

Part 614 – Applying Soil Taxonomy

Subpart A – General Information

614.0 Definition and Purpose

The national system of soil classification identifies sets of soil properties and groups them in taxonomic classes. The system is dynamic and amended as needed. The purpose of soil classification is to order, name, organize, understand, remember, transfer, and use information about soils.

614.1 Policy and Responsibilities

A. The National Cooperative Soil Survey (NCSS) is directed, administered, managed, conducted, and supported at various organizational levels within NRCS. Additional information about responsibilities at various levels of the organization can be found in part 608, section 608.1, of this handbook and in the Title 430, General Manual, Part 402.

B. The partnership of the NCSS is represented by a broad diversity of educational, research and scientific, land management, and operational organizations that have a stake in the content, detail, quality, and utility of soil survey products. It is the responsibility of all NCSS partners to participate in the review, update, and management of soil survey standards as well as adhere to these standards relative to the Soil Survey Program. Specific responsibilities of principle partners and staff are outlined below.

C. NRCS maintains and provides leadership for amending Soil Taxonomy and for maintaining the soil series classification data. All soil surveys within NCSS must use Soil Taxonomy.

D. National Headquarters (NHQ)

The director of the Soil Science Division—

- (i) Provides concurrence to additions or amendments to Soil Taxonomy and NCSS standards documents.
- (ii) Supports the function of the International Committee on Soil Taxonomy (ICOMTAX):
 - Recommends membership
 - Supports international participation
- (iii) Facilitates logistical support and communication.
- (iv) Supports regional and SSO staff participation in regional technical committees.

E. National Soil Survey Center (NSSC)

(1) The director of the NSSC—

- (i) Provides facilities and staff necessary to review and publish approved amendments and additions to NCSS standards and other documents.
- (ii) Concurs on recommendations forwarded by the national leader for soil survey standards.

(2) The national leader for soil survey standards—

- (i) Coordinates the review of proposals and amendments.
- (ii) Facilitates review by NCSS regional committees and ICOMTAX:
 - Notifies regional committee chairs and the Chair of ICOMTAX of needs
 - Develops charges to the committees

- Establishes a review schedule or timetable
- (iii) Collates recommendations from all interested entities.
- (iv) Serves as the primary contact for the person initiating the proposal and reports interim status and final decisions.
- (v) Posts original proposal, reviews and recommendations, and final decisions to publically accessible online sites.
- (vi) Develops comprehensive recommendations to the director of the National Soil Survey Center and the director of the Soil Science Division for concurrence.
- (vii) Codifies and publishes changes to Soil Taxonomy and other impacted standards documents, including the current version of the Keys to Soil Taxonomy and the Soil Survey Manual.
- (3) The functional branches at the NSSC, within their area of responsibility or technical expertise—
 - (i) Assess, as assigned, the scientific validity of a proposal.
 - (ii) Assess impacts of proposed amendments to other technical documents and standards of NCSS.
 - (iii) Evaluate changes to soil survey information and products, including soil survey descriptions and information, interpretations and ratings, maps and geospatial products, data collection and management, survey methodologies, training, and publication.

F. NCSS Regions and Cooperators

- (1) NRCS staff and cooperators within NCSS regions participate as members of the various technical and business committees on standards.
- (2) NRCS staff and cooperators within NCSS regions provide reviews of and support for Soil Taxonomy and other technical documents of NCSS.
- (3) The chair of the Regional Committee on Standards—
 - (i) Conducts reviews and develops report recommendations in timely manner.
 - (ii) Coordinates input and comments from cooperators and stake holders.
 - (iii) Provides written responses to the national leader for soil survey standards.

G. The International Committee on Soil Taxonomy

- (1) The committee reviews proposals forwarded by the national leader for soil survey standards.
- (2) The committee analyzes the international applications or impacts of a proposal.
- (3) The committee sponsors proposals originating from the international community.
- (4) The chair of ICOMTAX—
 - (i) Coordinates reviews by members of ICOMTAX.
 - (ii) Collates responses from members.
 - (iii) Reports on findings to the national leader for soil survey standards.
- (5) The U.S. soil taxonomy specialist at the NSSC serves as secretary to ICOMTAX.

H. Soil Survey Regional Offices (SSRs)

The regional director—

- (i) Provides data and technical support to the review committees.
- (ii) Coordinates proposals originating from soil survey offices.

I. Soil Survey Offices (SSOs)

The MLRA SSO leader—

- (i) Collects data to support the review and analysis of proposals.
- (ii) Develops and forwards proposals to regional standards committees in order to improve soil survey standards documents (e.g., Soil Taxonomy and the Soil Survey Manual).

J. State Offices

State soil scientists (SSS)—

- (i) Assist and coordinate with NCSS State partners regarding proposals and amendments to Soil Taxonomy and NCSS standards.
- (ii) In general, assist all users of soil survey and ecological site information.

614.2 National Soil Classification System

A. The national soil classification system has two parts. The first part is Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys, second edition, Agriculture Handbook No. 436, herein referred to as Soil Taxonomy (available at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053577). This part provides definitions and nomenclature for classifying soils. NCSS adopted this system in January 1965. Amendments to the system are periodically placed into a revised edition of the Keys to Soil Taxonomy (available at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053580).

B. The second part consists of the official soil series descriptions. The Soil Science Division maintains the official soil series descriptions in a file-share storage system (available online at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2_053587) and the soil series classifications in a database (available online at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2_053583). The file share and database list the classification of established, tentative, and inactive soil series of the United States, Puerto Rico, the Pacific Basin, and the U.S. Virgin Islands. The file share of the official soil series description is the official reference to soil series descriptions. The soil series classification (SC) database is the official source for the taxonomic classification of the soil series. The database contains other information about the soil series, such as which soil survey regional office (SSR) has responsibility for the series, the series status, dates of origin and establishment, related geographic areas, and benchmark soil designation. Both the official soil series description file and the soil series classification database are available on the Internet.

614.3 Use of the National Soil Classification System in Soil Surveys

A. Soil surveys use Soil Taxonomy to provide—

- (1) A connotative naming system that enables those users familiar with the nomenclature to remember selected properties of soils.
- (2) A means for understanding the relationships among soils within a given area and in different areas.
- (3) A means of communicating concepts of soils and soil properties.
- (4) A means of projecting experience with soils from one area to another.
- (5) Names that can be used as reference terms to identify soil map unit components.

B. Chapter 5 of Soil Taxonomy provides general information on the application of soil classification to soil maps of various scales.

C. The names of soil taxa are reference terms for naming the soil components of a map unit in most soil surveys. Soil taxa are classes at any categorical level in the multicategorical system of Soil Taxonomy, but typically range from the great group level for taxons in reconnaissance mapping to soil series for mapping of lands of intensive use. The name used is generally from a taxon of the lowest category that identifies the dominant kinds of soil. Chapter 7 of Soil Taxonomy provides more information on the derivation of the nomenclature, definition of the terminology, and structure of the taxonomic names. Even though names of one or more taxonomic classes identify components of map units, components are

not the same as soil taxa. If the fixed limits of soil taxa are superimposed on the pattern of soils in nature, the limits of taxonomic classes rarely coincide precisely with mappable areas. In addition to the named component or components, a map unit commonly includes components of minor extent that may be similar or dissimilar to the named soil. Part 627 of this handbook discusses major and minor map unit components and dissimilar and similar soils.

D. A map unit name is distinguished from a soil taxon name by adding one or more phase terms to the soil taxon reference name. For example, Gamma is a soil taxon; Gamma silt loam, saline, 0 to 2 percent slopes, is a map unit name. Part 627 of this handbook provides direction in naming map units. Chapter 5 of Soil Taxonomy and chapter 4 of the Soil Survey Manual provide additional information on the relationship between soil taxa and map units and the naming of map units.

614.4 Soil Taxonomy Committees, Work Groups, and Referees

A. Regional Soil Taxonomy Committees

Each group of States within the NCSS region has a soil taxonomy committee (or other standards-related committee) as part of the Regional Cooperative Soil Survey Conference. The membership and operational procedures of the committee are described in the regional conference bylaws. These committees work on standards-related issues that are identified as being important within the region and also review proposed amendments referred to them by the national leader for soil survey standards. Members serve on a continuous basis, as needed.

B. National Soil Taxonomy Committee

The National NCSS Conference has a Standing Committee on Standards that includes some members from the regional committees as well as members appointed by the Conference Steering Committee. The membership and operational procedures of the committee are described in the national NCSS conference by-laws. This committee works on standards-related issues that are identified by the Conference Steering Committee as being important, considers business items referred to it by the regional committees, and reviews proposed amendments that are referred to it by the national leader for soil survey standards.

C. International Committee for Soil Taxonomy

- (1) In order to continue the improvement of Soil Taxonomy and broaden interests and global application, ICOMTAX was established to actively promote input from the international community. ICOMTAX evaluates the technical soundness and appropriateness of international proposed amendments for inclusion in Soil Taxonomy and the Keys to Soil Taxonomy. It may also provide review of any amendments having potential international application.
- (2) ICOMTAX operates in an advisory capacity under the director of the Soil Science Division. Membership is by invitation of the director. It promotes the international use of Soil Taxonomy and supports the submission and review of proposals to amend Soil Taxonomy for greater use and applicability worldwide.
- (3) ICOMTAX reviews, analyzes, and develops recommendations on amendments to Soil Taxonomy, including issues of nomenclature, diagnostic properties, features and horizons, and classes.
- (4) ICOMTAX addresses international soil classification issues relative to Soil Taxonomy as referred from the national leader for soil survey standards. The business of ICOMTAX is conducted remotely by mail or email, teleconferences, and public comment forums. When feasible, face-to-face meetings concurrent with meetings of professional societies, such as the Soil Science Society

- of America (SSSA), the International Union of Soil Science (IUSS), and the World Congress of Soil Science (WCSS), are conducted.
- (5) Members of ICOMTAX are selected from active members of NCSS, IUSS, and similar national professional soil science organizations.
 - (6) A chair and co-chair, who are appointed by the director of the Soil Science Division, lead ICOMTAX business. The chair conducts meetings, develops reports of analyses, and provides recommendations to the national leader for soil survey standards. The co-chair assists the chair and takes over the position when the term of the current chair expires. The NRCS national soil classification specialist at the National Soil Survey Center serves as secretary and permanent member of the committee. This person facilitates communication, distributes proposals and recommendations, and maintains records of meetings and reports.
 - (7) Membership consists of 9 to 17 rotating members recommended by IUSS and NCSS and appointed by the director of the Soil Science Division. Terms are 3 years. Consecutive terms are permitted, and terms are staggered to provide continuity. Ad hoc participation by invited technical experts is recommended to address little known or complex issues.
 - (8) The committee develops operational procedures (bylaws) and guidance documents, as needed. These documents need to clearly address—
 - (i) Receipt of proposed amendments.
 - (ii) Discussion, analysis, and development of recommendations.
 - (iii) The recommendations to present to the national leader for soil survey standards.
 - (9) The national leader for soil survey standards reviews and processes the recommendations of ICOMTAX for final determination.

D. National Ad Hoc Work Groups

The director of the Soil Science Division appoints working groups as needed. The working groups review reports from regional Soil Taxonomy committees and recommend additional study or implementation of proposed amendments. Members include representatives of State and Federal agencies and also may include international representatives. The chairperson of a group, usually a member of the National Soil Survey Center staff, and other members are chosen according to the nature of the recommended changes and the expertise needed.

E. International Committees

The director of the Soil Science Division may establish international committees under the structure of ICOMTAX to address technical or scientific issues that affect international users of Soil Taxonomy and require major additions or changes in the soil classification system. Membership is open to any user of Soil Taxonomy and usually includes representatives of State and Federal agencies as well as international cooperators. Charges are focused and specific, and committees operate for a specified duration.

F. Referees

The director may request that referees prepare position papers on proposed amendments. The referee requests, as needed, a review by peers and assumes the responsibility for decisions regarding the proposal.

614.5 Procedures for Amending Soil Taxonomy

- A. Soil Taxonomy is a dynamic system for classification of soils. It is designed to be open-ended, permitting the addition of diagnostic features and classes that help explain the pedogenic history and

broad interpretative qualities of soils. Inferred taxonomic classes are not added until they are actually described and documented.

B. Recommendations for amending Soil Taxonomy must be fully developed and documented prior to submission to the national leader for soil survey standards. Established guidelines are followed in proposals and the submission of proposals as well as in the evaluation and testing. Proposals that meet requirements and are approved are drafted into amendment form and posted for open review and comment. Based upon review comments, the proposal is adopted and integrated, rejected, or sent back for further development and documentation. Part 614, subpart B, section 614.10, illustrates the processing of proposals to amend Soil Taxonomy.

C. Considerations in Proposing Amendments to Soil Taxonomy

- (1) An amendment should address questions of soil classification, including diagnostic features, diagnostic criteria, and taxonomic classes through the family level.
- (2) An amendment should add value and clarity to Soil Taxonomy, or accommodate needed classes as discovered.
- (3) An amendment should be based upon soil properties that can be observed or measured and serve as the basis for diagnostic criteria.
- (4) An amendment should be placed logically within the Soil Taxonomy hierarchy (i.e., within the order, suborder, great group, subgroup, family, or series).
- (5) Definitive diagnostic criteria should be developed and defined.
- (6) The impacts or consequences to the overall system of Soil Taxonomy should be considered. For example—
 - (i) Does the amendment provide clarity to the classification system or improve interpretative value?
 - (ii) Will the amendment require excessive modifications throughout the Soil Taxonomy system, affecting a large number of taxa or series?
 - (iii) Will the amendment impact existing State or Federal regulations or statutes?
 - (iv) Can the amendment be implemented readily?

D. Submitting Proposed Amendments

Proposals may be made by anyone using Soil Taxonomy from within or outside the United States. Proposals should be submitted to the national leader for soil survey standards. This individual determines routing to the appropriate regional Soil Taxonomy committee chairs and ICOMTAX. Send proposals to the national leader for soil survey standards at the National Soil Survey Center, Federal Building, Room 152, 100 Centennial Mall North, Lincoln, NE, 68508-3866. Proposals may be surface mailed or sent as attachments in email messages. (See the National Soil Survey Center directory at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053895 for the current email address of the national leader for soil survey standards.)

E. Documenting Proposed Amendments

- (1) **Criteria for New Taxa Above the Family Category.**—The minimum supporting evidence for all proposed classes must include pedon descriptions, the impact on interpretations, an estimate of geographical extent, and certain laboratory data. Laboratory data is required for at least the critical parts of diagnostic horizons in the proposed new class if the limits between the proposed class and the other recognized classes cannot be adequately identified using field criteria alone.
- (2) **Criteria for a New Class in the Family Category.**—The minimum supporting evidence includes about 10 pedon descriptions or a description of a proposed soil series and the expected impact on interpretations for the intended use. Laboratory data is required for at least the critical parts of the proposed new class if the limits between the proposed class and the other recognized classes cannot be adequately identified using field criteria alone.

- (3) Support of the Review Process.—Proposals should include the following materials:
 - (i) Soil and site descriptions, as appropriate to support the proposal
 - (ii) Definitions of new terminology
 - (iii) Analytical results using procedures in SSIR #42 (Laboratory Methods Manual)
 - (iv) Graphics, illustrations, maps, and photos
 - (v) Citations and technical references
 - (vi) Justification of metrics and limits for the classes or differentiae being proposed
 - (vii) Brief analysis of improvement to soil survey maps, data, and descriptions relative to use and management of soil or improvements to soil science procedures and processes in general
 - (viii) Brief analysis of geographic extent or application of the proposal
 - (ix) If appropriate, brief analysis of impacts to NCSS soil survey standards and procedures, such as the Keys to Soil Taxonomy and Soil Survey Manual

F. Evaluating Proposed Amendments

- (1) The national leader for soil survey standards, located at the National Soil Survey Center, circulates the proposed amendment to NCSS cooperators and ICOMTAX for review. Proposed amendments are also posted online on the Soil Taxonomy web page (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053577) under the heading “Proposals to Amend Soil Taxonomy.” Review and comment are welcome from any interested cooperators. Those who are current members of the regional taxonomy committees have a special obligation to review and comment on proposals. Appropriate review recommendation would be for approval without change, approval with change, or rejection. Notes of discussions and reasoning for the recommendation should also be given.
- (2) The national leader for soil survey standards evaluates all proposals from the international committees and other proposals that originate outside the United States, arranges a review of these proposals by cooperators or work groups and by ICOMTAX, and determines disposition for proposals.
- (3) If a significant proposal is rejected, the originator is typically sent recommendations for improving the amendment for a future resubmission. Rejected amendments may be appealed to the director of the Soil Science Division for reconsideration.
- (4) Recommendations to change or reject the proposal are documented. The national leader for soil survey standards reviews the recommendations and either makes a decision to return the proposal to the originator with reasons for the rejection or includes the proposal in a transmittal (by email or surface mail) to the chairs of the regional soil taxonomy committees and ICOMTAX.
- (5) If the proposal is accepted and concurred by the director of the Soil Science Division, it is incorporated into Soil Taxonomy and related standards documents.
- (6) The Deputy Chief for Soil Science and Resource Assessment in NRCS issues a national bulletin to announce changes to the Keys to Soil Taxonomy or Agriculture Handbook 436 (Soil Taxonomy). Issuance of this bulletin gives the final official approval for the changes.

G. Distributing Amendments

The publication of proposed amendments constitutes final approval. New editions of the Keys to Soil Taxonomy and Soil Taxonomy include these amendments. All soil scientists of NCSS and other soil scientists, both national and international, receive new editions of these documents.

614.6 The Soil Series

A. The soil series is the lowest category of the national soil classification system. The name of a soil series or the phase of a soil series is the most common reference term used in soil map unit names. The name of a soil series is also the most common reference term used as a soil map unit component. The purpose of the soil series category is closely allied to the interpretive uses of the system. Map unit

components provide the interpretive applications within soil survey for the most detailed purposes. Soil series are the most homogeneous classes in the classification system.

B. Chapter 21 of Soil Taxonomy and chapter 17 of the current edition of the Keys to Soil Taxonomy provide guidance for series differentiae within a family.

C. Establishing Norms and Class Limits for Soil Series

- (1) In developing or revising soil series concepts, systematic procedures are essential. They reduce the possibility of recognizing more soil series than are necessary to organize and present existing knowledge about soil behavior. The distinctions between one soil series and its competitors must be large enough to be consistently recognized and to be recorded clearly. Clearly differentiate each soil series from all other soil series. Simplify this differentiation by using the systematic procedure described in this section.
- (2) Assemble and study all available information on morphology, composition, position on the landscape, and geographic distribution of the soils being considered. Compare the available information with the concepts of existing soil series and evaluate possible concepts for new soil series. Refine soil characteristics that define higher categories of Soil Taxonomy to differentiate one soil series from another. These characteristics reflect the kind and sequence of horizons that can be observed, or they are observable and can be consistently measured. Only use those characteristics that are observed or measured within the soil series control section to differentiate soil series. Chapter 21 of Soil Taxonomy provides more information on the series control section. A significant soil characteristic is one that has genetic implication, such as the nature or arrangement of horizons or the absence of horizons, or one that has an influence on use and management, such as percent of gravel or reaction. Exercise judgment in the selection and weighing of soil characteristics used to separate soil series. Chapter 21 of Soil Taxonomy and chapter 17 of the current edition of the Keys to Soil Taxonomy further discuss soil series and their differentiae.
- (3) Competing soil series are those that are in the same family as the soil series under study. Changing the concept of one soil series may necessitate modification to the concepts of other soil series in the family. It may be necessary to revisit and redescribe competing series to assess the adequacy of the description for proper taxonomic placement and appropriateness of competing statements.
- (4) When proposing a new series, conceptualize a model of it. Develop a model with a specific norm and range in characteristics for the proposed soil series description. The range for differentiating characteristics may not overlap that of an existing soil series in the same family. Limits of the range in soil characteristics for the proposed soil series may be as wide as those permitted in the family to which it belongs. Generally, keep the range in differentiating soil characteristics of the soil series narrower than that for the span of the family. The permissible ranges must not be too narrow for precise and consistent identification. They must be practical to use with the natural variation of soils.
- (5) Select a pedon that is typical for the soil series concept. The typical pedon is a reference specimen that illustrates the central concept for the soil series. This pedon, along with other very similar pedons, forms the model for the soil series class. Thus, the selection of a typical pedon is a very important process and must be done with great care. Base it on the arrayed data on morphology, composition, and geographic distribution. A pedon is not likely to be central for all ranges, but the representative pedon should lie reasonably near the center of the ranges for most physical and chemical properties and for the geographic distribution. If the pedon selected to typify a soil series has one or more properties unusual for the soil series class, record the properties as part of the range of characteristics and note them in the “Remarks” section of the description.

- (6) After selecting the typical pedon, define the permissible ranges for soil properties and qualities. Use the arrayed information on morphology and composition of the soils, especially the profile descriptions, field notes, and laboratory analyses. If laboratory data are used to define ranges in soil properties, use the conventional rules for rounding (see part 614, subpart B, section 614.13). To determine significant digits for soil property or quality measurements used as criteria in Soil Taxonomy, see part 614, subpart B, section 614.14).
- (7) Soils are classified to the family level using only a selected set of properties occurring within specified depths. When defining new soil series, all properties that separate it from similar but competing soil series are essential to include in the series description. Emphasize these properties in the statement of the range of characteristics. Also describe the ranges in significant properties that do not differentiate between the soil series being described and its competing soil series.
- (8) Test the soil series concept. Check the norm and ranges in characteristics against the class limits for the family to which the soil series belongs. Do not cross the limits of the family with the ranges specified for the soil series. The distinctions in definitive characteristics between the norms for the proposed soil series and the norms for competing soil series must be clearly greater than what may be due to normal errors of observation or be based on laboratory data and geomorphic or geographic information. Do not overlap ranges in differentiating characteristics.
- (9) Differences in a single characteristic are seldom used to separate soil series. Preferably, use the distinctions in several characteristics to separate soil series. Some may have greater importance than others. A new soil series is justified if the differences in morphology and composition are clearly greater than what could be attributed to normal errors of observation and if these differences are significant to use and management of the soil. Deciding whether or not to propose a new soil series is difficult when two or more properties of the soils to be classified are outside but near the limits of an existing soil series. Propose new soil series if the soils differ in characteristics that have practical significance to use and management.

D. Allowing Normal Errors of Observation

- (1) A new soil series differs appreciably in either morphology or composition, or both, from already defined soil series. Differences in relevant characteristics must be larger than what may be normal errors of observation or estimates. The following paragraphs give examples of allowed normal errors of observation and tolerance. Soils within these tolerances do not need a new series, nor do they need to be named as taxadjuncts.
- (2) Identification of soil color in the field is subject to errors because of changes in the quality of light and in soil moisture, differences in the visual acuity and skill of individuals, and limitations in the standards used to determine color. Chapter 3 of the Soil Survey Manual provides a discussion of soil color. Field observations of soil color are taken at different times of the day and at differing soil moisture contents. These variables could result in differences as large as a full interval between chips in the Munsell color system. The differences in identification of soil color resulting from one person looking at the same specimen at different times and under different conditions or from a group of individuals looking at the same specimen together are an example of normal errors of observation. Optimum field conditions allow soil color to be matched to within one-half interval between chips on the color chart. The normal range of difference between careful observations is plus or minus a half interval between chips of the same hue or between chips of the same value and chroma on adjacent hues. Color distinctions, if definitive, between the soils of two soil series must be greater than this normal range.
- (3) Field estimates of texture are commonly within plus or minus one-half class of the actual texture, though errors by highly skilled individuals are smaller. To separate soil series that are based in part on differences in texture, use distinctions that are greater than the probable error of field estimates or use laboratory data and geomorphic or geographic information. This rule applies to the entire soil series control section and any of its parts. Not all differences among soil series are obvious. The limit between the fine-loamy and fine particle-size classes is a clay content of 35 percent. The experienced mapper has little difficulty in distinguishing between 30 percent and 40

- percent clay. However, only the laboratory can consistently distinguish between 34 percent and 36 percent clay content. If this is the only difference, the distinction is not important for most uses of the soil map. Name the map unit for either of the two soil series that have a common conceptual boundary at 35 percent clay. Differences that are no greater than the normal errors of observation can cause many needless decisions, even for an experienced mapper. If the estimate of the properties varies by these normal errors, the similar soils do not seriously affect the use of the map as long as the map units are defined to allow for the variation.
- (4) Occurrence of soil pedons having properties that in their normal range on the landscape extend only slightly outside class limits but do not otherwise impact use and management should not be considered for establishment of a new series.

E. Proposing and Naming a Soil Series

- (1) Soil scientists in NCSS write and complete descriptions of new soil series and their ranges for soil properties. Ranges for soil properties are estimated, measured, or both. Part 627, subpart A, section 627.8E(1), of this handbook contains documentation requirements.
- (2) The SC database contains a complete list of active and inactive soil series. It provides the official classification for all soil series in the official soil series description (OSD) file share. When naming a proposed series, give preference to the names of geographic places as a source of possible names. In choosing a name, avoid using—
 - (i) Names consisting of very long words.
 - (ii) Names with any characters other than letters, spaces, periods, apostrophes, or grave accents;
 - (iii) Bizarre, discriminatory, comical, or vulgar words.
 - (iv) Geological terms, such as the names of rocks, minerals, landforms, and the formations of a locality.
 - (v) Names of plants and animals.
 - (vi) Given names of persons, unless the name is a known geographic location or feature.
 - (vii) Copyrighted names and registered trademarks.
 - (viii) Names essentially identical in pronunciation to a name already in use (e.g., Whit vs. Witt).
 - (ix) Names similar in spelling to a name already in use (e.g., Tonnor vs. Tonor).
- (3) Series names with a similar spelling should differ by at least two characters. Names consisting of two words must differ by more than just the space between the two words from similarly spelled single-word series names. Names of local geographic features or places are preferred. If these are unavailable, coined names may be used. Geographic place names must also avoid all restrictions listed above. Coined names must be consistent with American usage and free from the restrictions listed above. The series name may contain only letters, spaces, periods, or apostrophes (single quotes) and the grave accent (`) as characters. The words “AUX,” “CON,” “NUL,” and “PRN” are considered reserved and cannot be used as soil series names due to constraints imposed by the SC database. Refer to the SC/OSD Maintenance Tool User’s Guide (available at https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052428.pdf) for more information on series names.
- (4) After the proposed soil series description is revised within the soil survey region, the SSR that has responsibility for the new series approves the name and reserves the series by entering required data into the SC database. The minimum data required to enter a new series into the SC database consists of the series name, responsible SSR, State having the type location, complete taxonomic classification, and at least one MLRA in which that series occurs. By default, the new soil series is identified as having tentative status and the current year of proposal is assigned. The SSR enters the soil series description into the OSD file share, where it is available for the adjoining SSRs and cooperators to review and provide comment. The entry of new OSDs should occur as soon as possible in order to minimize the inconvenience to other users of having series in the SC database without a corresponding OSD for viewing. A notification and request for comments are sent to adjoining SSRs, State soil scientists within the MLRA, and all other SSRs that have soil series in the same family as the proposed series.

- (5) The responsible SSR evaluates any comments and prepares a revision of the soil series description. The revised description is transmitted to the official soil series description file. If the decision is made not to use the series, the SSR removes the tentative soil series from the SC database. This causes the tentative soil series description in the OSD file share to move to an inaccessible file.
- (6) The responsible SSR resolves disagreements on concepts of soil series. It assembles and evaluates available evidence on the points in question and, if necessary, requests additional information about the soils under consideration from one or more MLRA soil survey regions. If the soil series is in dispute or if the questions about the soil series concept are of considerable importance, a joint field study may be necessary. After the differences have been resolved, the SSR updates the soil series description in the OSD file share.

F. Revising Official Soil Series Descriptions

- (1) Soil scientists must revise soil series descriptions if one or more of the following conditions exist:
 - (i) A change in the concept of the soil series, including the range in characteristics
 - (ii) A change in the classification of the soil series
 - (iii) A change in the type location of the soil series
- (2) Any soil scientist in NCSS may write revisions of soil series descriptions. These descriptions are submitted to the SSR assigned responsibility for the series. The responsibility for maintenance of a series is populated in the SC database and is shown in the OSD. The revision is based on pedon descriptions, laboratory data, and other available sources of information about the soils that represent the series.
- (3) If the soil series classification, range in characteristics, or type location is changed, the SSR reviews these changes within the soil survey region and with other soil survey regions and States in which the soil series or competing series is known or expected to occur. After critical review, scientists return comments to the originating SSR. The staff soil scientist at the SSR evaluates the comments and makes the necessary changes in the revised description of the soil series. The SSR soil scientist updates the classification of the soil series in the soil series classification file, if necessary, and then revises the official soil series description.

G. Inactivating an Established Soil Series

When it is appropriate, SSRs may change the status of a soil series from “established” to “inactive.” They support the decision to inactivate a soil series with documentation as to why the soil series should be made inactive and a recommendation for the disposition of the soils that have been classified in the inactive series. Before changing the status of a soil series to inactive, the SSR with responsibility for the series sends a memorandum of intentions and supporting reasons to affected State soil scientists and SSRs. The responsible SSR notifies members of other disciplines and cooperators who may use the series name in databases and publications. About 45 days are allowed for filing objections to the recommendation. If the SSR determines that the soil series should be made inactive, it notifies the affected regions. The memorandum includes the reclassification to the appropriate soil series or to a taxon of a higher category of all pedons in the inactive series that have been sampled and analyzed by NRCS, cooperating universities, highway departments, or other laboratories. Inactive soil series are retained in the soil series classification database. The OSD of the inactivated series is updated with information from the memorandum of intentions that provides the reason for the status change and the recorrelation of existing components to other named series.

H. Reactivating an Inactive Soil Series Name

The name of a soil series that is placed on the inactive list is not reused unless the series concept is the same as in the previous description. If a SSR wants to reactivate a soil series name, they follow the procedure that is used to propose a soil. A notation is made under “Remarks” that the soil series name is being reactivated.

I. Dropping a Tentative Soil Series

- (1) A tentative soil series is dropped from the soil series classification database if it duplicates an already recognized series.
- (2) If multiple SSRs use the soil series, the SSR with responsibility for the series requests concurrence from affected SSRs to drop the series. Note that responsibility for maintenance is generally determined by the type location of a series. Upon concurrence, the SSR notifies the users that the series is dropped. The notification includes a statement of reasons for dropping the series. The name of the dropped series is noted in the correlation document of the soil survey area that has the type location.
- (3) If only the SSR with responsibility is using a soil series listed as tentative, it drops the series by listing it as dropped in the correlation document of the survey area that has the type location.
- (4) The name and record from the soil series classification database are removed. This causes the description in the official soil series description file to move to an inaccessible file. A tentative soil series is not listed as inactive.

J. Transferring Responsibility for a Soil Series and Changing the Type Location

Approval for transfer of the responsibility for a soil series and change of type location is as follows:

- (i) The responsible SSR approves changes within the MLRA soil survey region.
- (ii) Mutual consent of the SSRs allows transfers of responsibility between soil survey regions. All transfers of soil series responsibility and changes of type location require a series description using the new type location. The SSR receiving responsibility enters the new description into the database.

K. Establishing a Soil Series

A soil series is established when it is used in the correlation of a survey area and the correlation document is approved and signed by the SSR. The correlation document contains a list of the soil series that are established by that correlation. If a soil series is established by a correlation, the responsible SSR changes the status of the series in the official soil series description file and the soil series classification database from “tentative” to “established” and concurrently changes the heading from “SERIES PROPOSED” to “SERIES ESTABLISHED” in the official description. The SSR also enters the year that the soil series is established in both the soil series classification database and the official series description file and then enters the name of the survey area (which may be a MLRA) in which it is established. The SSR uses the SC/OSD maintenance tool (a Web application protected by USDA eAuthentication) to perform these tasks. If a tentative soil series is not used and established in the correlation document for the survey area in which it was proposed and no other potential use is pending, the soil series is removed from the soil series classification database.

L. Making and Managing Official Soil Series Descriptions

- (1) The term “official soil series description” indicates the description approved by the SSRs that defines a specific series in the United States. The description follows a prescribed format, which is defined in part 614, subpart B, section 614.12. An official soil series description needs to be revised if more information about the soils in the series is available or if the classification of the series changes because of revisions to the national system of soil classification. All soil scientists working in NCSS must be familiar with the requirements for adequate soil series descriptions. The Soil Survey Manual and chapter 21 of Soil Taxonomy discuss the concept of the soil series and requirements for descriptions. Field descriptions and official soil series descriptions should use metric units of measurement.
- (2) The official soil series descriptions are descriptions of the taxa in the series category of the national system of soil classification. They mainly serve as specifications for identifying and classifying soils. Scientists in other disciplines, such as agronomists, horticulturists, engineers,

- planners, and extension specialists, also use the descriptions to learn about the properties of soils in a particular area.
- (3) The major items in descriptions and the order in which they appear are listed below. Every official soil series description includes all but the “additional data” item, which is used only as needed. Part 614, subpart B, section 614.11, gives an example of an official soil series description as it would appear on the Internet. Part 614, subpart B, section 614.12, explains the content of a soil series description.
 - (i) Location line with first instance of series name and the States using it (FIPS code)
 - (ii) Status of soil series (tentative, established, or inactive)
 - (iii) Initials of authors
 - (iv) Date of latest revision (autogenerated in mm/yyyy format)
 - (v) Name of soil series
 - (vi) Introductory paragraph
 - (vii) Taxonomic class
 - (viii) Typical pedon
 - (ix) Type location
 - (x) Range in characteristics
 - (xi) Competing series
 - (xii) Geographic setting
 - (xiii) Geographically associated soils
 - (xiv) Drainage and saturated hydraulic conductivity (permeability in older series)
 - (xv) Use and vegetation
 - (xvi) Distribution and extent
 - (xvii) SSR responsible
 - (xviii) Series proposed or series established
 - (xix) Remarks on diagnostic horizons and features recognized in the pedon
 - (xx) Additional data as needed
 - (4) Each description must be complete and as brief as possible without omitting any essential information. It must clearly differentiate between the series being described and all other series. It must state the present concept of a soil series rather than past concepts or its evolution. The description must record the soil properties that—
 - (i) Define the soil series.
 - (ii) Distinguish it from other soil series.
 - (iii) Serve as the basis for the placement of that soil series in the soil family.
 - (iv) Are needed to generate soil interpretations in the National Soil Information System (NASIS).
 - (5) In the competing series paragraph, give differentiae used to separate other soils in the same family in terms of soil properties, diagnostic horizons, or features.
 - (6) Use the standard terminology that is defined in the Soil Survey Manual as appropriate. If applicable, use terms defined in Soil Taxonomy. The rule for the use of standard terms applies to all parts of soil series descriptions but is especially important for descriptions of individual horizons. Some soil descriptions need to use some terms that are not defined in the Soil Survey Manual or Soil Taxonomy. Use such terms in their ordinary, standard dictionary sense.