

# Nutrient Management (590) – Precision Agriculture

## Conservation Practice Job Sheet

ID – 590, JS-16

Natural Resources Conservation Service - Idaho

October 2007



Photo courtesy of NRCS

### What is Nutrient Management?

Nutrient management is defined as “managing the amount, source, placement, form and timing of the application of nutrients and soil amendments for the purpose of balancing available nutrients with crop needs, and preventing adverse on-site and off-site environmental impacts from the application of animal waste and commercial fertilizers.” Effective nutrient management relies on the use of a variety of tools and strategies. The overall objective is to make these essential nutrients more available for crop production, while reducing off-site impacts to surface and ground water.

### Purpose

Nutrient management plans will assist producers in improving or maintaining their level of management and expertise as it relates to the application of nutrients on the lands they own and/or control.

Nutrient management is applied as part of a resource management system with one or more of the following purposes:

- To budget and supply adequate nutrients for plant production.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To minimize or prevent 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.

### Practice Specifications

This practice applies to cropland, hayland, and pasture where plant nutrients and soil amendments are applied. Producers eligible for this practice have an identified water quality or plant condition concern, and must meet all criteria in the Nutrient Management (590) Standard. This includes a risk assessment of off-site transport. This option requires the development of mitigating or companion practices include crop rotation, grassed waterways, filter strips, riparian buffers, residue management, or other appropriate practices to fully address the water quality concerns. This practice requires the producer with fields under irrigation to utilize High-Intensity, Electronic Moisture Sensing Irrigation Water Management.

The Precision Agriculture option requires the evaluation and documentation of the variability in fertility across the field. A suggested approach is using a Systematic Management Unit Approach ([PNW publication 570-E - October 2003](#)). GPS soil sampling techniques in combination with soil survey maps or aerial photos showing variability in cropping patterns shall be included as part of the Nutrient Management Plan (NMP). The development of a Nutrient Management Plan is required. This includes basic soil testing, development of an annual budget, documentation of risk assessment, and record keeping.

The producer is also required to use in-season tissue tests and post-harvest soil tests to determine if adjustments are required to address nutrient availability, inefficiencies and nutrient carryover that could be considered a water quality or plant condition concern. This option requires the producer to use GPS guided ([e.g. Greenseeker or equivalent technology](#)) nutrient application technology to apply nutrients at variable rates as determined by the integrated GPS soil sampling analysis. Qualifications for this Nutrient Management treatment level require the involvement of a Certified Crop Advisor (CCA).

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### Soil Testing

Sufficient soil samples must be taken in combination with GPS soil sampling techniques from each field or Conservation Management Unit (CMU) (defined below) to generate a “representative” sample of the unit. Refer to the crop-specific soil sampling requirements outlined in the University of Idaho (UI) Fertilizer Guide or the UI publication “Soil Sampling” (CES Number 704).

(<http://info.ag.uidaho.edu/resources/pdfs/ext0704.pdf>)

Annual soil tests on each field or CMU shall be taken at the 1<sup>st</sup> and 2<sup>nd</sup> foot depths for each crop where nutrients are applied, or at the depths specified for specific crops by the University of Idaho Fertilizer Guides.

(<http://info.ag.uidaho.edu:591/catalog/fertilizers.html>)

### Developing the Annual Nutrient Budget and Applying the NMP

An annual nutrient budget shall be prepared based on realistic yield goals and the annual soil test for nitrogen (N), phosphorus (P<sub>2</sub>O<sub>5</sub>), and potassium (K<sub>2</sub>O), based on the University of Idaho Crop Fertilizer Guides. Nutrient rates, timing, and method of application will be documented. The planned rates of nutrient application shall be applied to meet the crop needs (except when manure or organic byproducts are applied). Applications in excess of the budget should be approved in advance and be justified on the basis of soil or tissue testing. Timing and method of nutrient application (particularly nitrogen) shall correspond as closely as possible with plant nutrient uptake characteristics. Application methods to reduce the risk of nutrient transport to surface and ground water or into the atmosphere shall be employed. When manure or organic-matter by-products are applied, special criteria apply. Refer to the Nutrient Management (590) Standard, “Additional

Criteria Applicable to Manure and Organic By-Products or Biosolids Applied as a Plant Nutrient Source.”

### Recordkeeping

Records are an important tool to track trends in available nutrients over time, and can document reduction in nutrient use as a result of good nutrient management planning and nutrient application. All nutrient applications must be recorded. Documentation shall include field identification, crop and previous crop, soil and/or plant tissue test method used and sampling technique, date and /or crop stage when tested, test results, nutrient source or product name, nutrient analysis and application rate (or pounds of nutrient applied per acre), application date, and method of application. The producer can use the attached Nutrient Application Records worksheet, the Idaho Commercial Fertilizer Nutrient Management Plan spreadsheet, or any format that contains all the required information.

**Conservation Management Unit (CMU):** One consolidated soil sample may be analyzed which represents several fields when all the fields in the CMU have the same predominate soil type, the same crop rotation, the same previous crop, and the same current crop.

#### Client's Acknowledgement Statement

The Client acknowledges that:

- a. University of Idaho basic soil sampling procedures will be used to determine the nutrient requirements for the crop. Annual soils samples at the 1<sup>st</sup> and 2<sup>nd</sup> foot depths are required in most cases.
- b. A risk assessment will document surface and ground water resource concerns for the field.
- c. The producer must implement the nutrient management plan (NMP) for the field, which includes the current crop's annual nutrient budget, and appropriate timing, rate, and method of fertilizer application. The annual nutrient budget will be based on the most recent University of Idaho Fertilizer Guide or Crop Production Guide (FG), when available. If a FG is not available for the crop then use the nutrient recommendations from the seed supplier.
- d. The producer will utilize advanced technologies to address variability in fertility, and irrigation water management (if irrigated).
- e. Significant changes to the NMP (increased rates of application, changes in timing or method, etc.) should be approved in advance, and may require adequate justification.
- f. The producer must maintain and keep field records.
- g. The NMP will require the selection of companion practices to address any water quality resource concerns as identified by the risk assessment for the field
- h. The producer has received a copy of this practice specification and understands the contents and requirements.

Accepted by: /s/ \_\_\_\_\_ Date: \_\_\_\_\_

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