

## Water Quality Enhancement Activity – WQL11 – Precision Application Technology to Apply Nutrients



### Enhancement Description

The use of precision agriculture technologies to apply nutrients to fit variations in site-specific conditions found within fields.

### Land Use Applicability

This enhancement is applicable on cropland and pastureland.

### Nutrient Management Benefit

Precision agriculture methods are used to collect information needed to more precisely evaluate production input factors, accurately

predict crop yields, and precisely apply variable rates of nutrients. The primary benefit of precision agriculture techniques is the use of accurate information about within field variability to minimize nutrient losses and optimize inputs. Done properly this helps to protect surface and ground water resources while maximizing net production.

### Criteria for Applying Precision Application Technology to Apply Nutrients

Implementation of this enhancement requires the use of nutrient management techniques. This enhancement requires:

- 1) The use of the following precision agriculture practices:
  - Variable rate technologies (VRT) for nutrient application- Computer-controlled equipment that adjusts fertilizer applications based on soil maps, vegetative indexes, or yield maps, etc. used to create management zones. Nitrogen, phosphorus and potassium fertilizer will be applied according to Land Grant University recommendations in the management zones.
  - Yield monitoring systems - Yields in the field are measured using combine-mounted sensors or volume meters. A GPS receiver mounted on the combine is required to correlate field location with yield to create a yield map.
- 2) Soil samples for nutrient analysis are taken based on soil management zones or on a maximum of a five acre grid
- 3) Base nitrogen application rates on a real time analysis of crop nitrogen needs. Examples include in season aerial photography and in field equipment based chlorophyll sensors.
- 4) Producer must have current soil tests for P and K (and Nitrogen where applicable) that are no more than 3 years old



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- 5) Nutrient application rates must be within the “Land Grant University (LGU) recommendations based on soil testing and established yield goals and considering all nutrient sources.

**Documentation Requirements for Applying Precision Application Technology to Apply Nutrients:**

- 1) Documentation for each Treatment area (field) and year of this enhancement describing these items:
  - Treatment acres
  - Crop grown in each treatment area
  - Soil sampling protocol (grid or zone) for each treatment area
  - Number of soil samples taken per treatment area
  - Soil test results
  - Calibration of fertilizer application equipment
  - Nutrient application rates/amounts and application dates for each treatment area
  - When using NDVI, provide an as-applied digital map of nutrients applied
- 2) A map showing where the activities are applied.

**References**

Precision Agriculture in the 21st Century: Geospatial and Information Technologies in Crop Management; National Research Council (U.S.). Committee on Assessing Crop Yield: Site-Specific Farming, Information Systems, and Research Opportunities, National Research Council Published by National Academies Press, 1997; ISBN 0309058937, 9780309058933; 149 pp.

Precision Farming, An Introduction, G.C. Rains and D.L. Thomas. Cooperative Extension Service, The University of Georgia College of Agriculture and Environmental Sciences; (<http://pubs.caes.uga.edu/caespubs/pubcd/B1186.htm>).

Follett, R.F. 2001. Nitrogen Transformation and Transport Processes. pp. 17-44, In R.F. Follett and J. Hatfield. (eds.). 2001. Nitrogen in the Environment; Sources, Problems, and Solutions. Elsevier Science Publishers. The Netherlands. 520 pp.