USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

The NRCS Soil Carbon Amendment Practice Standard

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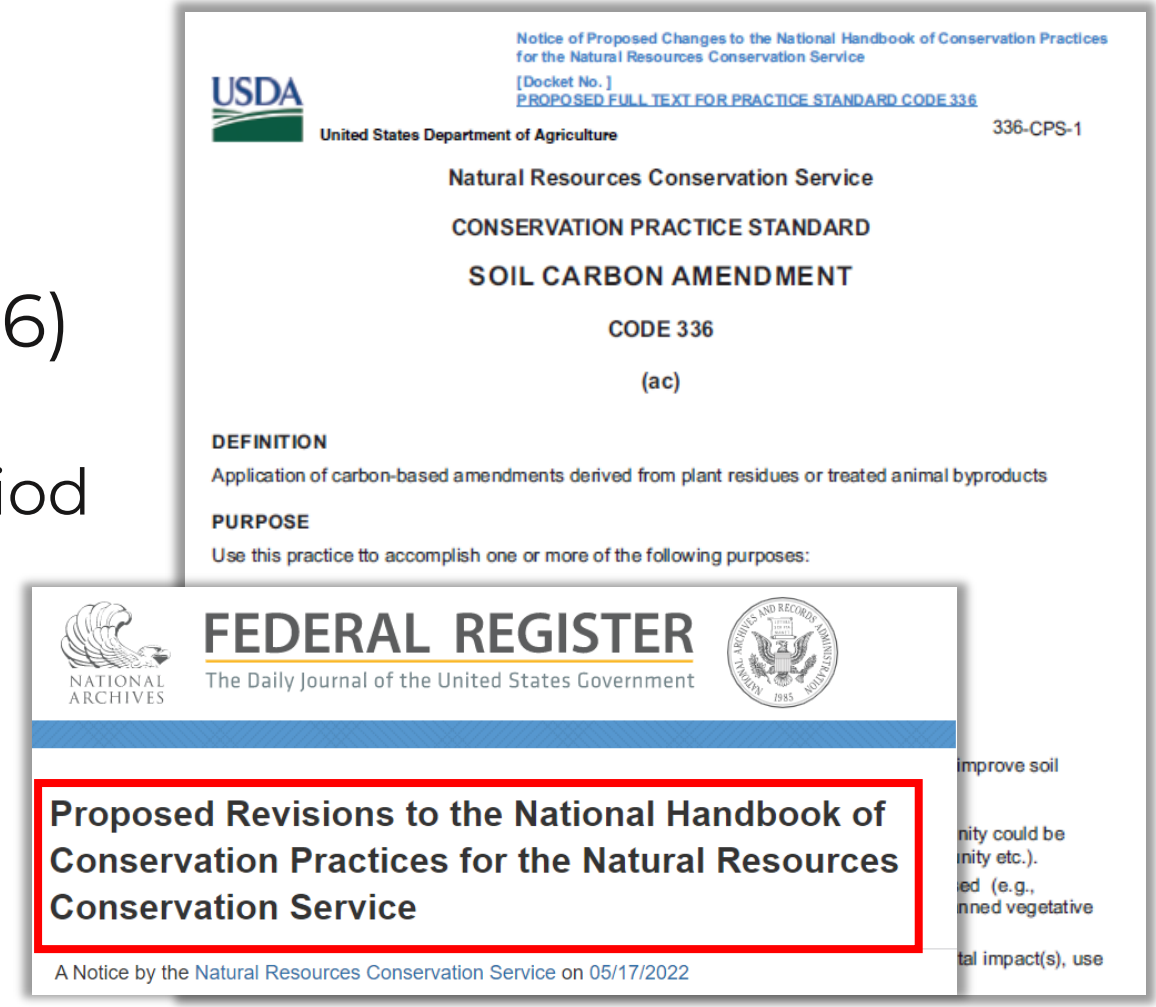
FARM PRODUCTION AND CONSERVATION
FSA | NRCS | RMA | Business Center

Soil Carbon Amendment Practice Standard

- Interim Practice (808)
  - Created in 2018
  - Evaluation & Refinement
- Transition to National Practice (336)
  - Expected for FY23 Release
  - States can use either for a 1-year period
- Internal and External Comments
  - 2 Internal Review Periods
    - >550 comments
  - 1 Public Comment Period
    - >500 comments



Notice of Proposed Changes to the National Handbook of Conservation Practices for the Natural Resources Conservation Service
[Docket No.]
PROPOSED FULL TEXT FOR PRACTICE STANDARD CODE 336

USDA
United States Department of Agriculture
336-CPS-1

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

SOIL CARBON AMENDMENT

CODE 336

(ac)

DEFINITION

Application of carbon-based amendments derived from plant residues or treated animal byproducts

PURPOSE

Use this practice tto accomplish one or more of the following purposes:

NATIONAL ARCHIVES
FEDERAL REGISTER
The Daily Journal of the United States Government

Proposed Revisions to the National Handbook of Conservation Practices for the Natural Resources Conservation Service

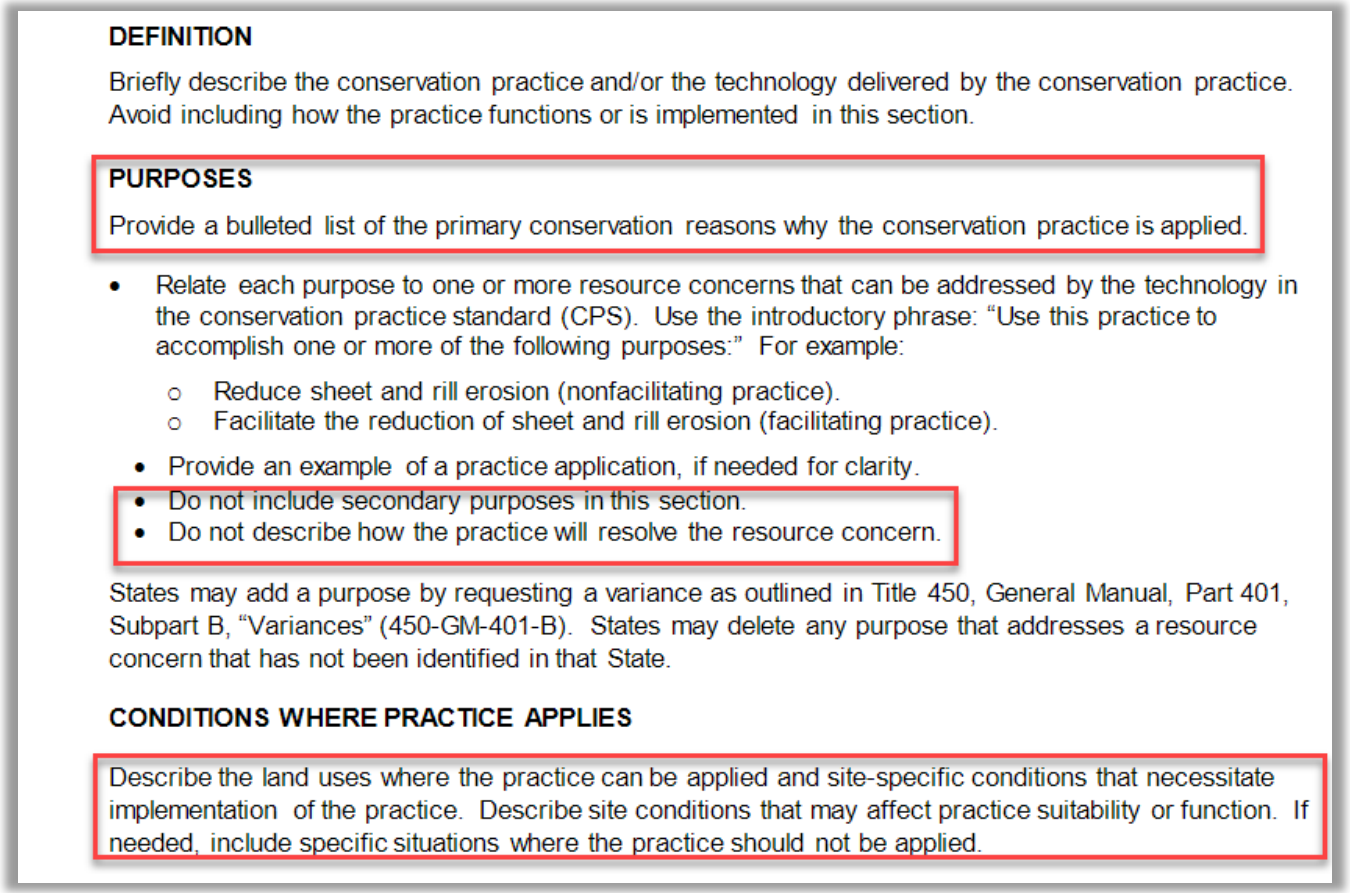
A Notice by the Natural Resources Conservation Service on 05/17/2022

The Practice Standard

- A structural or vegetative measure, or management activity used to protect or reduce the degradation of soil, water, air, plant, animal, or energy resources
- Delivers technology based on allowable criteria to adapt the technology to the site
- 164 Current Practices in NHCP
- Supporting Materials:
  - Specifications
  - Implementation Requirements
  - Payment Scenarios

The Practice Standard

- Definition
- Purposes
- Conditions Where Practice Applies
- General Criteria
- Additional Criteria
- Considerations*
- Plans & Specifications
- Operation & Maintenance



DEFINITION

Briefly describe the conservation practice and/or the technology delivered by the conservation practice. Avoid including how the practice functions or is implemented in this section.

PURPOSES

Provide a bulleted list of the primary conservation reasons why the conservation practice is applied.

- Relate each purpose to one or more resource concerns that can be addressed by the technology in the conservation practice standard (CPS). Use the introductory phrase: "Use this practice to accomplish one or more of the following purposes:" For example:
  - Reduce sheet and rill erosion (nonfacilitating practice).
  - Facilitate the reduction of sheet and rill erosion (facilitating practice).
- Provide an example of a practice application, if needed for clarity.
- Do not include secondary purposes in this section.
- Do not describe how the practice will resolve the resource concern.

States may add a purpose by requesting a variance as outlined in Title 450, General Manual, Part 401, Subpart B, "Variances" (450-GM-401-B). States may delete any purpose that addresses a resource concern that has not been identified in that State.

CONDITIONS WHERE PRACTICE APPLIES

Describe the land uses where the practice can be applied and site-specific conditions that necessitate implementation of the practice. Describe site conditions that may affect practice suitability or function. If needed, include specific situations where the practice should not be applied.

https://directives.sc.egov.usda.gov/

Chapter 3
National Conservation Practice Standards

Practice Name and Units	Practice Code	Date of Current CPS	Lead Discipline	Practice Lifespan*
Access Control (ac)	472	10/17	ESD-For	10
Access Road (ft)	560	09/20	CED-CE	10
Agrichemical Handling Facility (no)	309	07/21	CED-EE	15
Air Filtration and Scrubbing (no)	371	07/21	CED-AQS & ESD-ARS	10
Alley Cropping (ac)	311	10/17	ESD-For	15
Amending Soil Pr				1

National Discipline Leads

ESD	Ecological Sciences Division	CED	Conservation Engineering Division
Agron	Agronomist	AE	Agricultural Engineer
AH	National Leader Animal Husbandry	AQS	Air Quality Specialist
AqEco	Aquatic Ecologist	CCE	Conservation Civil Engineer
ARS	Atmospheric Resource Specialist	CE	Construction Engineer
For	Forester	DE	Design Engineer
Graz Land Sp	Grazing Land Specialist	EE	Environmental Engineer
NM	Nutrient Management Specialist	ECE	Energy Conservation Engineer
PM	Pest Management Specialist	EG	Engineering Geologist
WBio	Biologist	HE	Hydraulic Engineer
		LA	Landscape Architect
		SE	Soils Engineer
		WME	Water Management Engineer

CONSERVATION PRACTICE STANDARD

SOIL CARBON AMENDMENT

CODE 336

(ac)

DEFINITION

Application of carbon-based amendments derived from plant residues or treated animal byproducts

PURPOSE

Use this practice to accomplish one or more of the following purposes:

- Improve or maintain soil organic matter
- Sequester carbon and enhance soil carbon (C) stocks
- Improve soil aggregate stability
- Improve habitat for soil organisms

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where organic carbon amendment applications will improve soil conditions, with the following exceptions:

- Do not use this practice to apply amendments where changes to the plant community could be undesirable or unknown (e.g., changing a native or an established desired community etc.).
- Do not apply amendments when nutrients in the amendment will not be directly used (e.g., nutrient-rich amendment applications to fallow land or fields without existing or planned vegetative cover).

CRITERIA

General Criteria Applicable to All Purposes

Plan, design, and implement carbon amendment applications in compliance with all federal, state, and local laws and regulations. The owner or operator is responsible for securing all required permits or approvals and for applying in amendment in accordance with such laws and regulations.

Evaluate site using appropriate planning criteria, assessment tools, or evaluation activities for the intended land use to determine where soil carbon amendments will achieve the intended purpose(s).

Test the soil prior to amendment application. Use laboratories meeting current requirements and performance standards of the North American Proficiency Testing Program under the auspices of the Soil Science Society of America or use an alternative State-approved certification program that considers laboratory performance and proficiency to ensure accuracy of soil test results.

USDA United States Department of Agriculture

National Resource Concern List and Planning Criteria

Natural Resources Conservation Service (NRCS)

Organic matter depletion

Management-induced depletion of any or all pools of soil organic matter resulting in limited soil function and processes that support plant productivity, biological activity and water and nutrient cycling.

Objective: Maintain, increase and/or improve soil organic matter.

When land use is: Crop or Associated Ag Land

Tools	Planning Criteria
National or State In-Field Soil Health Assessment Worksheet	Soil organic matter indicators do not meet the criteria in the assessment worksheet
Client input and/or Planner Observation OR Soil Test Results OR Current NRCS wind or water erosion technology	Implementing a Soil Health Management System that addresses organic matter depletion. OR Soil test shows organic matter, labile carbon, or labile bioavailable nitrogen trends at or above typical value for a high functioning soil for that specific management unit and site conditions. OR Improved organic matter over multiple years of results.

Follow Land Grant University (LGU) or industry guidance to collect, prepare, store and ship soil samples. Ensure sampling protocol and laboratory soil test methods are the same as those required by the State-adapted NRCS Conservation Practice Standard (CPS) Nutrient Management (Code 590).

At a minimum, measure the following soil properties:

- Soil pH
- Soil organic matter or soil organic carbon
- Extractable phosphorus, potassium, calcium, sulfur, and magnesium
- Cation exchange capacity

Test for any of the following properties when applicable to local conditions or conservation objectives:

- Aluminum, sodium, and soluble salts (electrical conductivity)
- Bulk density
- Aggregate stability
- Available water capacity
- Iron, manganese, copper, zinc

Additional Criteria for All Amendments

Document the physical and chemical analysis (i.e., composition and properties) of amendment per amendment category near the time of application. Current amendment analysis documentation shall be provided by the party who produces the amendment.

Apply carbon amendments with minimal disturbance at a rate and time that will achieve the intended purpose.

Evaluate the landscape, soil properties, amendment composition, plant nutrient needs, and application rate to determine if NRCS CPS Nutrient Management (Code 590) is needed to address nutrient-related resource concerns.

Do not use this practice for the application of raw manure alone or non-pyrolyzed or non-gasified biosolids.

Do not apply high-salt materials where salinity is a concern.

Do not apply amendments:

- Produced from crop residues that could otherwise provide soil protection and improve soil health (e.g., stover or straw) or from woody residue that is necessary to sustain forest health and support wildlife habitat as referenced in NRCS CPS Forest Stand Improvement (Code 666)
- During high wind events
- Where soil, site, climate, or condition pose a significant risk of loss due to slope, runoff potential, rainfall or irrigation intensity, or other factors
- To areas where negative impacts on air or water resources or nutrient cycling may occur
- That may contain undesirable plant propagules or seeds

For operations certified under USDA's National Organic Program (NOP), apply and manage amendments according to program regulations, including but not limited to compost temperature and carbon to nitrogen ratio (C:N) requirements under 7 CFR §205.203. Operations should consult their certifying agent to ensure compliance with NOP standards (or other certification programs or marketing agreements) prior to application.

Consult state rangeland or grazing specialists when planning soil carbon amendments on rangelands.

Report values for all parameters listed in Table 1. Do not apply amendments if the maximum allowable levels listed are exceeded.

Table 1. Parameters for All Carbon Amendments

Parameter	Range	Unit
Feedstock	Report[1]	Type by %
pH	Report	pH units
Electrical Conductivity (EC)	Report	dS/m
Moisture	Report	%
Organic Matter/Carbon	Report	% DW[2]
Total Nitrogen	Report	% DW
Particle Size	Report	% per size class
Phosphorus	Report	mg/kg[4] DW
Potassium	Report	mg/kg DW
Calcium	Report	mg/kg DW
Magnesium	Report	mg/kg DW
Arsenic[3]	<41	mg/kg DW
Cadmium	<39	mg/kg DW
Copper	<1500	mg/kg DW
Lead	<300	mg/kg DW
Mercury	<17	mg/kg DW
Nickel	<420	mg/kg DW
Selenium	<100	mg/kg DW
Zinc	<2800	mg/kg DW

[3]Pollutant concentration limit values from US EPA Title 40 Part 503 STANDARDS FOR THE USE OR DISPOSAL OF SEWAGE SLUDGE. Follow state and local laws and regulations.

[4]milligrams per kilogram (mg/kg) = parts per million (ppm) = grams per ton ($g\ t^{-1}$)

Biochar

Use biochar that is produced by heating biomass to a temperature in excess of 350 °C under conditions of controlled and limited oxygen concentrations to prevent combustion (i.e., pyrolysis or gasification). Use biochar with the International Biochar Initiative (IBI) Certified biochar seal or that meets the criteria in Table 3 as determined by the methods in IBI Standards (version 2.1), or by LGU recognized methods.

500+?

Document:

- Origin of biochar and production method (e.g., verification of temperature and limited oxygen conditions).
- Parameters for All Carbon Amendments in Table 1
- Parameters for Biochar Amendments in Table 3

Use laboratories successfully meeting the current requirements and performance standards of the IBI Seal or use an alternative State-approved certification program that considers laboratory performance and proficiency to ensure accuracy of laboratory analyses.

Apply biochar under weather conditions using application methods that reduce risk of off-site movement and follow worker safety precautions, including use of appropriate Personal Protective Equipment (PPE).

More?

Table 3. Parameters for Biochar Amendments

Parameter	Range	Unit
Total Ash	Report[1]	% of total mass, dry basis
Liming equivalent	Report	% $CaCO_3$
Organic Carbon (C_{org})	>10	% DW
H:C_{org}	<0.7	Molar ratio
Chromium	<1200	mg per kg DW
[1]Report = Required results only, no threshold or range needs to be met		

30%?

Additional Criteria to Maintain or Improve Soil Organic Matter and Sequester Carbon

Apply amendments at a minimum rate of 12 cubic yards per acre and with minimal soil disturbance that will improve soil organic matter without exceeding acceptable risk of N or P loss.

Actual Carbon Applied?

Additional Criteria to Improve Aggregate Stability

Apply amendments with minimal soil disturbance and when soil is not excessively wet to avoid damage to soil structure.

Additional Criteria to Improve Soil Organism Habitat

Apply compost or other carbon amendments with a C:N approximately 24:1 or biochar with high surface area and porosity at a minimum rate of 4 cubic yards per acre with minimal disturbance.

CONSIDERATIONS

General Considerations

Apply low $H:C_{org}$ biochar (<0.7) to maximize soil carbon sequestration.

Inoculate biochar with compost, compost tea, or manure to balance nutrients and nutrient interactions, stabilize pH, and improve amendment moisture content to aid application.

When feedstocks have higher risk of synthetic organic or heavy metals contaminants, evaluate amendment as appropriate for contaminant and amendment type (e.g. processed municipal waste feedstocks that may contain pesticide residues, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyl (PCBs), polyfluoroalkyl substances (PFAS), etc.).

Additional Considerations to Maintain or Improve Soil Organic Matter and Sequester Carbon

When applying soil carbon amendment with diesel-powered equipment and vehicles, consider using Tier 3 or Tier 4 emissions certified diesel engines to minimize nitrous oxides and particulate matter emissions from diesel exhaust and to maximize climate benefits.

Consider life cycle analysis of the amendment that evaluates the feedstock source, processing and transportation impacts on carbon and greenhouse gas accounting.

Consider using COMET-Farm or COMET-Planner to estimate changes in carbon and greenhouse gas emissions of planned practices.

Scenario Name	Narrative	Rate*	Unit
100% Biochar	Apply 100% biochar…	$200	Cubic Yards (per Acre)
80% Biochar-20% Compost	Apply a blend of a >= 80% biochar and <= 20% compost (by volume)…	$170	Cubic Yards (per Acre)
60% Biochar-40% Compost	Apply a blend of a >= 60% biochar and <= 40% compost (by volume)…	$150	Cubic Yards (per Acre)
40% Biochar-60% Compost	Apply a blend of a >= 40% biochar and <= 60% compost (by volume)…	$130	Cubic Yards (per Acre)
20% Biochar-80% Compost	Apply a blend of a >= 20% biochar and <= 80% compost (by volume)…	$105	Cubic Yards (per Acre)
Compost & Biochar Blend Small Areas	Apply a blend of a >= 50% biochar and <= 50% compost (by volume)…	$13	Cubic Feet (per 1000 ft^2)

….to sequester carbon, reduce nitrogen losses, and improve other soil health-related resource concerns. **Biochar has been tested and is imported from an outside source**. Biochar is applied at the recommended rate to treat the identified resource concerns

USDA United States Department of Agriculture

Conservation Practice Standard Overview

SOIL CARBON AMENDMENT (808)

Soil Carbon Amendments (SCA) are materials derived from plant or animal residues, that when applied will improve the physical, chemical, or biological properties of the soil.

These amendments may be applied to the soil in order to improve organic matter, aggregate stability, organism habitat, plant productivity and health, moisture management efficiency, and air quality.

Practice Information

Soil carbon amendments consisting of compost, biochar, and other identified materials may be added to improve existing soil conditions. Soils of the planning unit should be evaluated using the most current planning criteria, field assessments, and benchmark soil tests.

Materials used as soil carbon amendments should be created following approved methods. An appropriate laboratory analysis of the material is necessary to determine application rates and if there are any inherent chemical limitations.

Application of soil carbon amendments on planning units containing sensitive areas should be avoided, while limitations of crop sequence,

Operation and maintenance of the soil carbon amendment practice includes calibration of distribution equipment, monitoring crop health following applications, inspection of fields following precipitation events to ensure material is staying in place and completing soil health tests after the first application and then in subsequent years to develop a trend line for soil carbon levels.

Common Associated Practices

Soil Carbon Amendment (808) is commonly applied with conservation practices needed to mitigate soil erosion, compaction, nutrient runoff and leaching such as Conservation Crop Rotation (328); Cover Crop (340); Residue and Tillage Management, No Till (329), Residue and Tillage Management , Reduced Till (345),

USDA United States Department of Agriculture

Natural Resources Conservation Service

STATEMENT OF WORK
Soil Carbon Amendment (808)
Interim Conservation Practice Standard

These deliverables apply to this individual practice. For deliverables for other planned practices, refer to those specific Statements of Work.

DESIGN

Deliverables

1. Design documents that demonstrate criteria in NRCS practice standard have been met and are compatible with planned and applied practices
   a. Practice purpose(s) as identified in the Implementation Requirements.
   b. List of required permits to be obtained by the client, if applicable.
   c. List all required and/or facilitating practices.
   d. Practice standard criteria-related computations and analyses to develop plans and specifications including but not limited to:
      i. Results of applicable soil sampling, analyses and tests, provided by the client.
      ii. Documentation of soil carbon amendment material source or feedstock.
      iii. Results of soil carbon amendment laboratory analyses and tests for nutrients provided by the client.
2. Written plans and specifications shall be provided to the client that adequately describes the requirements to install the practice and obtain necessary permits. Plans and specifications shall be developed in accordance with the requirements of conservation practice standard Soil Carbon Amendment (808) on the 808 Implementation Requirements Document and will include at a minimum:
      i. Planned amendment application rates, methods, and timing of application.
      ii. Maps delineating areas for application; identifying setbacks and spreading date restrictions, as applicable.
      iii. Nutrient management analyses of soil and amendments for planned cropping sequence.
3. Operation and maintenance documented on the 808 Implementation Requirements Document.
4. Certification that the design meets practice standard criteria and comply with applicable laws and regulations on the 808 Implementation Requirements Document.
5. Design modifications during installation as required.

INSTALLATION

Deliverables

1. Pre-implementation conference with client.
2. Verification that client has obtained required permits if required.
3. Application areas, rates, and timing identified according to plans and specifications including applicable layout notes.

Producer:	[Producer]	**Project or Contract:**	[Project or Contract #]
Farm Name:	[Farm Name]	**Planner/TSP:**	[Planner /TSP Name]
Location:	[Location]	**Date:**	Click or tap to enter a date.

General description of the practice: The use of soil carbon amendments involves the application of materials derived from plant or animal residues to improve the physical, chemical, or biological properties of the soil.
Practice Lifespan: 1 year

Description of Work:

Practice Purpose(s): (check all that apply)

- ☐ Maintain, increase, or improve soil organic matter quantity and quality.
- ☐ Maintain or improve soil aggregate stability.
- ☐ Maintain or improve habitat for soil organisms.
- ☐ Improve plant productivity and health.
- ☐ Improve the efficient use of irrigation water.

☐ A map(s) showing all fields planned for Soil Carbon Amendment is attached. The map shows:

1. The location of sensitive areas,
2. Required setbacks,

☐ A soil map(s) for all fields planned for Soil Carbon Amendment is attached. The map(s) and any attached soils data includes at a minimum: soil type and slope.

USDA United States Department of Agriculture

808 – Soil Carbon Amendment Implementation Requirements

Associated Practices:

☐	Conservation Cover (327)	☐	Forage and Biomass Planting (512)
☐	Conservation Crop Rotation (328)	☐	Prescribed Grazing (528)
☐	Residue & Tillage Management, No-Till (329)	☐	Range Planting (550)
☐	High Tunnel System (325)	☐	Nutrient Management (590)
☐	Amending Soil Properties with Gypsum (333)	☐	Pest Management Conservation System (595)
☐	Controlled Traffic Farming (334)	☐	Salinity & Sodic Soil Management (610)
☐	Cover Crop (340)	☐	Soil Health Testing (216)
☐	Residue & Tillage Management, Reduced-Till (345)	☐	Mulching (484)
☐	Mulching (484)	☐	Irrigation Water Management (449)

Soil Carbon Amendment (SCA) Description:

Type of Soil Carbon Amendment to be applied:	
Raw source or feedstock of Soil Carbon Amendment if compost or biochar (if multiple sources list each):	
1)	**3)**
2)	**4)**
If biochar, document pyrolysis temperature used for processing:	

☐ Soil Health In-Field Assessment report: Attached

☐ Soil Health Lab Report: Attached

If other type of SCA, indicate type:	

☐ Amendment analysis or certification is attached.

Nutrient Management Plan (NMP)

☐ Planned application rate of SCA is determined to not be in excess of the NMP allowed rates for N and P.

Soil Carbon Amendment Test Results					
Carbon:		**Nitrogen:**		**Phosphorus:**	
Potassium:		**pH:**			
Additional Test Results Required for Compost or Compost Mixtures					
Moisture:		**Soluble Salts:**		**pH:**	
Organic Matter:		**Bulk Density:**		**Percent Solids:**	
C:N Ratio:					

Note: All Federal, State, local laws and regulations apply to the land application of Soil Carbon Amendments. Permits may be required depending on the source and specific application site of the SCA. For Soil Carbon Soil Amendments that are derived from, or contain mixtures of bio-solids, sewage sludge or municipal sourced waste, the material has been tested and is below EPA pollutant levels found in USEPA 40 CFR Part 503, and if applicable,

National Biochar Agreement

- USDA-ARS & NRCS, USBI, AFT, WSU Collaboration ($800k)
- Provide tools & calculators for potential biochar users to:
  - Select appropriate biochar products;
  - Calculate appropriate amendment rates;
  - Estimate financial costs and benefits of biochar amendment; and
  - Estimate greenhouse gas and carbon sequestration benefits from biochar application.
- Coordinate training and outreach to biochar producers to increase the representation of commercially available biochars within the Biochar Atlas (USBI).

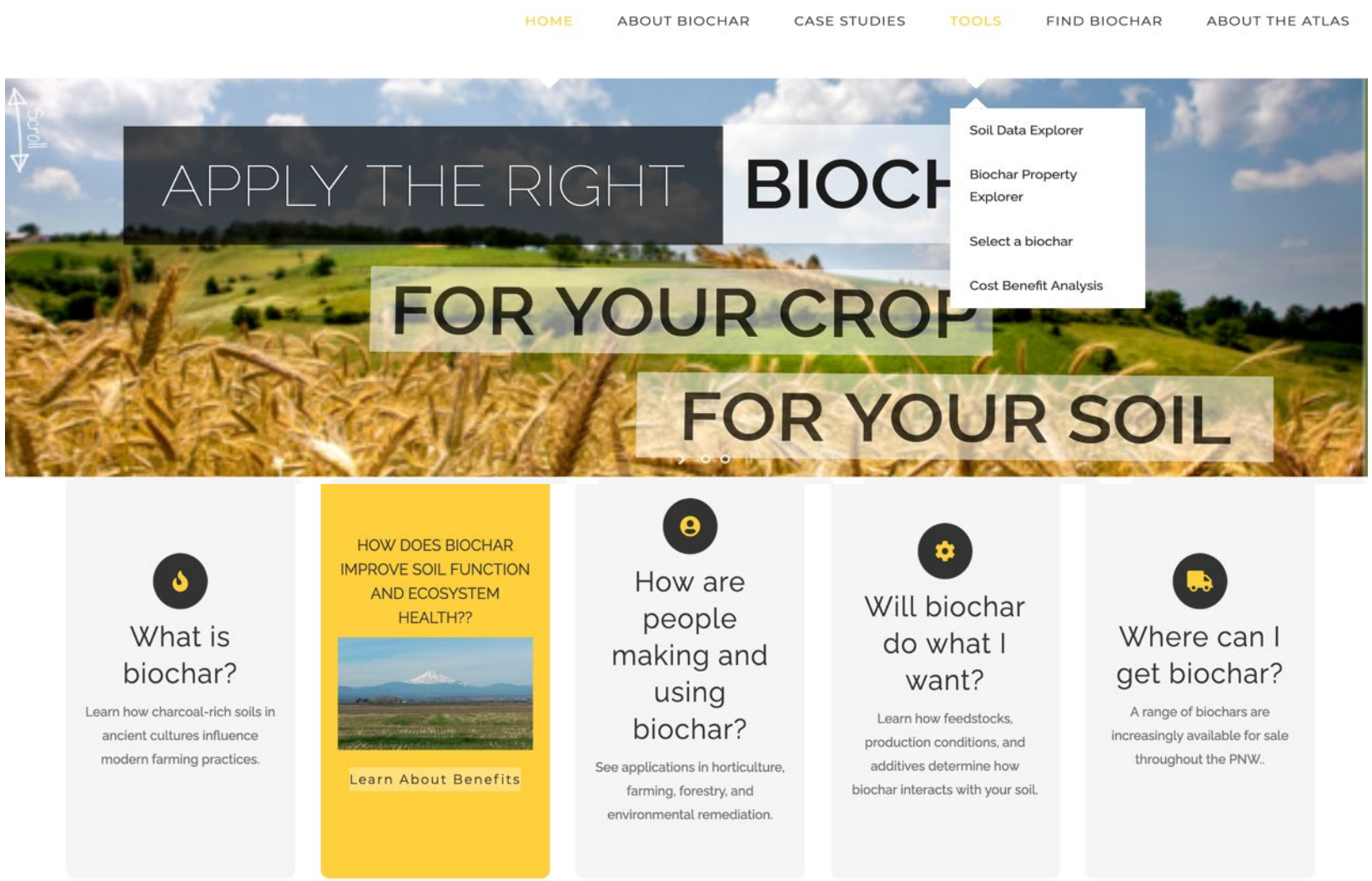
National Biochar Agreement

- Provide training and outreach material targeted to farmers (producers)*, ag service providers, conservation planners, & biochar producers (manufacturers)*.
- Educate biochar producers about the regional market, performance characteristics of biochar, & value of biochar products.
- Provide NRCS materials to train planners, including:
  - Videos, webinars, and fact sheets to implement EQIP practices, including Soil Carbon Amendment (336/808)

*NRCS refers to farmers, ranchers, forestland owners, operators etc. as “producers”.

USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

HELP US… HELP FARMERS!

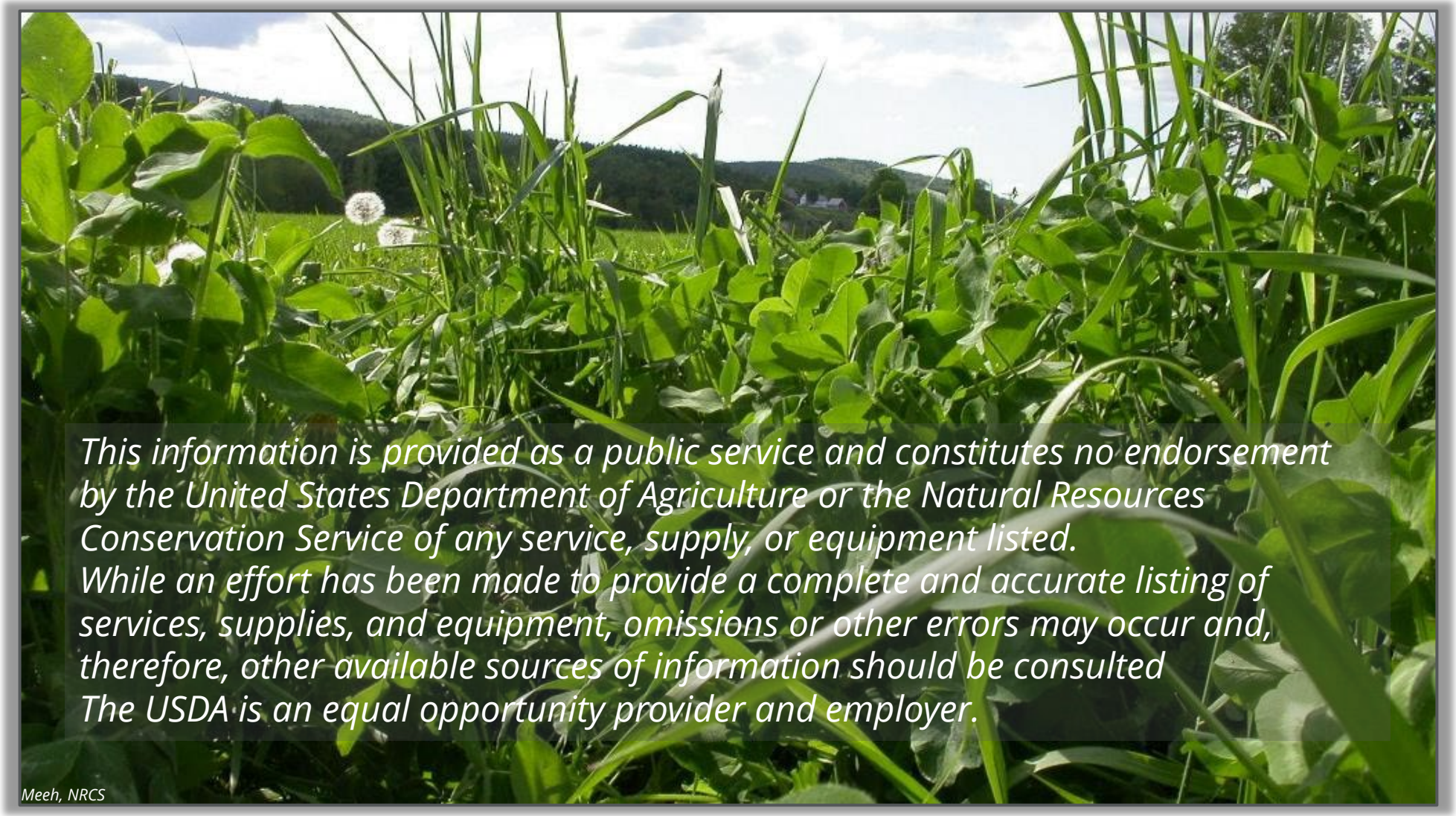


THE USDA ARS WANTS TO INCLUDE YOUR BIOCHAR IN OUR LIBRARY.

We are offering free lab testing of commercially available biochars to include them in our decision support toolkit.

Contact :
Kristin Trippe
Kristin.Trippe@USDA.GOV

For more information!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