improve water and air quality (Consider installation of one or more NRCS FOTG, Section IV – Conservation Practice Standards). Cover crops can effectively utilize and/or recycle residual nitrogen.	Use conservation practices that slow runoff, reduce erosion, and increase infiltration, e.g., filter strip, contour farming, or contour buffer strips. These practices can also reduce the loss of nitrates or soluble phosphorus.		This was put into the criteria. They are embedded into the P-Index.
Apply nutrient materials uniformly to the application area. Application methods and timing that reduce the risk of nutrients being transported to ground and surface waters, or into the atmosphere include:	Use application methods and timing strategies that reduce the risk of nutrient transport by ground and surface waters, such as:	Use application methods and timing strategies that reduce the risk of nutrient transport by ground and surface waters, such as:	
• Split applications of	• split applications of nitrogen	• split applications of	

nitrogen to provide nutrients at the times of maximum crop utilization,	to deliver nutrients during periods of maximum crop utilization,	nitrogen to deliver nutrients during periods of maximum crop utilization,	
• On soils with high permeability (greater than 2 inches per hour through the 5 foot profile), apply nitrogen using split spring preplant/sidedress, at planting/sidedress or sidedress applications to provide distribution of nutrients at a time when plants will utilize the nutrients.			Somewhat redundant, so deleted. This is where the Leaching Index may be of use.
• Use stalk-test to minimize risk of over applying nitrogen in excess of crop needs.			Redundant.
• Avoid winter nutrient application for spring seeded crops,			Winter application is not allowed under criteria.
• Band applications of phosphorus near the seed row,	• banded applications of nitrogen and/or phosphorus to improve nutrient availability,	• band nitrogen and/or phosphorus to improve nutrient availability, and	
	• drainage water management to reduce nutrient discharge through drainage systems, and		Moved to criteria (though still a consideration) for planning clarity.
• Delay field application of animal manures or organic by-products if precipitation capable of producing runoff and erosion is forecast within 24 hours of the time of the planned application.	• incorporation of surface-applied manures or organic by-products if precipitation capable of producing runoff or erosion is forecast within the time of planned application.	• delay field application of animal manures, biosolids, or organic by-products if precipitation capable of producing runoff and erosion is forecast within 24 hours of the time of the planned application.	Follows IA590. Producers may need additional guidance on predicting runoff events.
• Limit the application rate of liquid materials applied to			Redundant

not exceed the soil infiltration rate, to minimize ponding, to avoid runoff, and to minimize loss to subsurface tile drains.			
• When applying manure to legume crops, limit the crop available nitrogen application to 125 pounds of nitrogen per acre.			
	Use the agricultural chemical storage facility conservation practice to protect air, soil, and water quality.	Use the Agrichemical Handling Facility (309) conservation practice to protect air, soil, and water quality.	
	Use bioreactors and multistage drainage strategies when approved by the land-grant university.		In criteria.
		Avoid surface applying manure and fertilizer to grassed waterways, ditches, and other places of concentrated water flow especially during times of the year when runoff is likely.	**New.** In some states this is in the criteria or application is forbidden.
		Nutrients applied to coarse soils and karst topography are especially at risk to leach into the groundwater. Consider additional measures to reduce the pollution risk.	Moved from 2008 IA 590 criteria as neither had actual criteria associated with them.
		Considerations to Properly Utilize Manure, Municipal and Industrial Biosolids and Other Organic By-products as a Plant Nutrient Source	
Animal feeding operations requiring removal of manure		For animal feeding operations which apply manure more	The only new issue here might be the suggestion to take samples seasonally. The rest appear to be in the Criteria

more frequently than annually should consider taking samples more frequently (i.e. seasonally or after material changes to feed rations or other operational aspects of the animal feeding operation that may impact the nutrient content of the manure) . The nutrient budget should be reviewed annually to determine if any changes are needed for the next planned crop.		than once a year, sample manure more frequently to account for seasonal differences.	section.
To manage the conversion of nitrogen in manure or fertilizer, use products or materials (e.g. nitrification inhibitors, urease inhibitors and slow or controlled release fertilizers) that more closely match nutrient release and availability for plant uptake. These materials may improve the nitrogen use efficiency (NUE) of the nutrient management system by reducing losses of nitrogen into water and/or air.			I don't think there is research support that manure additives work. This may just come down to timing and placement (inject or incorporate) which is already covered. There are trade-offs, what is best timing for P management may not be best for N or for erosion control. This is acknowledged in the criteria.
	Use manure management conservation practices to manage manure nutrients to limit losses prior to nutrient utilization.	Use manure management conservation practices to manage manure nutrients to limit losses prior to nutrient utilization.	
	Apply manure at a rate that will result in an “improving” Soil Conditioning Index (SCI) without exceeding acceptable	Apply manure at a rate that will result in an “improving” Soil Conditioning Index (SCI) without exceeding acceptable	

	risk of nitrogen or phosphorus loss.	risk of nitrogen or phosphorus loss.	
Additional practices to enhance the producer's ability to manage manure effectively include modification of the animal's diet to reduce the manure nutrient content, or utilizing manure amendments that stabilize or tie-up nutrients.	Modify animal feed diets to reduce the nutrient content of manure following guidance contained in Conservation Practice Standard (CPS) Code 592, Feed Management.	Modify animal feed diets to reduce the nutrient content of manure following guidance contained in Conservation Practice Standard (CPS) Code 592, Feed Management.	
Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere	**Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere**	**Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere**	
Odors associated with the land application of manures and organic by-products can be offensive to the occupants of nearby homes. When possible, application of these materials upwind of occupied structures when residents are likely to be home (evenings, weekends and holidays) should be avoided.	Avoid applying manure and other by-products upwind of inhabited areas.	Avoid applying manure and other by-products upwind of inhabited areas.	
When applying manure with irrigation equipment, modifying the equipment can reduce the potential for volatilization of nitrogen from the time the manure leaves the application equipment until it reaches the surface of the soil (e.g., reduced pressure, drop down tubes for center pivots). Nitrogen	Use high-efficiency irrigation technologies (e.g., reduced-pressure drop nozzles for center pivots) to reduce the potential for nutrient losses.	Use high-efficiency irrigation technologies (e.g., reduced-pressure drop nozzles for center pivots) to reduce the potential for nutrient losses. Use conservation practice standard 449 Irrigation Water Management for additional guidance.	

volatilization from manure in a surface irrigation system should be reduced when applied under a crop canopy. When liquid forms of manure are applied with irrigation equipment, operators should select weather conditions during application that will minimize volatilization losses. Nutrient applications associated with irrigation systems should be applied in accordance with the requirements of Irrigation Water Management (Code 449).			
When tillage can be performed, surface applications of manure and fertilizer nitrogen formulations that are subject to volatilization on the soil surface (e.g., urea) should be incorporated into the soil within 24 hours after application.		When tillage is feasible and otherwise does not cause erosion or soil quality issues, incorporate within 24 hours surface applied manure or fertilizer nitrogen formulations that are subject to volatilization (e.g., urea).	
		Use the National Air Quality Site Assessment Tool to explore options to improve management.	
In areas with an identified or designated nutrient management related air quality concern, any component(s) of nutrient			We do not have such a designation. Information is too general to be of use.

management (i.e., amount, source, placement, form, timing of application) identified by risk assessment tools as a potential source of atmospheric pollutants should be adjusted, as necessary, to minimize the loss(es).			
When manure or organic by-products are applied to grassland, hayland, pasture or minimum-till areas the rate, form and timing of application(s) should be managed to minimize volatilization losses.			This is not specific enough to be helpful beyond the information already in the criteria.
Operators should handle and apply poultry litter or other dry types of animal manures when the potential for wind-driven loss is low and there is less potential for transport of particulates into the atmosphere.			In criteria.
Weather and climatic conditions during manure or organic by-product application(s) should be recorded and maintained in accordance with the operation and maintenance section of this standard.			Covered in Operations and Maint.
When planning nutrient applications and tillage operations, encourage soil carbon buildup while discouraging greenhouse gas emissions (e.g., nitrous oxide N2O, carbon dioxide CO2).			Covered generically in the SCI. Do not have a reference that relates tillage management to to Nox.

CAFO operations seeking permits under USEPA regulations (40 CFR Parts 122 and 412) should consult with their respective state permitting authority for			
		Considerations to Maintain or Improve the Physical, Chemical, and Biological Condition of the Soil	
		To maintain or improve the physical, chemical, or biological condition of the soil use the concepts and technologies in the nutrient management for soil quality technical note (available soon).	

Plans&Specs: Compare 08IA590, 12Nat590, & Proposed 13IA590

Thursday, January 03, 2013
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2008 Iowa 590	2012 National 590	Proposed 2013 Iowa 590	Explanation, Justification, Notes, Concerns
PLANS AND SPECIFICATIONS	**PLANS AND SPECIFICATIONS**	**PLANS AND SPECIFICATIONS**	
Plans and specifications for nutrient management shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s), using nutrients to achieve production goals and to prevent or minimize resource impairment.		Develop the nutrient management plan to reflect the objectives and decisions of the owner/operator of the land planned. Adapt the form of the plan – from field names to equipment size – to the particular needs of the producer to facilitate plan implementation.	Provides guidance that the plan be meaningful to the user.
Nutrient management plans shall include a statement that the plan was developed based on requirements of the current standard and any applicable Federal, state, or local regulations, policies, or programs, which may include the implementation of other practices and/or management activities. Changes in any of these requirements may necessitate a revision of the plan.			
		Specifications for All Plans	
The following components shall be included in the	The following components must be included in the	Include in the nutrient management plan:	

nutrient management plan:	nutrient management plan:		
		• producer objectives • statement of resource concerns that will be addressed in the plan	
		• statement of local, state, and/or federal standards and/or requirements the plan is designed to meet; tools and data sources used; and assumptions made.	New. Many planners already include this information and it is very useful for the producer and for the reviewer.
• aerial site photograph(s) or site map(s), and a soil survey map of the site,	• aerial site photograph(s)/ imagery or site map(s), and a soil survey map of the site,	• aerial site photograph(s)/imagery or site map(s) • a soil survey map of the site,	Changed the order of the bullets. As shown, it follows the 2008 Iowa 590 with the national items inserted where it may make sense.
	• soil information including: soil type surface texture, pH, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and/or ponding frequency,	• soil information including: soil type surface texture, pH, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and/or ponding frequency,	NRCS is working on developing a model map.
• location of designated sensitive areas or resources and the associated, nutrient management restriction,	• location of designated sensitive areas and the associated nutrient application restrictions and setbacks,	• fields delineated with ID and acres, location of designated sensitive areas and the associated nutrient application restrictions and setbacks,	
	• for manure applications, location of nearby residences, or other locations where humans may be present on a regular basis, and any identified meteorological (e.g., prevailing winds at different times of the year), or topographical influences that may affect the transport	• for manure and biosolids applications, location of nearby residences, or other locations where humans may be present on a regular basis, and any identified meteorological (e.g., prevailing winds at different times of the year), or topographical influences that	

	of odors to those locations,	may affect the transport of odors to those locations,	
	• results of approved risk assessment tools for nitrogen, phosphorus, and erosion losses,	• results of the RUSLE2, Leaching Index, and Iowa Phosphorus Index resource risk assessment tools,	
• results of appropriate risk assessment tools to document the relationship between soil phosphorus levels and potential for phosphorus transport from the field,	• documentation establishing that the application site presents low risk for phosphorus transport to local water when phosphorus is applied in excess of crop requirement.	• documentation that the Iowa Phosphorus Index interpretations of site vulnerability ratings criteria are met,	"Requirement " substituted for "removal" in a 2012 National version.
		• documentation that the conservation practices required to meet Iowa Phosphorus Index criteria are applied and/or the implementation schedule,	
• current and/or planned plant production sequence or crop rotation,	• current and/or planned plant production sequence or crop rotation,	• current and/or planned plant production sequence or crop rotation,	
• results of soil, water, manure and/or organic by-product sample analyses, • results of plant tissue analyses, when used for nutrient management,	• soil, water, compost, manure, organic by-product, and plant tissue sample analyses applicable to the plan,	• soil, manure, municipal or industrial biosolid, organic by-product, plant tissue sample, and/or water analyses applicable to the plan	
• realistic yield goals for the crops,	• realistic yield goals for the crops,	• documentation of the realistic yield potentials for the crops and how they were derived,	Consistent with language in the criteria.
• complete nutrient budget for nitrogen, phosphorus, and potassium for the crop rotation or sequence,	• complete nutrient budget for nitrogen, phosphorus, and potassium for the plant production sequence or crop rotation,	• complete nutrient management plan for nitrogen, phosphorus, and potassium for the plant production sequence or crop rotation,	

• listing and quantification of all nutrient sources,	• listing and quantification of all nutrient sources and form,		Redundant of 2 down.
	• all enhanced efficiency fertilizer products that are planned for use,		Enhanced efficiency fertilizers are a type of fertilizer source. This already covered and does not need its own line.
• CMU specific recommended nutrient application rates, timing, form, and method of application and incorporation, and	• in accordance with the nitrogen and phosphorus risk assessment tool(s), specify the recommended nutrient application source, timing, amount (except for precision/variable rate applications specify method used to determine rate), and placement of plant nutrients for each field or management unit,	• specify the nutrient application source, timing, rate (except for precision/variable rate applications specify method used to determine rate), and placement of plant nutrients for each field or management unit and the source and reasoning for the choices,	
		• rationale for P applications in excess of crop removal when the P-Index is very low, low, or medium.	This text was in the 12/2011 National 590, but was struck for the 01/2012 version. Language is left as it provides value to the plan to explain why application rates are above what is likely agronomically necessary.
If increases in soil phosphorus levels are expected, the nutrient management plan shall document: • the soil phosphorus levels at which it may be desirable to convert to phosphorus based planning, • the potential for soil phosphorus drawdown from the production and harvesting of crops, and • management activities or techniques used to reduce the potential for phosphorus loss.	• when soil phosphorus levels are increasing, include a discussion of the risk associated with phosphorus accumulation and a proposed phosphorus draw-down strategy, <Also later> If increases in soil phosphorus levels are expected (i.e., when N-based rates are used), the nutrient management plan must document: • the soil phosphorus levels at which it is desirable to convert to phosphorus based planning, • the potential plan for soil test phosphorus drawdown	• when soil test phosphorus levels are high or very high and/or increasing, ○ include a discussion of the risk associated with phosphorus accumulation, ○ estimate using the P-Index when P should no longer be applied, ○ propose a P stabilization or draw-down strategy to optimum soil test P, and ○ formulate alternative manure management strategies to reduce application rates (i.e. use it to fertilize more land to better optimize the use of the resource), and	Consolidated language to make this more integral to the plan and to reduce redundancy including redundancy with the Iowa P-Index which already addresses the over-application of P.

	from the production and harvesting of crops, and • management activities or techniques used to reduce the potential for phosphorus transport and loss, • for AFOs, a quantification of manure produced in excess of crop nutrient requirements, and • a long-term strategy and proposed implementation timeline for reducing soil P to levels that protect water quality,		
• guidance for implementation, operation, maintenance, and recordkeeping.	• guidance for implementation, operation and maintenance, and recordkeeping.	• guidance for implementation, operation and maintenance, and recordkeeping.	
		Additional Specifications for Precision/Variable Rate Plans	
	In addition, the following components must be included in a precision/variable rate nutrient management plan: • Document the geo-referenced field boundary and data collected that was processed and analyzed as a GIS layer or layers to generate nutrient or soil amendment recommendations.	Include the following components in a precision/variable rate nutrient management plan: • Document the geo-referenced field boundary and data collected that were processed and analyzed as a GIS layer or layers to generate nutrient or soil amendment recommendations.	Review this again to make sure it reads well.
	• Document the nutrient recommendation guidance and recommendation equations used to convert the GIS base data layer or layers to a nutrient source material recommendation GIS layer or layers.	• Document the nutrient recommendation guidance and recommendation equations used to convert the GIS base data layer or layers to a nutrient source material recommendation GIS layer or layers.	

	• Document if a variable rate nutrient or soil amendment application was made.	• Document if a variable rate nutrient or soil amendment application was made.	
	• Provide application records per management zone or as applied map within individual field boundaries (or electronic records) documenting source, timing, method, and rate of all applications that resulted from use of the precision agriculture process for nutrient or soil amendment applications.	• Provide application records per management zone or as applied map within individual field boundaries (or electronic records) documenting source, timing, method, and rate of all applications that resulted from use of the precision agriculture process for nutrient or soil amendment applications.	
	• Maintain the electronic records of the GIS data layers and nutrient applications for at least 5 years.	• Maintain the electronic records of the GIS data layers and nutrient applications for at least 5 years.	

Ops&Maint: Compare 08IA590, 12Nat590, & Proposed 13IA590

Thursday, January 03, 2013
1:31 PM

2008 Iowa 590	2012 National 590	Proposed 2013 Iowa 590	Explanation, Justification, Notes, Concerns
OPERATIONS AND MAINTENANCE	**OPERATIONS AND MAINTENANCE**	**OPERATIONS AND MAINTENANCE**	
Operation and maintenance addresses the following: • periodic plan review to determine if adjustments or modifications to the plan are needed. As a minimum, plans will be reviewed and revised with each soil test cycle.	Conduct periodic plan reviews to determine if adjustments or modifications to the plan are needed. At a minimum, plans must be reviewed and revised, as needed with each soil test cycle, changes in manure volume or analysis, crops, or crop management.	Conduct periodic plan reviews to determine if adjustments or modifications to the plan are needed. At a minimum, plans must be reviewed, evaluated, and, if needed, revised, with • each soil test cycle, • changes in manure volume or analysis, or • changes in crops or crop management.	
	Fields receiving animal manures and/or biosolids must be monitored for the accumulation of heavy metals and phosphorus in accordance with land- grant university guidance and State law.	Monitor fields receiving animal manures and/or municipal or industrial biosolids for the accumulation of phosphorus.	The phosphorus monitoring is standard as soil testing is done every 4 years. However, we don't have criteria for measuring soil heavy metals nor standard values to compare. This will require more information to implement the national standard fully. Heavy metal accumulation records is currently maintained by the producer/applicator of biosolids.
• significant changes in animal numbers and/or feed management will necessitate additional manure sampling and analyses to establish a revised average nutrient content.	Significant changes in animal numbers, management, and feed management will necessitate additional manure analyses to establish a revised average nutrient content.	Continue to test each manure source based on PM 1558 "How to sample manure for nutrient analysis." If feed management, animal numbers or type, manure handling strategy, storage time, etc., change significantly, re-inventory the manure resource and re-	

		analyze the manure. The nutrient management plan may need to be revised accordingly.	
• protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.			
• calibration of application equipment to ensure uniform distribution of material at planned rates.	Calibrate application equipment to ensure accurate distribution of material at planned rates.	**Calibration of Fertilizer Application Equipment** Calibrate fertilizer application equipment at least annually to ensure proper placement or material at planned rates. Use ISU guidance PM-1941 "Calibration and Uniformity of solid Manure Spreaders" or PM-1948 "Calibrating Liquid Tank Manure Applicators."For custom applicators or rented equipment, verify that the operator or owner has calibrated applicators.	
		For anhydrous ammonia, verify that the applicator is properly plumbed. See PM-1975 "Improving the Uniformity of Anhydrous Ammonia Application" for guidance. Note that other effective manifolds are now available. Verify that anhydrous ammonia is injected to the proper depth and good soil coverage is provided.	
• Maintaining records to document plan	Records must be maintained for at least 5 years to	**Records for All Plans** Maintain records for at least	

implementation. As applicable, records include:	document plan implementation and maintenance. As applicable, records include:	5 years – longer if required by other Federal, state or local ordinances, or program or contract requirements – to document plan implementation and maintenance. As applicable, include:	
o Soil, plant tissue, water, manure, and organic by-product analyses resulting in recommendations for nutrient application,	• soil, plant tissue, water, manure, and organic by-product analyses resulting in recommendations for nutrient application,	• soil, plant tissue, water, manure, biosolid, and organic by-product analyses resulting in recommendations for nutrient application.	
o quantities, analyses and sources of nutrients applied, o dates and method(s) of nutrient applications,	• quantities, analyses and sources of nutrients applied, • dates, and method(s) of nutrient applications, source of nutrients, and rates of application,	• nutrient sources and analyses, rates as applied, placement, timing (dates) of nutrients applied, and a summary of actual pounds of nutrients applied per acre.	
o weather conditions and general soil moisture (e.g. wet, damp, dry) at the time of application; lapsed time to manure incorporation, rainfall or irrigation event.	• weather conditions and soil moisture at the time of application; lapsed time to manure incorporation; rainfall or irrigation event,	• weather conditions and soil moisture at the time of application; lapsed time to incorporation; and rainfall or irrigation event,	
		• record of equipment calibration.	
o crops planted, planting and harvest dates, yields, and crop residues removed,	• crops planted, planting and harvest dates, yields, nutrient analyses of harvested biomass, and crop residues removed,	• crops planted, planting and harvest dates, yields, nutrient analyses of harvested biomass (if applicable), and crop residues removed, and	
• documentation of the actual rate at which nutrients were applied. When the actual rates used differ from the recommended and planned rates, records will indicate	Document the nutrient application rate. When the applied rate differs from the planned rate, provide appropriate documentation for the change.	• identify variations from the nutrient management plan, evaluate why the variation occurred, and determine if a plan needs to be updated. Document decision.	

the reasons for the differences.			
o dates of plan review, name of reviewer, and recommended changes resulting from the review.	• dates of plan review, name of reviewer, and recommended changes resulting from the review, and	• dates of plan review, name of reviewer, and recommended changes resulting from the review.	
	• all enhanced efficiency fertilizer products used.		Redundant to sources above.
Records should be maintained for five years; or for a period longer than five years if required by other Federal, state or local ordinances, or program or contract requirements.	Records must be maintained for at least 5 years to document plan implementation and maintenance.		Redundant
		Additional Records for Precision/Variable Rate Plans	
	Additional records for precision/variable rate sites must include: • maps identifying the variable application source, timing, amount, and placement of all plant nutrients applied, and • GPS-based yield maps for crops where yields can be digitally collected.	Include: • maps identifying the variable application source, timing, amount, and placement of all plant nutrients applied, and • GPS-based yield maps for crops where yield data can be digitally collected.	

References: Compare 08-IA590 to Nat & Proposed 13-IA590

Wednesday, November 07, 2012
9:35 AM

2008 Iowa 590	2012 National 590	Proposed 2013 Iowa 590	Explanation, Justification, Notes, Concerns
REFERENCES	**REFERENCES**	**REFERENCES**	
These publications are available at County Extension Offices; Extension Distribution Center, Printing Building, Iowa State University, Ames, IA 50011; and several are available on the ISU Publications Home page at http://www.extension.iastate.edu/Pages/pubs/. • ISU PM-1310 "Interpretation of Soil Test Results" • ISU PM-287 "Take a Good Sample to Help Make Good Decisions" • ISU PM-1714 "Nitrogen Fertilizer Recommendations for Corn in Iowa" • ISU PM-2015 "Concepts and Rationale for Regional Nitrogen Rate Guidelines for Corn" • ISU PM-1688 "General Guide for Crop Nutrient Recommendations in Iowa" • ISU PM-869 "Fertilizing Pasture" • ISUPM-1268(rev) "Establishing Realistic Yields"	Association of American Plant Food Control Officials (AAPFCO). 2011. AAPFCO Official Publication no. 64. AAPFCO Inc., Little Rock, AR. Follett, R.F. 2001. Nitrogen transformation and transport processes. In Nitrogen in the environment; sources, problems, and solutions, (eds.) R.F. Follett and J. Hatfield, pp. 17-44. Elsevier Science Publishers. The Netherlands. 520 pp. Schepers, J.S., and W.R. Ruan, (eds.) 2008. Nitrogen in agricultural systems. Agron. Monogr. no. 49, American Society of Agronomy (ASA), Crop Science Society of America (CSSA), Soil Science Society of America (SSSA). Madison, WI. Sims, J.T. (ed.) 2005. Phosphorus: Agriculture and the environment. Agron. Monogr. no. 46. ASA, CSSA, and SSSA, Madison, WI. Stevenson, F.J. (ed.) 1982.	Association of American Plant Food Control Officers (AAPFCO). 2012. Official Publication No. 65. West Lafayette, IN. Iowa State University Extension publications are available at County Extension Offices or at ISU Publications Home page: http://www.extension.iastate.edu/Pages/pubs/ or at the Soil Fertility Website: www.agronext.iastate.edu/soilfertility. A-3769 "Recommended Methods of Manure Analysis" AEP0200f "Nitrogen Fertilization for Continuous and Rotated Corn" ISU NMEP-2 "Nutrient Management: Phosphorus Application" ISU PM-1310 "Interpretation of Soil Test Results" ISU PM-1558 "How to Sample Manure for Nutrient Analysis" ISU PM-1584 "Cornstalk Testing to Evaluate Nitrogen Management"	Providing live web links here is problematic. Links go out of date. One idea would be to treat this section like a standard bibliography and then provide the link to the NRCS website and maintain this reference list there with live links. Will clean up and format this section last.

• ISU PM-1584 “Cornstalk Testing to Evaluate Nitrogen Management” • ISU PM-1436 “Nitrogen Fertilizer Management for Northeast Iowa” • ISU PM-569 “Warm-Season Grasses for hay and Pasture” ISU PM-1558 “How to Sample Manure for Nutrient Analysis” • ISU PM-1941 “Calibration and Uniformity of Solid Manure Spreaders” • ISU PM-1948 “Calibrating Liquid Tank Manure Applicators”	Nitrogen in agricultural soils. Agron. Series 22. ASA, CSSA, and SSSA, Madison, WI. U.S. Department of Agriculture, Natural Resources Conservation Service. 2010. Agronomy Technical Note, (TN) 190-AGR-3, Precision Nutrient Management Planning. Washington, DC. U.S. Department of Agriculture, Natural Resources Conservation Service. 2011. Title 190, General Manual, (GM), Part 402, Nutrient Management. Washington, DC. U.S. Department of Agriculture, Natural Resources Conservation Service. 2011, Title 190, National Instruction (NI), Part 302, Nutrient Management Policy Implementation. Washington, DC.	ISU PM-1688 “A General Guide for Crop Nutrient and Limestone Recommendations in Iowa” ISU PM-1714 “Nitrogen Fertilizer Recommendations for Corn in Iowa” ISU PM-1747 “Rate Variability of Anhydrous Ammonia Applicator Equipment” ISU PM-1875 “Improving the Uniformity of Anhydrous Ammonia Application” ISU PM-1941 “Calibration and Uniformity of Solid Manure Spreaders” ISU PM-1948 “Calibrating Liquid Tank Manure Applicators” ISU PM-2015 “Concepts and Rationale for Regional Nitrogen Rate Guidelines for Corn” PM 2021 “Data Collection Worksheet for RUSLE2 and Iowa Phosphorous Index” ISU PM-2026 “Sensing Nitrogen Stress in Corn” ISU PM-287 “Take a Good Sample to Help Make Good Decisions” ISU PM-3014 “How to Interpret Your Manure Analysis” ISU PM-569 Warm-Season Grasses for Hay and Pasture ISU PM-869 “Fertilizing Pasture” ISU PMR-1003 “Using Manure Nutrients for Crop Production”

		NCH 55 Nitrification inhibitors for Corn Production	
The following publication is available on the NRCS Fort Worth Home page at http://www.ftw.nrcs.usda.gov/awmfh.html • Agricultural Waste Management Field Handbook The following Standard on Manure Production and Characteristics is available from the American Society of Agricultural and Biological Engineers. http://asae.frymulti.com/standards.asp • ASABE D384.2 MAR2005 The following publications are available at the Iowa Conservation Partners Home page at: http://www.ia.nrcs.usda.gov. • Iowa Technical Note 25, Iowa Phosphorus Index • Background and Basic Concepts of the Phosphorus Index • Phosphorus Index Calculator (Excel Spreadsheet) • Waste Utilization Standard (633)		Agricultural Waste Management Field Handbook. Available at: http://www.ftw.nrcs.usda.gov/awmfh.html Standard on Manure Production and Characteristics. American Society of Agricultural and Biological Engineers (ASABE) D384.2 MAR2005. Available at: http://asae.frymulti.com/standards.asp Available at the Iowa Conservation Partners: http://www.ia.nrcs.usda.gov. Agronomy Technical Note 6: "Adaptive Management" Iowa Technical Note 25, "Iowa Phosphorus Index" Background and Basic Concepts of the Phosphorus Index Phosphorus Index Calculator (Excel Spreadsheet) Purdue's Manure Management Planner (software) Waste Recycling Standard (633) U.S. Department of Agriculture, Natural Resources Conservation Service. 2010. Agronomy Technical Note, (TN) 190-	

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