



Natural Resources Conservation Service  
WASHINGTON

# WQL25 – Split applications of nitrogen based on a PSNT

CSP Enhancement Washington State Supplement

Land Use Applicability: Cropland

January 2014

Client/Operating Unit:

Tract Number:

Farm/Ranch Location:

Farm Number:

Specifications Date:

Field Number(s):

Planned Installation Date:

Proposed Treatment Acres:

## Enhancement Description:

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Use **pre-sidedress soil nitrate test** (PSNT) to determine the need and/or amount of additional nitrogen to be applied during a sidedress/topdress N application.

## Benefits

Efficient use of nitrogen (N) fertilizer is important for economical crop production as well as water and air quality enhancement. Split sidedress or topdress applications of fertilizer N improve the efficiency of nutrient uptake and protect water and air resources. Pre-plant soil test nitrogen analysis (not to be confused with PSNT) can be poorly correlated with growing season soil N availability and often does not provide sufficient insight upon which to base sidedress or topdress N applications. Additionally, sidedress or topdress applications of N based on a PSNT may lower the total amount of fertilizer applied, including ammonia fertilizer, minimizing ozone damage and greenhouse gases. Nitrate, while required by plants as a nutrient, is unstable in soil and can move with water through the soil into surface and ground water. Using split applications of N based on a PSNT will minimize nitrate contamination of surface and ground water, improve N use efficiency, and reduce harmful N emissions, improving the overall greenhouse gas footprint.

## Conditions Where Enhancement Applies

This enhancement applies to all annually planted crop land use acres in states where a Land Grant University approves the methodology.

## Criteria for split applications of nitrogen based on a PSNT

Conduct a PSNT on the selected crop (e.g. corn) to test if additional N fertilizer is needed (sidedress application) on fields with a history of manure application, sewage sludge, or other residual organic products or where a legume crop or a legume cover crop has been grown.

The PSNT attempts to:

- a. Gauge the pool of potentially mineralizable organic N in the top foot of soil, and
- b. Link that pool with a likelihood of a yield response from additional N fertilizer at sidedressing time.

## Layout Sketch & Drawing (Provide sketch, drawings, maps, and/or aerial photographs.)

- Geo-referenced field map with all delineated treatment areas where CSP Enhancement WQL25 is to be applied.

## Adoption Requirements

This enhancement is considered adopted when a PSNT has been conducted on the land use acre.

## Documentation Requirements

Written documentation for each year of this enhancement describing the following items:

1. A map showing where the enhancement is applied,
2. Recommendations from the test,
3. Dates of split nutrient applications,
4. Type(s) of nutrients (fertilizer and organic) applied including rate, form and timing,
5. Treatment area(s),
6. Soil test results,
7. Crops grown and yields (both yield goals and measured yield), and
8. Calibration of application equipment.

**Note: In lieu of documenting each individual item listed in the Documentation Requirements, a Certified Crop Advisor plan that contains each of the items may be substituted.**

## References\*:

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. pp 520.

International Plant Nutrition Institute (IPNI). 2012. 4R Plant Nutrition – A Manual for Improving the Management of Plant Nutrition (North American Version). IPNI, Norcross, GA.

Randall, G., J.A. Delgado and J.S. Schepers. 2008. Nitrogen management to protect water resources. In Schepers and Raun (eds) Nitrogen in Agricultural Systems. SSSA Monograph. 49. Madison, WI. pp. 911-945.

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.

### Field Office Technical Guide:

[eFOTG, http://www.nrcs.usda.gov/technical/efotg/](http://www.nrcs.usda.gov/technical/efotg/)

\* **Some online documents may take several minutes to download.**

Good representative sampling technique applies as it does for all soil sample interpretations.

“The Where” the soil test represents is as or more important to proper interpretation than the value of a soil test. Collect representative samples.

[http://www.extension.org/pages/Soil\\_Sampling\\_-\\_Collecting\\_the\\_Sample](http://www.extension.org/pages/Soil_Sampling_-_Collecting_the_Sample)

The methods and interpretation process for using Pre side dress Nitrate testing for corn are outlined in Fact Sheet #3 from Cornell. Remember, a similar approach to N management is suitable for many crops. The pre side dress is complimentary to a current soil test taken and interpreted preplant, previous N applications and other sources of N accounted for in the nutrient budget.

<http://cnal.cals.cornell.edu/publications/FactSheets/CornellAgronomyFactSheets.html>

## State Supplemental Information

**States may need to have information available on how to conduct the test, where to send the samples and how to interpret the results.**

Pre-side dress analysis to determine if additional N application is practical must account for yield limiting factors that affect adjustments in yield goal and soil available N that is available to reach the realistic yield goal.

A nutrient budget with estimates for Nitrogen mineralization and yield goals are used during pre-plant period of the crop to determine the N application rates and schedule. The pre-side dress nitrogen evaluation and application if needed can allow fine tuning of the nitrogen application based on actual soil organic matter N release and changing yield goals based on such attributes as climate, stand quality and current plant health and vigor.

**If the original N application recommendation includes both a preplant and one or more planned in-season applications (ie only a portion of total N recommendation is applied preplant), the pre-side dress N analysis can still be used to adjust the planned application rates in season.**

This method of split application of N can reduce risk of Air Quality resource concerns as well as protect water quality.

**Primary References for this N management technique:**

<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/24399/EMNO8650.pdf?sequence=1>

The Pre-side dress Soil Nitrate Test (PSNT) is a soil/crop sampling technique that is used to evaluate nitrogen fertilizer needs and N supply for crop production. The PSNT can help ensure maximum yields by fine tuning the initial N recommendation made during planning. Adjustments to the recommendation include change in Yield determining factors during crop season, fine tuning soil the available soil N supply and plant uptake. The benefits include improved N use efficiency for desired crop production.

Split application of Nitrogen fertilizer is common for many crops and areas in Washington besides corn. On both irrigated and dry land crops, N is often applied after crop emergence (post emerge). Soil test Nitrate, previous N applications, soil N mineralization rates and modifications in Yield (quantity and quality determine potential needs for in-season N application rates for a field.

Soil test N in the top 12" just prior to the period of rapid N uptake for the crop is the appropriate time. Allow enough time to take/analyze/interpret the soil test as well as apply the appropriate N rate prior to the crop's need for rapid uptake.

Applied N must have time and placement in order to reach the active site (generally root zone) for effective uptake to occur. In a dry summer climate such as Washington, there is a very short time frame for effective use of this technique for dry land small grain production. The adjusted N application in season must be on in time to reach the primary N uptake site (root zone of the crop).

Most Agricultural Testing Laboratories can analyze soil test Nitrate (NO<sub>3</sub>). Laboratories that participate in the North American Proficiency testing program are listed:

<http://www.naptprogram.org/about/participants/all/>

**NOTE:** NHQ criteria described in the Job Sheet and documentation requirements for the activity are adequate: except for the requirement for 100% of the initial recommendation to be applied pre-plant. See First Paragraph of Supplemental Information above.

(an in-season N application of a percentage of the original total N recommendation can be part of the original nutrient management plan and the in-season N evaluation or PSNT method can be used to make adjustments to the planned in-season N applications).



### Documentation Form

Producer: 
 Date:   
 Tracts: 
 County:

Written documentation for each year of this enhancement describing the following items:

1. A map showing where the enhancement is applied,
2. Recommendations from the test,
3. Dates of split nutrient applications,
4. Type(s) of nutrients (fertilizer and organic) applied including rate, form and timing,
5. Treatment area(s),
6. Soil test results,
7. Crops grown and yields (both yield goals and measured yield), and
8. Calibration of application equipment.

*Note: In lieu of documenting each individual item listed in the Documentation Requirements, a Certified Crop Advisor plan that contains each of the items may be substituted.*

Field Number(s):					
Crop:					
Yield Goal:					
Treatment Acres:					
Type of Test Selected:					
Recommendations from Selected test*:					
Test Date(s):					
Measured Yield:					
Calibration of Fertilizer Application Equipment:					
<b>Type(s) and Amounts of Nutrients Applied (Fertilizer and Organics) Applied for Each Treatment Area:</b>					
<b>Nitrogen Applications</b>					
Rate:					
Form:					
Dates and Timings of Split N Applications:					

P <sub>2</sub> O <sub>5</sub> Applications					
Rate:					
Form:					
Date:					
K <sub>2</sub> O Applications					
Rate:					
Form:					
Date:					

**Required Documentation:**

1. Map Showing where Activities are Applied
2. Soil Test Results

**NOTE: In lieu of documenting each individual item listed above, a Certified Crop Advisor plan that contains each of the items may be substituted.**

**\*If PNST is used, Soil Test Results Must be Submitted.**

Client's Acknowledgement (To be signed before the Enhancement is applied.)	
<p><b>By signing below, I acknowledge that I:</b></p> <ul style="list-style-type: none"> <li>● have reviewed and understand the site specific design, installation specifications and operation/maintenance requirements in this State Supplemental Sheet and have an understanding of the purpose(s) of this Enhancement;</li> <li>● will install, operate, and maintain this Enhancement in accordance with the National Sheet, the Washington State Supplemental Sheet and the site specific specifications.</li> <li>● will make no changes to the planned design and installation without prior written approval of the Natural Resources Conservation Service.</li> <li>● will obtain all necessary permits and/or rights, and comply with all ordinances and laws pertaining to the installation, operation, and maintenance of this Enhancement, prior to the start of installation; and</li> <li>● will assume responsibility for notifying all Utilities affected by the installation, operation and maintenance of this Enhancement.</li> </ul>	
<div style="border: 1px solid black; height: 25px; width: 100%; background-color: #ffffcc;"></div> <p>Signature</p>	<div style="border: 1px solid black; height: 25px; width: 100%; background-color: #ffffcc;"></div> <p>Date</p>

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