



Conservation Evaluation and Monitoring Activity

Soil and Source Testing for Nutrient Management

CEMA 217

Definition

A sampling strategy for nutrient management measuring nutrient levels in soil and or nutrient source.

REQUIREMENTS

Qualified Individual Requirements

A Qualified Individual (QI) for this CEMA will develop a nutrient testing strategy, collect soil samples and prepare for laboratory analysis; collect manure, compost, irrigation water and other nutrient source materials and prepare for laboratory testing; and interpret soil nutrient needs.

The Natural Resources Conservation Service (NRCS) strongly encourages participants to know the following QI Requirements to ensure the person they hire is a good match for their needs and objectives.

Individuals qualified to develop CEMA 217 include at least one of the following:

- 1) Individuals who have a minimum of 2-years training and experience in soil, water, or other nutrient material sample collection.
- 2) Individuals who hold current applicable credentials, such as the American Society of Agronomy Certified Crop Advisor (CCA) or Certified Professional Agronomist (CPAg).
- 3) Individuals recognized through the NRCS Registry as a Technical Service Provider for at least one of the following: DIA 157, CPS 590, CPA 102 or the DIA 101.
- 4) Agricultural retailers and crop consultants with 4R Nutrient Stewardship Certification Program.
- 5) Persons performing sample collection under the guidance of a qualified individual, consultant, or retailer.

General Requirements

- 1) This CEMA includes the performance of work and documentation of the tasks, results, interpretations, and other activities described herein by a QI.
- 2) Prior to initiation of the CEMA, the QI must arrange a pre-work conference to ensure all parties understand the participant's objectives, required deliverables, and characteristics of the CEMA tasks.
 - a) The parties in the pre-work conference must include the participant, the QI, and the NRCS field office staff. The parties should agree whether they will join in-person or join via phone, web-meeting, etc.
 - b) If the participant will employ a Technical Service Provider (TSP) to implement a Conservation Planning Activity (CPA) or Design and Implementation Activity (DIA) that will be supported by results of this CEMA, it is recommended to invite them to the pre-work conference as well.

- 3) A QI may use any reference information, resource concerns, conservation practice standards and related documents served in the NRCS Field Office Technical Guide (FOTG) for the state where this CEMA is performed.

Technical Requirements

A qualified individual will develop a nutrient testing strategy, collect soil samples and prepare for laboratory analysis; collect manure, compost, irrigation water and other nutrient source materials and prepare for laboratory testing; interpret soil nutrient needs.

1) Soil testing and analysis

- a) Collect, prepare, store, and ship all soil and tissue samples following Land Grant University (LGU) guidance or industry practice. The test analyses must include pertinent information for monitoring or amending the annual nutrient plan. Follow LGU guidelines regarding required analyses and test interpretations. To make sure test results are as accurate as possible, always follow protocols specified by the laboratory.
- b) Utilize common sampling strategies include Whole Field Composite, Zone, and Grid.
 - i) When the soil test strategy is utilized to sample by the Whole Field, collect composite samples. Composite samples are a mixture of individual samples, or subsamples (10-20), generally collected from multiple locations and mixed together to form a single composite sample. One composite sample should represent no more than 20 acres.
 - ii) Zone and Grid strategies are known as spatially explicit management. Zone or Grid sampling can identify areas of the field with specific fertilizer or liming needs and provides a map of a field's nutrient and liming requirements. Spatially explicit management is an essential part of precision agriculture. In spatially explicit management, variable-rate technology can be used to alter fertilizer and lime applications so that each zone receives a targeted, zone-specific fertilizer or lime application.
- c) For soil test analyses, use laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program under the auspices of the Soil Science Society of America and NRCS or use an alternative NRCS or State approved certification program that considers laboratory performance and proficiency to assure accuracy of soil test results. Alternative certification programs must have solid stakeholder support (e.g., State department of agriculture, LGU, water quality control entity, NRCS State staff, growers, and others) and be State or regional in scope.

2) Manure, organic by-product, and biosolids testing and analysis

- a) Collect, prepare, store, and ship all manure, organic by-products, and biosolids following LGU guidance or industry practice when recognized by the LGU. In the absence of such guidance, test at least annually, or more frequently if needed to account for operational changes (e.g., feed management, animal type, manure handling strategy, etc.) impacting manure nutrient concentrations. Follow LGU guidelines regarding required analyses and test interpretations. Analyze, as a minimum, total N, total P or P₂O₅, total K or K₂O, and percent solids.
- b) For manure analyses, use laboratories successfully meeting the requirements and performance standards of the Manure Testing Laboratory Certification program 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.

- 3) Water nutrient sources
 - a) Irrigation water contains organic and inorganic compounds that influence plant health, soil health and structure, and irrigation system longevity. It is important to regularly test the quality of the irrigation source water. The frequency of testing depends upon use. The analysis should be conducted in the same laboratory over time to create a record of changes in water quality. Keep the reports to create a baseline of stability or seasonal changes in water quality to compare to future reports.
 - b) General water sampling guidance
 - i) To ensure test results are as accurate as possible, always follow protocols specified by the laboratory.
 - ii) Allow the water to run at least five minutes before collecting a water sample.
 - iii) Preferably, collect the water sample after completion of an irrigation run or filling a large water tank. Before collecting water sample, be sure the nozzle of the hose or faucet is clean, rinse out a clean plastic pail and the sample bottle with the water to be sampled.

DELIVERABLES

The QI must provide documentation showing all the tasks indicated in the **General Requirements** section, the **Technical Requirements** section, and the following sections:

Cover Page

Cover page reporting the technical services provided by the QI. Cover page(s) must include the following:

- 1) CEMA name and number.
- 2) Participant information: Name, farm bill program name, contract number (QI obtains contract number from participant), land identification (e.g., state, county, farm, and tract number).
- 3) QI name, address, phone number, email.
- 4) A statement by the QI explaining how they currently meet the Qualified Individual Requirements for this CEMA. Attaching or enclosing a copy of documentation for how the QI requirements are met is encouraged. Examples include but not limited to:
 - Nutrient Management or Agronomy related Certification or License (Name and Number),
 - Agricultural Retailer Business Name, or
 - Other brief written statement indicating how the requirements of a QI for this CEMA are met.
- 5) A statement by the QI that services provided meet NRCS requirements, such as:

I certify the work completed and delivered for this CEMA:

 - *Complies with all applicable Federal, State, Tribal, and local laws and regulations.*
 - *Meets the general requirements, technical requirements and deliverables for this CEMA.*
 - *Is consistent with and meets the conservation objectives for which the program contract was entered into by the participant.*
 - *Addresses the participant's conservation objectives for this CEMA.*

QI Signature: _____ Date: _____

- 6) A Participant's acceptance statement, such as:

I accept the completed CEMA deliverables as thorough and satisfying my objectives.

Participant Signature: _____ Date: _____

- 7) A space for an NRCS reviewer to certify the agency's acceptance of the completed CEMA and, such as:

NRCS administrative review completion by:

Signature: _____ Title: _____ Date: _____

Notes and Correspondence

- 1) Document each site visit, its participants, the activity completed in the field, and results of each site visit.
- 2) Copies of correspondence between the QI and the participant relating to decision-making and completion of this CEMA.
- 3) Copies of observations, data, technology tool output, or test results prepared during completion of this CEMA.

Maps

- 1) Maps developed from the CNMP CPA 102, CNMP DIA 101, CPS 590 or DIA 157 can be used with CEMA 217 if available.
- 2) At a minimum, all new maps developed for the CEMA will include:
 - a) Map title.
 - b) Participant's name
 - c) Assisted By [QI planner's name]
 - d) Name of applicable Conservation District, County, and State.
 - e) Date prepared.
 - f) Map scale.
 - g) Information needed to locate the assessment area, such as geographic coordinates, public land survey coordinates, etc.
 - h) For soil sampling, plot the sample point(s) on the field map based on the sampling strategy.
 - i) North arrow.
 - j) Appropriate map symbols and a map symbol legend on the map or as an attachment.

Evaluation or Monitoring Results

- 1) Develop a sampling strategy for nutrient management measuring nutrient levels in soil, nutrient and/or water source.
- 2) Describe sampling methodology used to collect other materials including details such as liquid manure agitation time or sampling depth.

- 3) Prepare soils or source materials for transport to accredited laboratory for analysis.
- 4) Provide laboratory analysis results, include nutrient analysis for manure or compost provided if imported.

Deliver Completed Work

- 1) The QI must prepare and provide the participant two sets of all of the items listed in the **General Requirements**, the **Technical Requirements** and the **Deliverables** sections of this document.
- 2) One set is for the participant to keep.
- 3) The other set is for the local NRCS Office.
- 4) The QI may transmit a set of the completed work to the local NRCS Office, if their participant has authorized it.

It is recommended to provide the NRCS field office an opportunity to review the CEMA deliverables, prior to asking for their acceptance.

References

4R Nutrient Stewardship Certification Program Website.

<https://4rcertified.org/>

American Society of Agronomy Website, Certifications Page.

<https://www.agronomy.org/certifications>

Purdue Extension. Soil Sampling Guidelines AY-368-W

<https://www.extension.purdue.edu/extmedia/AY/AY-368-w.pdf>

Michigan State University Extension. Extension Bulletin. Sampling Soils for Fertilizer and Lime Recommendations. E498S

https://archive.lib.msu.edu/DMC/extension_publications/e498/E0498S.pdf

University of Nebraska Extension. Soil Sampling for Precision Agriculture EC 154

<https://extensionpublications.unl.edu/assets/pdf/ec154.pdf>

University of Nebraska Extension. Manure Testing for Nutrient Content G1450

<https://extensionpublications.unl.edu/assets/pdf/g1450.pdf>

Clemson College of Agriculture. Collecting Samples for Agricultural Irrigation Water Quality Testing. LGP 1084

<https://clemson.app.box.com/s/986mfucdero8uedeshmzqnisihyualsu>

North Dakota State University Extension Service. Developing Zone Soil Sampling Maps SF-1176-2

<https://www.ag.ndsu.edu/publications/crops/site-specific-farming-developing-zone-soil-sampling-maps/sf1176-2.pdf>

USDA Natural Resources Conservation Service. National Planning Procedures Handbook.

<https://directives.sc.egov.usda.gov/viewerFS.aspx?hid=44407>

USDA Natural Resources Conservation Service. Field Office Technical Guide.

<https://efotg.sc.egov.usda.gov/#/>

USDA Natural Resources Conservation Service. National TSP Website.

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp/>

USDA Natural Resources Conservation Service. National TSP Resources.

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1417414>