This Quick Key references the NSSH sections that relate to soil correlation. Items in the key are organized under major headings and not according to NSSH sections. Related pages in the “Soil Survey Manual” are also referenced under each major heading. Related Mid-Atlantic Region Guidelines are also noted.

Attached are the appropriate Mid-Atlantic Region Guidelines that relate to each section. A table of contents is provided at the front of the guidelines.

For the guidelines, click here: [MID-ATLANTIC REGION GUIDELINES](#)
PART 608 - PROGRAM MANAGEMENT (2003)

608.11 Conducting Field Reviews
608.12 Field Assistance Visits
608.13 Final Soil Survey Activities

Exhibit 608-1 Workload Analysis—Long Range Plan of Operation
Exhibit 608-2 Workload Analysis—Annual Range Plan of Operation
Exhibit 608-3 Initial Field Review Checklist
Exhibit 608-4 Progress FR Checklist
Exhibit 608-5 Final FR Checklist

Related Mid-Atlantic Region Guidelines

- Preparation for Field Reviews
- Special Concerns With Initial Field Reviews
- Special Concerns With Final Field Reviews
- Responsibilities Following the Final Field Review
- Exhibit: Preparation for Final Field Reviews by SSPL

PART 609 - QUALITY CONTROL AND QUALITY ASSURANCE (2003)

609.01 Policy and Responsibilities
609.02 General Guidelines and Procedures
609.06 Soil Correlation
   (a) Progressive Correlation
   (b) Field Reviews
   (c) Final Correlation
   (d) Role of MLRA Office in Correlation

Exhibit 609-1 Format for Correlation Memo.

Related Mid-Atlantic Region Guidelines

- Correlation Responsibilities
- Correlation Memorandum
- Correlation Documentation Requirements
- Template for Submitting MUDs and TUDs for Correlation Approval
THE SOIL SERIES


614.06 The Soil Series
   (a) Distinguishing ... higher criteria
   (b) The soil series control section
   (c) Establishing norms and class limits
   (d) Normal errors of observation
   (e) Proposing a soil series
   (f) Official soil series descriptions

Exhibit 614-1 Example of OSED
Exhibit 614-2 Explanation and content of OSED

Soil Survey Manual -- pg. 20, 45-47

MAP UNITS: DESIGN, NAMING, AND PHASES

PART 627 - LEGEND DEVELOPMENT AND DATA COLLECTION (2003)

627.03 Map Units of Soil Surveys
627.04 Map Unit Components
627.05 Terms Used in Naming Map Units
627.06 Phases Used to Name Map Units
627.08 Documentation

Exhibit 627-1 Miscellaneous Areas
Exhibit 627-5 Feature and Symbol Legend for Soil Survey (37A)
Exhibit 627-8 Matrix of Soil Orders and Documentation

Related Mid-Atlantic Region Guidelines

- Naming Complexes and Undifferentiated Units
- Flooding Phases
- Slope Phases

PART 629 - GLOSSARY OF LANDFORM AND GEOLOGIC TERMS (2002)

Exhibit 629-1 List of Terms for Landscape and Landform
PART 618 - SOIL PROPERTIES AND QUALITIES (2003)

618.03 Soil Properties and Qualities
618.04 through 618.72 Albedo through Wind Erodibility

Related Mid Atlantic Region Guidelines

• MO14 Estimated Soil Property Guide Sheets and NASIS Thunderbook

PART 627 - LEGEND DEVELOPMENT AND DATA COLLECTION (2003)

627.02 Field Studies for Legend Development
627.07 Soil Performance Data Collection
627.08 Documentation
   (a) Definition
   (b) Purpose of Documentation
   (c) Specifying Documentation
   (d) Kinds of Documentation
   (e) Field Description Standards
   (f) Descriptive Legend
   (g) Survey area soil handbook

Exhibit 627-8 Matrix of Soil Orders and Documentation

Related Mid-Atlantic Region Guidelines

• Minimum requirements
• Methods for map unit data collection
• Determination of similar dissimilar components in map units
• Testing and analyzing data using statistics


PART 609 - QUALITY CONTROL AND QUALITY ASSURANCE (2003)

609.05 Maps
   (a) Detailed soil survey maps
   (b) General soil Maps

Related Mid-Atlantic Region Guidelines

• Join Statements
SOIL INVESTIGATIONS AND SAMPLING

PART 631 - SOIL SURVEY INVESTIGATIONS (2001)

631.02 Kinds of Projects
631.03 Laboratory Investigation Methods
631.04 Field Investigation Methods
631.05 Investigations Planning

Exhibit 631-1 NRCS-SOI-8 Form
Exhibit 631-2 Instructions for Completing the
NRCS-SOI-8
Exhibit 631-3 Research Work Plan Checklist
Exhibit 631-4 Example Research Work Plan
Exhibit 631-5 Example of Soil Characterization Work Plan

Related Mid-Atlantic Region Guidelines

- Guidelines for Sampling
- Developing a plan
- Sampling requirements
- Correlation samples
- Reference samples
- Characterization samples
- Engineering samples
- SOI-8 form
- Exhibit: Record of Soil Sampling Data
- Exhibit: Laboratory – Workload Request Form


MID- ATLANTIC REGION GUIDELINES RELATED TO CORRELATION
Version 4.0, May 11, 2004
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A. PREPARATION FOR FIELD REVIEWS

OBJECTIVE OF REVIEWS: To review all field soil survey information, including field sheets and compiled sheets, map unit and taxonomic unit files, laboratory data, crop yield and woodland site index data, identification legend, descriptive legend, manuscript tables (standard and nonstandard), photography, etc., in order to complete the correlation memorandum and prepare the soil survey manuscript for technical review.

Good preparation is important to the quality and efficiency of field reviews and field correlation. The project leader (SSPL) is responsible for organizing the review so that key items can be addressed and a system of progressive correlation can be followed. Attention to detail before the review saves time during the review week and helps to ensure a good review or correlation. Exhibits 608-3, 608-4, and 608-5 can help in this preparation.

AN OPTIONAL APPROACH TO FIELD REVIEWS may be used by the SDQS’s with certain project soil surveys and teams. Instead of a 1-week formal review of items, the review may be broken up and completed during several visits. In addition, not all items of the review process may be addressed each year. Decisions on process are made by the SDQS in consultation with the State Soil Scientist and the team. A field review report is distributed each fiscal year to address status in all cases.

1. Agenda for field reviews.
   - List each planned activity
   - Provide copy to each participant, preferably prior to the review
   - SDQS may amend as needed
   - Agenda may include:
     a. Items that are ready for quality review (see Section 4.1 of the Field Review Report)
        1. typical pedons approved by teams
        2. documentation materials for taxonomic and map units that are correlated to-date by teams
        3. completed parts of the manuscript
     b. Items requiring the assistance of the MLRA staff member
     c. Review of mapping completed by each project member
     d. Review of special activities or projects
     e. Wrap-up conference

2. Preparation for field stops at field reviews. The following are suggested (an appendix is included with the same information):
   a. Marking a county map with field stops
   b. Selecting stops that have landowner permission before review
   c. Make sure that all necessary items are available, including:
      1. Soil maps (so the mapping can be reviewed at each stop)
      2. Supporting documentation (233s, transects, field notes, lab data, etc.
      3. Other supporting information, such as geology maps
      4. Descriptive legend
      5. Set of OSED’s for soils in the descriptive legend
      6. Taxonomy or Keys to Taxonomy
      7. Color book, Field Book for Describing and Sampling Soils
      8. Any additional items/equipment that may be needed

3. Status of action items and recommendations made in previous field reviews.
   a. Review each item
b. Be prepared to address status of each

4. **Changes needed in Official Series Descriptions (OSED’s) and NASIS Data Standards.**
   a. SSPL should check soil series used in the survey against the official descriptions
   b. SSPL should prepare a list of needed revisions.

   **Note:** It is the responsibility of the SSPL to provide a list of changes needed in the Official Series Descriptions and NASIS data. The SDQS is responsible for making or requesting the needed changes and to see that they have been made before the correlation is prepared. SSPL should 1) download a text file of the OSD from the OSD database, 2) use MS Word track change to make appropriate edits, and 3) submit text file to the SDQS for review and comment. The SDQS will process the file through the OSDCheck program.

5. **Data Mapunits (DMUs).**
   a. A complete set of DMUs are made available at the beginning of the survey.
   b. New DMUs should be prepared as provisional map units are added to the legend by the SSPL.
   c. A symbol on the map requires addition to the legend and inclusion of a map unit and DMU in NASIS.
   d. Data for proposed approved map units should be updated and certified by the MO prior to each field review by the SSPL.

6. **Soil Correlation.**
   a. After 300 acres of a map unit are mapped, the gathering of documentation and support data begins. This helps to develop a progressive pattern of soil correlation through the life of the survey up to the final field review.
   b. Only those map units that have complete support documentation should be approved for correlation.
   c. The Quick Key refers to support documentation guidelines under “Soil Survey Documentation.”

7. **Field Review form (NRCS-233).** The project leader should check over the NRCS-233 from the previous field review (except at the Initial Review).

   **Note:** Prior to the field review, the project leader will populate and maintain the field review report appendices tables which show;
   - Status of documentation
   - Status of typical pedons
   - Status of lab data
   - Status of maps
   - Progress map

   **Note:** Soil Data Quality Specialists will add legends and correlation status from NASIS. Field review report legends will be generated from NASIS reports.

   **Note:** Within 30 days of completion of the review each year, the field review report will be circulated for review. If this is not possible due to the SDQS schedule, a summary of action items, recommendations, and commendations will be included in a letter to the State Soil Scientist and the Soil Survey Project Leader within 30 days, with the official review report to follow as soon as possible.

7. **Join statements.**
   a. All sheets must be joined within the county and from county to county.
   b. A join statement for the detailed soil map units and the general soil map units must be developed and filed with the MLRA Office’s copy of the correlation memorandum.
c. Joins are "exact joins" unless otherwise agreed to by the SSPL and the SDQA Specialist.
8. **Manuscript preparation.**  
   a. The SSPL refers to the Manuscript Manual and completes the required forms.  
   b. The manuscript should be in a publication format.  
   c. A copy of all manuscript materials should be available for review.

SPECIAL CONCERNS WITH INITIAL FIELD REVIEWS

1. **Soil Mapping.**  
   a. Initial traverses and test block mapping should be completed for selected sections of the survey area.

2. **Soil Sampling.**  
   a. A Soil Sampling Work Plan for reference sampling and special studies should be ready for the Initial Field Review.  
   b. Reference sampling for correlation should begin as early as possible in the survey. Delays from turnaround times at laboratories may impede correlation decisions.  
   c. A Laboratory Data Request form needs to be completed and requests routed through the MLRA Office.  
   d. The Quick Key refers to sampling specifics under "Soil Investigations and Sampling."

SPECIAL CONCERNS WITH FINAL FIELD REVIEWS

1. **Checklist, MLRA Exhibit: Preparation for Final Field Review by SSPL**  
   a. This checklist should be completed prior to the Final Review. It serves as a self guide to become ready for the review and the subsequent completion of the final correlation.  
   b. The SSPL should consult with the assigned SDQS to make sure preparation is complete.

RESPONSIBILITIES FOLLOWING THE FINAL FIELD REVIEW

After the Final Field Review has been completed, the following items need to be addressed by the SDQS and the SSPL.

1. **The SDQS:**  
   a. Provides a list of additional items needing correction or attention.  
   b. Completes any revisions to the OSED’s and the NASIS standard.  
   c. Completes the FFR report.  
   d. Completes NASIS certification  
   e. Certifies the correlation memorandum
2. The SSPL:
   a. Completes additional items identified by the SDQS.
   b. Finishes map compilation.
   c. Completes edits of NASIS data.
   d. Prepares the draft correlation memorandum, including amendments to the final field review report, with the assistance of the SDQS.
EXHIBIT: PREPARATION FOR FINAL FIELD REVIEW BY SSPL

___ Complete all correlation (through team approval)
   ___ Complete correlation of TUD’s with OSED’s and interpretive standards
   ___ Complete classification of TUD’s according to Taxonomy
   ___ Complete all map unit approval
   ___ Ensure that all documentation for all TUDs and MUDs is available
   ___ Ensure that all preparation of statistics is complete and available

___ Ensure that DMUs are up-to-date based on approved legend

___ Ensure that interpretive tables have been tested based on up-to-date DMUs

___ Complete join statements for adjoining surveys

___ Complete the draft of the manuscript
   ___ Ensure that examples of TUD and MUD formats have received MLRA and State Soil Scientist review and approval
   ___ Complete manuscript checklist -- Form 644(MLRA-W)-6

___ Complete SOI-8’s

___ Verify that all typifying pedons are located on a county highway map and/or on compilation sheets or field sheets, or in available computer software programs

___ Verify that all requests for updates to OSED’s and Estimated Properties have been completed by SDQA staff.
B. CORRELATION POLICY

CORRELATION RESPONSIBILITIES

In order to implement the MLRA concept within the region, a system of managing soil surveys was established in which the SSPL’s have greater responsibility in making correlation decisions. The SSPL’s are thereby encouraged to consider more than just the county in which they are working when making mapping and correlation decisions. This system facilitates the development of MLRA-wide legends and associated soil data.

a. The project offices are grouped into teams.
b. Each team consists of surveys that are within the same MLRA, are mapping similar soils, and are geographically near one another. In most cases, these teams extend across a state boundary.
c. Rather than only working one-on-one when conducting field reviews and field visits, SDQS’s also work with project offices in a team setting.

As appropriate;

a. the MO expects the SSPL’s to work together in identifying correlation and mapping problems,
b. developing investigation plans to solve these problems,
c. and implementing decisions on a regional basis.

All decisions concerning taxonomic unit and map unit approval/correlation are made by the teams.

The composition of the teams is fluid so that the SSPL’s and staff members can move from one team to another as surveys are completed and as new surveys are begun.

CORRELATION MEMORANDUM

Upon completion of the project, the SSPL, in consultation with other team members and with guidance from the assigned SDQS,
a. drafts the final correlation document for the project.
b. The correlation document is reviewed and signed by the MLRA Team Leader and the appropriate State Conservationist and
c. distributed along with a cover letter signed by the appropriate State Conservationist.
CORRELATION DOCUMENTATION REQUIREMENTS

The SSPL must meet certain minimum standards for taxonomic units and map units before the team is requested to address approval/correlation decisions.

a. These standards are considered MLRA Region 14 "sideboards" for correlation approval.

b. Referring to and following requirements in the MO14 233-Field Review and Certification Report, section 4.1, Descriptive Legend and Correlation, the SSPL will have met MO14 standards for taxonomic unit and map unit approval.

c. A checklist is provided (see appendix) to help guide your efforts.

1. Taxonomic description.
   a. It must be completed in manuscript format and checked appropriately with National standards.
   b. It may be generated from a NASIS TUG report
   c. Differences with National standards should be noted for disposition consideration by the Team and the assigned SDQS. This could be done using track change and inserted comments in a text file of the OSD received via ftp from the national OSD site.

   a. It must be in manuscript format.
   b. It may be generated from a NASIS MUG report

3. Minimum requirements for documentation
   a. The minimum requirements for documentation based on extent should be met. However, alternatives are provided. See the Appendix.
   b. Information is available in the NSSH, Part 627.08(e)-Field description standards.
   c. A data summary and statistics should be presented in a standardized format, using the current MO14 guidelines and computer assisted spreadsheet or database programs developed for this purpose.

4. NASIS
   a. Data mapunits should be certified by the Soil Survey Project Leader and the assigned Soil Data Quality Specialist prior to requesting map unit approval
      1. All minor components may be populated to the same quality as major components, but it is noted that this is not a NSSH requirement.
      2. Populate minors by copy and paste from same major components from another data mapunit when it is available, or by editing thoroughly as you would a major component-
      3. Complete all minor components by the end of the survey project
   b. It is recommended that at the least the typical or representative pedon be entered into Pedon and Site tables

C. MAP UNIT DESIGN, NAMING, AND PHASES IN MLRA REGION 14

TERMS USED IN NAMING MAP UNITS
Naming complexes

a. When designing names for complexes, the word "complex" should be used as the second part of all map unit names regardless of surface texture of individual taxa making up the map unit.
b. Terms for surface texture should not be part of the map unit name unless, in the same correlation, two complexes of the same soils have different surface texture phases.
c. This guideline parallels conventions for naming associations. Example: Alpha-Beta complex, 8 to 15 percent slopes.
d. The exceptions would be: Alpha-Beta silt loams, 8 to 15 percent slopes and Alpha-Beta fine sandy loams, 8 to 15 percent slopes.

Naming undifferentiated groups

a. When designing names for undifferentiated groups, the word "soils" should be used as the second part of all map unit names regardless of surface texture of individual taxa of the map unit.
b. This is consistent with the above guideline for complexes. Example: Alpha and Beta soils, 8 to 15 percent slopes.

Flooding

Flood classes should be used in all map unit names, unless a complex has multiple flood classes.

Slope

Slope phases should be stated in all map unit names, except for those of miscellaneous areas. This includes names using family or higher categories.

D. RECOMMENDATIONS FOR USE OF TERMINOLOGY IN POINT, PEDON, AND DATA MAPUNITS

Geomorphology Terms

It is recommended that we only use terms that are a part of the National Cooperative Soil Survey system and that they be used as they are defined in the system (Part 629 of the NSSH)
D. SOIL SURVEY DOCUMENTATION GUIDELINES

MINIMUM REQUIREMENTS

1. Additions of new map units to the identification legend
   a. Completed mapping of one delineation triggers:
      • adding symbol and name to legend,
      • adding a DMU to NASIS, and
      • writing a field note that states the minimum requirements established for
        the series.
   b. Completed mapping of 300 acres triggers:
      • beginning documentation for correlation
      • scheduling the map unit for progressive correlation (adding to plan of
        operation)

2. Exceptions to standards
   a. In the team process, the sharing of data among project areas as part of an MLRA soil
      survey is expected.
   b. In this process, the survey area is defined as the combined current soil survey projects
      of the team.
   c. In the future, approved documentation from a completed project will remain part of the
      team-soil-survey-area dataset and will be used in determining current documentation
      needs.
   d. Minimum standards for map units, as stated in NSSH 627.08(e), are met for the team-
      soil-survey-area. However, alternatives are provided. See the appendix.
      • Individual project areas must have a minimum of 10 observations. Teams may
        raise the minimum.
      • Map units may be added for the purpose of joining, if they are small in extent,
        without documentation.
   e. Minimum standards for pedon descriptions, as stated in NSSH 627.08(e), are still met
      within each individual project area.
   f. It may be appropriate to use the OSD Typical Pedon in some cases.
   g. A typical pedon (TP) from another individual project may be selected. This requires
      team approval. This pedon must:
      • be in the same parent material
      • be on the same landform type
      • have already been approved by the team for correlation in the first survey
      • be approved by the team to be correlated in the second survey area

3. Typical pedon (TP) descriptions
   a. The pedon should be described from a pit/excavation, not an auger hole. Road cuts
      and borrow pit walls may be used if the cut is clearly undisturbed and clearly unaffected by
      prolonged exposure.
b. The delineation should represent the typical landscape and land use for the map unit and occur within the map unit phase that has the largest extent.
c. As the survey progresses, a new TP may be selected as concepts are redefined.
d. TP’s require team approval.

4. Representative pedon descriptions

   a. If a soil survey uses the OSD TP or a pedon from another survey area as a TP, it must still have a representative pedon description within the survey area
   
   c. All components in the survey area require a representative pedon.
      • An example is a TP that has a noneroded loam surface texture and a second map unit of a severely eroded phase with a clay loam surface. A representative pedon description with a clay loam surface should be completed.

METHODS FOR MAP UNIT DATA COLLECTION

1. All methods used require a stratified random selection of delineations or points to represent the map unit under investigation.

2. All soil scientists are required to record a standard set of data for each observation, as designated for each taxon in each MLRA.
   • Each soil survey team will decide upon these standard requirements according to soil series.

   Systematic variability.--The variation that can be understood and predicted by our knowledge of the factors of soil formation. We use this when we “partition” the landscape into map unit delineations based on our knowledge and on what we can readily observe in the process of mapping. Measurement of this variability can be done by systematic or random methods of inference.

   Random variability.--The variation that cannot be predicted or observed readily in relation to our knowledge of the soils. To measure this variability, we are required to infer data from a limited number of observations. This requires a random method of measurement.

3. Transects measure systematic variation using point intercept or line intercept methods. Each transect must:

   a. meet (1) above for delineation selection
   b. be oriented, to permit observation of a cross section of the delineation,
      • perpendicular to drainage pattern and/or
      • perpendicular to summit(s) or divide(s)
   c. extend from edge to edge of the delineation
   d. include the same number of observations as other delineations of the map (the number of observations and the length of intervals should be determined by the size of the delineation)
   e. 5-point transects are recommended versus 10-point. More delineations can be observed this way.
4. **Random Map Unit Evaluations (RMUE)** can be used to measure systematic and random variation. RMUE’s also can be used to measure random variability. RMUE’s must:

   a. meet (1) above for delineation selection
   b. include 5 or 10 stratified random observations per delineation (the number of observations and the minimum distance between observations should be determined by the size of the delineation)
   c. 5-observations per delineation is recommended versus 10-points. More delineations can be observed this way

5. MO14 has prepared guidelines entitled “Data Gathering Methods for Estimating Map Unit Composition and Selected Soil & Map Unit Characteristics.” [Review your copy](#).

**DETERMINATION OF SIMILAR VERSUS DISSIMILAR COMPONENTS IN MAP UNITS**

1. Each correlation team must use the model developed for the MLRA based on soil properties that provide consistency in determinations. (See model as appendix)

2. Each correlation team must complete the current Excel spreadsheet referred to as reference.xls (reference.xls) to prepare signatures for each component.

3. Each SSPL will use the current Excel spreadsheet referred to as tsummary.xls (tsummary2.xls) for completing:
   a. similar dissimilar decisions, that lead to,
   b. map unit composition statistics

**USING STATISTICS TO TEST AND ANALYZE DATA**

1. All soil survey project areas that have documentation meeting the requirements for random selection of delineations and/or observation points should use statistics to test and analyze map unit data.

2. Statistics will be calculated appropriately for normal and binomial distributions for:
   - Mean
   - Confidence limits/interval

3. Currently, two Excel spreadsheets are in use for preparing statistics for map unit composition and selected soil properties.
   a. tsummary.xls for composition
   b. Transect.xls for evaluating map unit or component properties
E. GUIDELINES FOR QUALITY JOINING

JOIN STATEMENTS

1. If no discrepancies exist, a blanket statement in the certification section of the document is sufficient.

2. If a join cannot be completed due to age or quality of the adjoining survey, a blanket statement in the certification section of the document is sufficient.

3. If a join involves surveys of different scale and join requirements for different scales have been met, a blanket statement in the certification section of the document is sufficient.

4. If discrepancies exist, soil correlation requires the attachment of detailed join statements to the Final Field Review report. Statements should include:
   a. Location of the problem (map sheet number or topoquad name)
   b. Symbols and names of map units
   c. Explanation of differences, including cartographic and data join statements, and a note stating if the adjoining survey is correct or not
   d. Explanation of any steps taken to achieve a join
F. GUIDELINES FOR SOIL INVESTIGATIONS AND SAMPLING

DEVELOPING A PLAN

a. A detailed soil survey investigations work plan should be developed by the SSPL early in the survey and coordinated with the soil survey team and the MLRA 14 investigations work plan.

b. It should identify special studies and soils that may require correlation, reference, characterization, or engineering sampling.

c. The plan should be reviewed and updated periodically.

If a special study is planned,

a. A “study plan” should be prepared specifically for the project.

b. It should include why, where, how, when and who.

c. Examples can be found in the NSSH and from MO14.

If soil samples are to be sent to the NSSL, the Soil Survey Laboratory – Workload Request for FY 200__ form should be completed with your SDQS and submitted to the NSSL by the SDQS to receive prior approval for analysis.

If soil samples are to be sent to a state lab, the Record of Soil Sampling Data form should be completed with your SDQS.

SAMPLING REQUIREMENTS

All sampling requires the following:

1. A work plan

2. Concurrence between the soil-survey-area-team and SDQS

3. A written detailed pedon description (A copy of this and a copy of correspondence should be sent to the assigned SDQS and to the lab along with the samples.)

4. A completed Soil Survey Laboratory – Workload Request for FY 200__ form or Record of Soil Sampling Data form.
CORRELATION SAMPLES

Correlation samples are optional. They are collected at the discretion of the SSPL.

REFERENCE SAMPLES

Reference samples are collected for specific analysis, such as particle-size or base saturation, to answer specific correlation and/or classification questions.

- For individual soil series, a minimum of three pedons is required. The typical pedon should be included, if known.
- For special studies, the number of samples is decided by the soil-survey-area-team.

CHARACTERIZATION SAMPLES

Characterization samples are collected for complete laboratory characterization/analyses. These samples are sent only to the NSSL, unless a state lab is capable of duplicating all analyses and methods of the NSSL. At this time, no University lab in MO14 states is providing this data. Characterization samples are required for:

1. Proposing new soil series.
   a. A minimum of one pedon for full characterization and two or more pedons for appropriate reference analysis are required.
   b. The proposed TP location should be included.
   c. However, full characterization sampling of one pedon to support concepts is risky. Also, a time factor may become involved in sending samples to the NSSL.
   d. Teams should decide if dual samples should be sent to the NSSL and to the University/experiment station lab.
   e. Exceptions may be made if data from a special study that includes the proposed soil and other related soils is sufficient to support classification. A team decision is required.

2. Supporting established soil series located within the soil survey area.
   a. If it is determined that the series does not have characterization analyses, a minimum of one pedon for characterization and two or more pedons for appropriate reference analysis should be sampled.
   b. The proposed TP location should be included. The same holds true here as for new proposed soil series.
   c. Exceptions may be made if data from a special study that includes the established soil and other related soils is sufficient to support classification. A team decision is required.
ENGINEERING SAMPLES

Engineering samples are collected for mechanical analyses, such as Atterburg limits. They require:

1. A minimum of 25 pounds of material without rock fragments or 50 pounds with rock fragments. (This amount does not include the >3 inch which has already been estimated and discarded.)

2. A minimum of 50 pounds of material for fine and very fine soils that have a high liquid limit and plasticity index.

SOI-8 FORMS

SOI-8 forms should be completed by the SSPL for all sampled pedons prior to completion of the project.
RECORD OF SOIL SAMPLING DATA

1. Soil sample project: ____________________________________________________

2. SS area: ______________________________


5. Field classification: __________________________________________________

6. Purpose of sampling:___________________________________________________

7. Laboratory sent to:  (NSSL) (Other) ________________________________

8. Is the pedon sampled for support of: 9. Sampled for:

   | Official series: | Y | N | Characterization | Y | N |
   | Typifying pedon:  | Y | N | Reference        |   |   |
   | Representative pedon: | Y | N | Particle size    | Y | N |
   | Other:______________ | Y | N | Chemistry        | Y | N |
   |                   |   |   | Reaction only   | Y | N |
   |                   |   |   | Base sat. only  | Y | N |
   |                   |   |   | Mineralogy      | Y | N |
   |                   |   |   | Other___________| Y | N |
   |                   |   |   | Other___________| Y | N |
   |                   |   |   | Engineering     | Y | N |

10. Soil sample numbers: S__ - __ - ____ - _____  thru S__ - __ - ____ - _____
    (yr) (state) (fips) (pedon) (yr) (state) (fips) (pedon)

Notes:

Submitted by:_________________________  Title:__________  Date: _____

Reviewed by:_________________________  Title:__________  Date: _____
SOIL SURVEY LABORATORY – WORKLOAD REQUEST FOR FY 200__

Narrative Part
(complete this page for each project)

State: ______________
MO: ______________
Project Name: ___________________________

Soils to be sampled¹:

Background²:

Questions³:

Field Assistance Needed⁴:

Notes⁵:

¹ Series name and field classification
² In a brief paragraph, indicate background information that would help someone not familiar with the site to better understand the area. Comment on geology/parent material; geomorphic setting; etc., and the general nature of the intent or problem. **A complete work plan for the project is required prior to sampling.** *(beginning the project)*
³ State the specific questions that are to be answered by the data or field assistance.
⁴ Indicate kind of assistance: geomorphic, sampling, Amoozemeters. If you are requesting the assistance of a specific person, (enter their) **indicate the** name here.
⁵ (Include indication) **Note** if the activity is part of a multi-year plan or project; (indicate) **List** other agencies involved if appropriate.
Checklist for correlation approval

Map unit symbol ____________

☐ Summarize transect and pedon description data
  ☐ Utilize Transect.xls for important map unit data
  ☐ Utilize Transect.xls for important component range in characteristics and/or NASIS data
☐ Enter Typical or Representative Pedon(s) into NASIS
☐ Prepare TUD (from NASIS or Word file; as directed by SSS)
☐ Compare TUD to OSD
☐ Edit TUD as needed and/or prepare proposed OSD revisions (using track change and inserted comments in a text file of OSD)
☐ Complete tsummary for composition
☐ Complete NASIS DMU editing (properties checklist completed)
☐ Generate MUD from NASIS (in interim-prepare map unit info page)
☐ Route correlation approval materials, to include:
  ☐ Transect.xls as appropriate
  ☐ tsummary.xls file for map unit
  ☐ MUD or map unit info page
  ☐ TUD
  ☐ OSD text file with changes proposed
☐ Capture reviewer comments in a table format and provide a second column to document actions taken and/or responses to each comment
☐ Complete any revisions to MUD (NASIS data), TUD, and OSD
☐ Request and receive DMU tentative (pending addition of interpretive properties per guidance of your state office) certification of properties
☐ Send revised materials to SDQS only. Have revised materials and comments table available for all at Team meeting or field review, as appropriate for the Team
Steps to determine minimum levels of documentation in soil survey projects.

Step 1. Map unit by map unit, determine if extent is significantly within areas of urbanization where access is limited, limiting documentation opportunities.
- Determine if enough acreage exists outside urban areas to utilize for gathering documentation
- Create a list of those that we will document with alternative methods

Step 2. Map unit by map unit, determine if each must stand alone or if they may be combined for documentation purposes with other phases of map units of same composition.
- Most require some field investigation before we can make this decision. In particular, the eroded phases are affected. Some of these change to a different series because of a thinner epipedon, based on today’s guidelines.
- Create a list of those that can be combined
- Agree that at least one delineation from each phase be documented

Step 3. Map unit by map unit, agree that small extent, less than 300 (?) acres, reduces the number observations (or delineations) required.
- Create a list of small extent units exempted from minimum requirements
- Agree to a number of observations (or delineations) for each

Step 4. Determine if any other map units may be designated for less than required documentation
- Create a list and include agreed-to reason for each and minimum number of observations (or delineations) acceptable for each

Step 5. Agree that two or more delineations within each project area will be documented regardless of meeting Table 1 estimate for minimum number of observations.

Step 6. Review existing documentation and determine workload remaining.
- Create list by map unit to track workload

Step 7. Agree to criteria for success or failure determination for individual observations, and to criteria for success or failure for comparing delineations for consistency within each map unit
- Utilize existing map unit models to complete the tasks

Step 8. After completion of initial set of observations (minimum of 10 observations and two delineations for statistical purposes), determine success to failure ratio and refer to Table 1 to determine 1) what confidence level and 2) what error (within plus or minus) is being estimated.
- Decide whether to accept those levels or to get additional observations to possible improve those levels
- Construct a table to be used to document each map unit, including the confidence level and the accepted error for the major components and the inclusions (minor dissimilar components)
Table 1.--Approximate minimum number of observations to estimate $p$ within a specified error, $E$, and confidence level, $(1-\alpha)100$, for selected success ($p$) to failure ($q$) ratios

$$n \approx pq \left[ \frac{Z\left(\frac{\alpha}{2}\right)}{E} \right]^2$$

$Z(\alpha/2)$ values for 95%, 90%, and 80% confidence intervals for $p$

<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$(1-\alpha)100$</th>
<th>$\alpha/2$</th>
<th>$Z(\alpha/2)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>95</td>
<td>0.025</td>
<td>1.64</td>
</tr>
<tr>
<td>0.10</td>
<td>90</td>
<td>0.05</td>
<td>1.65</td>
</tr>
<tr>
<td>0.20</td>
<td>80</td>
<td>0.10</td>
<td>1.28</td>
</tr>
</tbody>
</table>

Assigned $E$- Errors of Estimation of 0.10 and 0.15

<table>
<thead>
<tr>
<th>$p$ to $q$ Ratio of:</th>
<th>$pq=$</th>
<th>Approximate Minimum Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Confidence/error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(rounded)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95/10</td>
</tr>
<tr>
<td>.975 x .025</td>
<td>0.0244</td>
<td>9</td>
</tr>
<tr>
<td>.95 x .05</td>
<td>0.0475</td>
<td>18</td>
</tr>
<tr>
<td>.925 x .075</td>
<td>0.0694</td>
<td>27</td>
</tr>
<tr>
<td>.90 x .10</td>
<td>0.0900</td>
<td>35</td>
</tr>
<tr>
<td>.875 x .125</td>
<td>0.1094</td>
<td>42</td>
</tr>
<tr>
<td>.85 x .15</td>
<td>0.1275</td>
<td>49</td>
</tr>
<tr>
<td>.825 x .175</td>
<td>0.1444</td>
<td>55</td>
</tr>
<tr>
<td>.80 x .20</td>
<td>0.1600</td>
<td>61</td>
</tr>
<tr>
<td>.75 x .25</td>
<td>0.1875</td>
<td>72</td>
</tr>
<tr>
<td>.70 x .30</td>
<td>0.2100</td>
<td>81</td>
</tr>
<tr>
<td>.65 x .35</td>
<td>0.2275</td>
<td>87</td>
</tr>
<tr>
<td>.60 x .40</td>
<td>0.2400</td>
<td>92</td>
</tr>
<tr>
<td>.55 x .45</td>
<td>0.2475</td>
<td>95</td>
</tr>
<tr>
<td>.50 x .50</td>
<td>0.2500</td>
<td>96</td>
</tr>
</tbody>
</table>
Example

n = 10 total observations
p = .90
q = .10
Estimate at 90% confidence
\[ E \approx Z (\alpha / s) \sqrt{pq / n} \]
\[ E \approx 1.65 \sqrt{.90 \times .10} / 10 \]
\[ E \approx 0.15 \]
Estimated error at 90% confidence exceeds our arbitrarily desired limit (.10) for estimating p (success).

<table>
<thead>
<tr>
<th>p to q Ratio of:</th>
<th>pq=</th>
<th>Approximate Minimum Observations (rounded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.90 x .10</td>
<td>0.0900</td>
<td>35</td>
</tr>
</tbody>
</table>

From the chart, we can also see that we have the following other options, assuming that the same pq ratio is maintained with future observations:

1. To estimate p within an error of plus or minus 10% at 90% confidence, we need 25 observations (get 15 more).
2. To estimate p within an error of plus or minus 10% at 80% confidence, we need 15 observations (get 5 more).
3. To estimate p within an error of plus or minus 15% at 90% confidence, we need 11 observations (stay pat).
4. To estimate p within an error of plus or minus 15% at 80% confidence, we need 6 observations stay pat)
Preparation for field stops at field reviews

1. Marking a county map with field stops
2. Selecting stops that have landowner permission **before** review
3. If reviewing from a pit and excavation will be difficult, have pit already open
4. Make sure that **all** necessary items are available, including:
   a. Soil maps (so the mapping can be reviewed at each stop)
   b. Supporting documentation (233s, transects, field notes, lab data, etc.)
   c. Other supporting information, such as geology maps
   d. Descriptive legend
   e. Set of OSED’s for soils in the descriptive legend
   f. Taxonomy or Keys to Taxonomy
   g. Color book, Field Book for Describing and Sampling Soils
   h. Any additional items/equipment that may be needed
**Guide to Determining Similar and Dissimilar Soils in the Mid-Atlantic MLRA Region (Rev 06/2002)**

**NUMERICAL VALUES FOR SOIL PROPERTIES FOR MLRAs 133A, 137, 149A, 153A, 153B, 153C, and 153D**

(Difference of 2 or more in any category = Dissimilar; total difference of 3 or more in all categories = Dissimilar)

<table>
<thead>
<tr>
<th>DEPTH TO PHYSICAL ROOT LIMITING LAYER</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;60 inches</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>40 – 60 inches</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>20 – 40 inches</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>&lt;20 inches</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH TO SEASONAL HIGH WATER TABLE (RV)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;6.0 feet</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>5.5 feet</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5.0 feet</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>4.5 feet</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4.0 feet</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3.5 feet</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3.0 feet</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2.5 feet</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2.0 feet</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>1.5 feet</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>1.0 feet</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>0.5 feet</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0.0 feet</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>ponded</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOODING</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>very rare or rare</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>occasional or frequent (common)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>very frequent</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K FACTOR (0 to 40 INCHES)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35 or less</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>&gt;0.35</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SODIUM (SAR) (0 to 60 INCHES)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SAR of &lt;13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SAR of &gt;13</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARTICLE SIZE CLASS IN CONTROL SECTION</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>organic</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>sandy</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>coarse-loamy</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>coarse-silty</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>fine-loamy</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>fine-silty</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>fine</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>very fine</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>skeletal</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>contrasting</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SURFACE LAYER (6 to 10-inch mixed zone)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>organic</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>sandy</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>loamy</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>clayey</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>mucky (add 1 to mineral PSC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ORGANIC MATERIAL--THICKNESS of MUCK, MUCKY PEAT, &amp; PEAT</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 2 inches</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2 – 8 inches</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8 - 16 inches</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>16 – 20 inches</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>20 – 40 inches</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>40 - 51 inches</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>&gt; 51 inches</td>
<td>9.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THICKNESS of SANDY MATERIAL (measured from the surface)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 inches</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10 – 20 inches</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>20 – 30 inches</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>30 – 40 inches</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>40 – 50 inches</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>50 – 60 inches</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>&gt; 60 inches</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n-VALUE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1.0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>0.7 to 1.0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&lt;0.7</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SALINITY CLASS (mmhos/cm)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>nonsaline (0 – 2)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>very slightly saline (2 – 4)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>slightly saline (4 – 8)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>moderately saline (8 – 16)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>strongly saline (&gt;16)</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
USE COMMON SENSE when Soil Orders force you to
use different particle-size control sections and in
other situations.
<table>
<thead>
<tr>
<th>BEDROCK DEPTH &amp; KIND</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;60 inches</td>
<td>1</td>
</tr>
<tr>
<td>40 - 60 inches - soft</td>
<td>3</td>
</tr>
<tr>
<td>40 - 60 inches - hard</td>
<td>5</td>
</tr>
<tr>
<td>20 - 40 inches - soft</td>
<td>7</td>
</tr>
<tr>
<td>20 - 40 inches - hard</td>
<td>9</td>
</tr>
<tr>
<td>&lt;20 inches - soft</td>
<td>11</td>
</tr>
<tr>
<td>&lt;20 inches - hard</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH TO SEASONAL HIGH WATER TABLE (RV)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;6.0 feet</td>
<td>0.5</td>
</tr>
<tr>
<td>5.5 feet</td>
<td>1</td>
</tr>
<tr>
<td>5.0 feet</td>
<td>1.5</td>
</tr>
<tr>
<td>4.5 feet</td>
<td>2</td>
</tr>
<tr>
<td>4.0 feet</td>
<td>3</td>
</tr>
<tr>
<td>3.5 feet</td>
<td>4</td>
</tr>
<tr>
<td>3.0 feet</td>
<td>5</td>
</tr>
<tr>
<td>2.5 feet</td>
<td>6</td>
</tr>
<tr>
<td>2.0 feet</td>
<td>7</td>
</tr>
<tr>
<td>1.5 feet</td>
<td>8</td>
</tr>
<tr>
<td>1.0 feet</td>
<td>9</td>
</tr>
<tr>
<td>0.5 feet</td>
<td>10</td>
</tr>
<tr>
<td>0.0 feet</td>
<td>11</td>
</tr>
<tr>
<td>ponded</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOODING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>1</td>
</tr>
<tr>
<td>very rare or rare</td>
<td>3</td>
</tr>
<tr>
<td>occasional, frequent (common)</td>
<td>5</td>
</tr>
<tr>
<td>very frequent</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K FACTOR (0 to 40 INCHES)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35 or less</td>
<td>1</td>
</tr>
<tr>
<td>&gt; 0.35</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARTICLE SIZE CLASS IN CONTROL SECTION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>1</td>
</tr>
<tr>
<td>Sandy</td>
<td>3</td>
</tr>
<tr>
<td>coarse-loamy</td>
<td>4</td>
</tr>
<tr>
<td>coarse-silty</td>
<td>4.5</td>
</tr>
<tr>
<td>fine-loamy</td>
<td>5</td>
</tr>
<tr>
<td>fine-silty</td>
<td>5.5</td>
</tr>
<tr>
<td>Fine</td>
<td>6</td>
</tr>
<tr>
<td>very fine</td>
<td>7</td>
</tr>
<tr>
<td>Skeletal</td>
<td>9</td>
</tr>
<tr>
<td>Contrasting</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERMEABILITY IN SLOWEST LAYER (0 to 60 INCHES)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>very rapid or rapid (&gt;6 in/hr)</td>
<td>1</td>
</tr>
<tr>
<td>Moderately rapid (2-6 in/hr)</td>
<td>2</td>
</tr>
<tr>
<td>moderate (0.6-2.0 in/hr)</td>
<td>3</td>
</tr>
<tr>
<td>Moderately slow (0.2-0.6 in/hr)</td>
<td>5</td>
</tr>
<tr>
<td>slow (0.06-0.2 in/hr)</td>
<td>6</td>
</tr>
<tr>
<td>very slow (&lt;0.06 in/hr)</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROCK FRAGMENT MODIFIER of SURFACE LAYER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>gravelly or channery</td>
<td>2</td>
</tr>
<tr>
<td>cobbly or flaggy</td>
<td>3</td>
</tr>
<tr>
<td>very gravelly or channery</td>
<td>3</td>
</tr>
<tr>
<td>very cobbly or flaggy</td>
<td>4</td>
</tr>
<tr>
<td>extremely gravelly or channery</td>
<td>4</td>
</tr>
<tr>
<td>extremely cobbly or flaggy</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REACTION (0 to 40 INCHES)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;3.5 pH</td>
<td>1</td>
</tr>
<tr>
<td>&lt;3.5 pH</td>
<td>3</td>
</tr>
<tr>
<td>sulfidic material</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SODIUM (SAR) (0 to 60 INCHES)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SAR of &lt;13</td>
<td>1</td>
</tr>
<tr>
<td>SAR of &gt;13</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STONINESS CLASS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>1</td>
</tr>
<tr>
<td>1 (0.01-0.1% stony or bouldery)</td>
<td>2</td>
</tr>
<tr>
<td>2 (0.1-3% very stony or bouldery)</td>
<td>3</td>
</tr>
<tr>
<td>3 (3-15% ext. stony or bouldery)</td>
<td>4</td>
</tr>
<tr>
<td>4 (&gt;15% rubbly or very rubbly)</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SURFACE LAYER (6 to 10-inch mixed zone) GENERAL TEXTURE CLASS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>organic</td>
<td>1</td>
</tr>
<tr>
<td>sandy</td>
<td>3</td>
</tr>
<tr>
<td>loamy</td>
<td>4</td>
</tr>
<tr>
<td>clayey</td>
<td>5</td>
</tr>
<tr>
<td>mucky (add 1 to mineral PSC)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THICKNESS of SANDY MATERIAL (measured from the surface)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20 inches</td>
<td>1</td>
</tr>
<tr>
<td>20 – 40 inches</td>
<td>3</td>
</tr>
<tr>
<td>&gt;40 inches</td>
<td>5</td>
</tr>
</tbody>
</table>

USE COMMON SENSE when Soil Orders force you to use different particle-size control sections and in other situations.