MLRA Soil Survey Region 11

6013 Lakeside Blvd.
Indianapolis, IN
46268-2933

OPERATING PROCEDURES FOR UPDATING SOIL SURVEYS IN MLRA SOIL SURVEY REGION 11

May 2008

DRAFT

Cover:

Left.—A profile of Drummer silty clay loam, 0 to 2 percent slopes, in MLRA 108A.

Upper center.— A common landscape in MLRA 114B.

Lower center.— An exposure of glaciofluvial deposits in MLRA 99.

Right.—A profile of Fox loam, 2 to 6 percent slopes, in MLRA 111B.

FOREWORD

Operating Procedures for Updating Soil Surveys in MLRA Soil Survey Region 11 builds on the knowledge and experience gained over the past decade in updating soil survey information across the region. Many of the guidelines in this document were originally developed in 1996 by work groups consisting of soil scientists from the Natural Resources Conservation Service (NRCS) and our cooperating agencies across Major Land Resource Area (MLRA) Soil Survey Region 11. Many of these guidelines, agreed upon by consensus of the soil scientists, are still valid today.

There have been many changes recently in national policy as well as in our classification system. With the restructuring of the national soil survey program and the establishment of MLRA Soil Survey areas and offices, it was time to update the original *Region 11 Major Land Resource Area Soil Survey Guidance Document* issued in 1998.

It is hoped that *Operating Procedures for Updating Soil Surveys in MLRA Soil Survey Region 11 will* be a valuable reference. It contains items that are national policy, as outlined in the *National Soil Survey Handbook* and *Soil Taxonomy*. It also contains guidelines that will be helpful to MLRA Soil Survey Office staffs in the many phases of their soil survey activities.

It is understood that issues will arise that are not covered in this document. Other issues will arise that seem to be in conflict with guidance in the document. Issues will be addressed as they arise, and resolution of the issues will be incorporated into future revisions.

Travis Neely

Team Leader
Region 11 MLRA Office
Indianapolis, Indiana

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GENERAL INFORMATION

The updating of soil survey information is a continuous activity of data collection, reviews, evaluations, and additions to existing soil survey information. The project area for all updating activities will be the major land resource area (MLRA). MLRA Soil Survey Offices (MLRA-SSO) are responsible for evaluating, progressively correlating, and updating soil survey information within their assigned Soil Survey Area (SSA). Natural physiographic areas within the MLRA (i.e., specific groups of soils or natural landforms) can be identified as update projects. Region 11's MLRA Region-wide Memorandum of Understanding (MLRA Region-wide MOU) is an umbrella document to help ensure that updating of soil information, soil mapping, and soil interpretations is conducted according to common technical standards within the physiographic regions in Region 11. See Appendix III for a copy of the MLRA Region-wide MOU for Region 11.

OPERATIONS AND MANAGEMENT

The Organization Chart for MLRA Soil Survey Region 11 is shown in Appendix I.

MLRA Soil Survey Area Technical Teams - the staff of each MLRA-SSO under the supervision of the MLRA-SSO Leader. They develop the long-range plan with feedback from the MO Region Management Team and state work planning conferences. Additional members of the Technical Team include the SDQS with assigned responsibilities for the MLRA, Resource Soil Scientist(s), and specialists from other disciplines as needed, such as foresters, engineers, district conservationists, biologists, etc.

The **MO 11 Management Team** - all the state soil scientists for the states covered by Region 11. They coordinate the implementation of all work activities within Region 11, work with NCSS partners, and provide supervision. They review and concur with the long-range plans developed by the MLRA Soil Survey Area Technical Teams, and prioritize projects. The Management Team pushes project priorities up to the **Board of Directors** for support.

The **MO 11 Board of Directors** - all of the state conservationists for the states covered by Region 11. They review project priorities and decide which to fund. They give the approval for work activities within the region. If approved, project priorities are sent back to the MLRA-SSO Leader to develop a project plan.

See Appendix II for a list of the MLRA-SSOs and their assigned MLRA(s), the SDQS assigned responsibilities for the MLRA, and the states involved in each MLRA.

EVALUATING SOIL SURVEYS AND DEVELOPING WORK PLANS

Each official non-MLRA initial soil survey area is to be evaluated within the context of the greater MLRA soil survey area for update needs. The goal is to bring all soil survey areas within the MLRA to a common, coordinated standard so that the MLRA can be viewed as one survey. The states that share the MLRA are all involved in the evaluation process. Refer to NSSH, Part 610.03 for additional information.

Each MLRA-SSO will develop a **Long-range plan**. The long-range plan considers all aspects of soil survey work needed to bring the deficiencies identified in the evaluation process to the standard defined in the MLRA Region-wide MOU. It is a general, broad plan for the entire MLRA. It is basically a 'needs assessment' with broad goals and general priorities. The long-range plan can be used to develop a list of soil survey concerns or issues that may later be prioritized and addressed via project plans. The long-range plan can be modified as new information becomes available.

A **Project Plan** is a 1 to 5 year plan for a specific "project" with an MLRA soil survey area. It identifies project needs, schedules, etc., for the life of the project. It requires input from cooperators. It should identify specific work needed. There may be more than one project occurring with the MLRA soil survey area at any given time – each one needs a plan. The tasks and deliverables outlined in the project plan should be reflected in the host state's goals.

An **Annual Plan of Operation** is the annual business plan for the MLRA-SSO for the coming year. It outlines specific tasks, budget, staffing, schedules, etc., for the fiscal year. It should be linked both to the host state and the MO Region business plans.

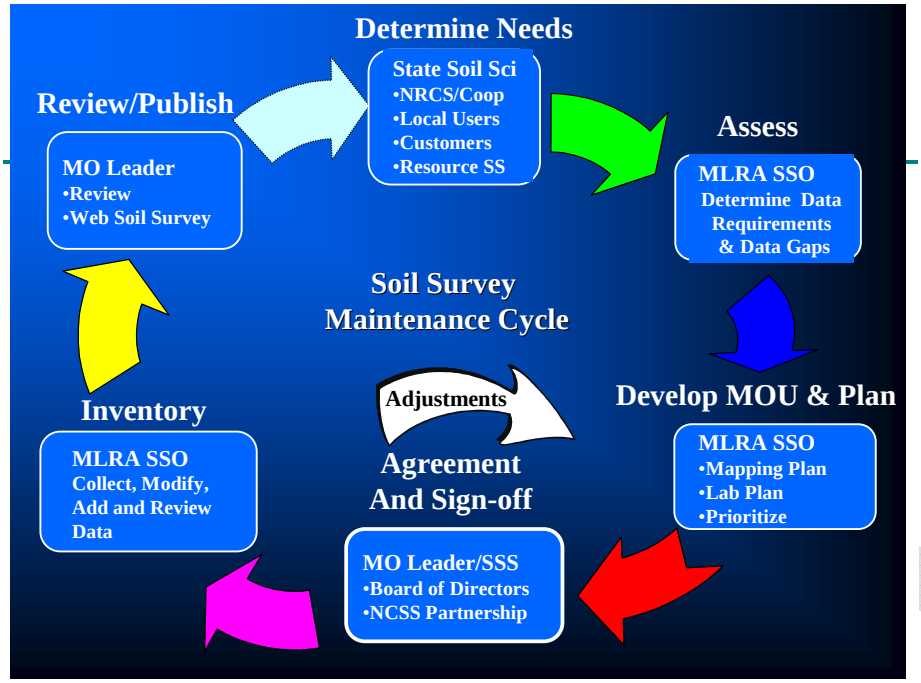
Refer to NSSH, Part 610.04 for additional information on developing work plans.

Each MLRA-SSO will address the status of existing soil characterization data at the National Soil Survey Laboratory (NSSL) and/or University characterization labs for the soil series that have type locations within their SSA, including benchmark series. Characterization data will be evaluated and the classification corrected/updated if needed in the Laboratory Information Management System (LIMS) database. Each taxon should have soil characterization data available that supports the soil series concept.

The MLRA Office (MO 11) Leader will work with the state soil scientists and NCSS partners to complete a workload analysis and develop a business plan for the MLRA Region. This plan will be maintained as a continuously updated document and will be used to assess staffing and budget needs for the MLRA Region.

ESTABLISHING PRIORITIES

State soil scientists provide leadership for the annual state soil survey conferences to discuss soil survey activities, consider the priorities of all partners, and review state soil survey plans of operations. MO 11 recommends that the state planning conferences be held by June 30th of each year. States will then forward their priorities to the MO 11 Leader by July 15th. The MO 11 Management Team will evaluate the states' priorities, decide on priorities for the MLRA Region, and submit the priorities to the MO 11 Board of Directors for approval. The approved list of priorities will be distributed to the states and the MLRA-SSO's by September 15th.



The work flow for production Soil Survey in Region 11.

NASIS LEGEND MANAGEMENT FOR UPDATES

In Region 11, the preferred method to manage all map units for the MLRA is within the official legend designated with the Area Type Name of "Non-MLRA Soil Survey Area". The map units within the MLRA are managed using the Legend Area Overlap and Mapunit Area Overlap tables. Status in the Mapunit Table in NASIS will be used to separate map units that are provisional from those that have been approved or correlated to the MLRA legend. Refer to NSSH, Part 610.05 for additional information on NASIS legend management for updates.

An update soil survey requiring *extensive revision* will be the only instance in which a new legend is created. All other legends will be managed under *update* or *update needed* status. Refer to NSSH, Part 608.08 (g) for information on soil survey area status.

QUALITY CONTROL, QUALITY ASSURANCE, AND SOIL CORRELATION

Soil survey **quality control** is the process of providing direct review and inspection, direction, and coordination of soil survey production activities to ensure that soil survey products meet the defined standards for content, accuracy, and precision. Quality control at the field level is the responsibility of the MLRA-SSO Leader.

Soil survey **quality assurance** is the process of providing technical standards and guidelines, oversight and review, and training to ensure that soil survey products meet National Cooperative Soil Survey (NCSS) standards. Quality assurance of soil survey products such as maps, descriptions, data, texts, photographs, etc., is the responsibility of the MO.

Soil correlation ensures consistent and accurate mapping, naming, classification, joining, database population, and interpretations within the MLRA. Soil correlation requires that data entered into the soil survey database meets national standards. Soil correlation ensures that all adjacent soil survey maps sharing the same purpose, scale, and order of survey exactly join. Soil correlation requires that soil properties are populated using standard criteria in NSSH Part 618, that each map unit is distinguished from all others, and that proper interpretations are assigned to each map unit component.

Progressive soil correlation is the process that identifies and records all the issues and decisions surrounding soil map unit level information throughout the course of a soil survey. Field reviews and field assistance visits are vehicles through which the MLRA-SSO and MO promote progressive correlation, maintain quality control and quality assurance, and ensure that technical standards are met. During each review or field assistance visit, any changes, deletions, or additions to taxonomic units and map units recognized since the last review or visit are evaluated and, if appropriate, certified. All soil survey activities, including interpretation, legend development, joining, soil investigation, and report development, are concurrent with mapping.

All progressive soil correlation decisions and their reasoning are recorded in NASIS. Any changes or additions to legends, taxonomic units, or map units must be recorded. Significant changes to soil property data and interpretive data should also be recorded. The reasons for the decision should be recorded if it is relevant and important to future users of the information.

Final correlation. If, during the course of an update soil survey requiring *extensive revision,* effective progressive soil correlation has taken place, the final correlation is primarily a review of the progressive correlation decisions that have been previously made.

Correlation document and amendments. For initial soil surveys and update soil surveys requiring *extensive revision,* a correlation document will be produced by MLRA Regional Office and distributed per NSSH guidelines. The final correlation document is archived in the Legend Correlation Table in NASIS.

Prior to SSURGO certification, the archived final correlation document can be amended and hard copies of the amendment redistributed. A copy of the amendment will also be archived in the Legend Correlation Table. Once a survey is SSURGO certified, the original correlation document is no longer amended.

Subsequent correlation decisions resulting in changes to legends, map units, or taxons will be documented and recorded in the Map Unit History Table in NASIS. In lieu of issuing amendments to the original correlation document, a report will be generated from NASIS that lists and identifies all the changes to legends, map units, and taxons. The report will be printed and distributed by the MO in a manner similar to a correlation amendment prior to any download of the changed legends, map units, or taxons to the Soil Data Warehouse.

QUALITY CONTROL REVIEWS

Each individual involved in soil survey operations; whether it is mapping and describing soils in the field, on-screen digitizing of soil boundaries, sampling and classifying pedons, analyzing and summarizing data, populating databases, developing report materials, or any other soil survey activity; has the greatest influence on the quality of the work they perform. All are expected to perform their duties in a way that results in soil survey products that meet NCSS standards and are of a high quality.

The MLRA-SSO Leader is the first level manager who is responsible to see that all work performed within their assigned area is of high quality and meets NCSS standards. Much of this quality control responsibility is carried out on a day-to-day basis through direct interaction with subordinate staff members to schedule activities and make work assignments, review completed work, provide on the job training, and other related activities. In addition to these routine management activities, systematic reviews are periodically conducted to document the success of the quality control procedures used. The specific details of the items to be reviewed will vary with the kind of activities being carried out as described in the project plan of operations.

The kinds of activities reviewed may include:

- administrative and scheduling
- progress reporting
- review of mapping
- legend development and progressive correlation
- adequacy of field documentation
- field investigations and sampling
- database development
- digital map development
- publication development

Each MLRA-SSO Leader will be responsible for developing and implementing a quality control review process tailored to the project plan of operations. NSSH, Exhibit 609-10 is a template that can be edited by the MLRA-SSO Leader to reflect local conditions. It contains separate sections for various soil survey process steps and a set of specific items to be reviewed and certified by the MLRA-SSO Leader.

QUALITY ASSURANCE REVIEWS

Refer to NSSH, Part 609.05 for information on the kinds of reviews, conduct of the review, and preparation of the report. The following information is intended to clarify the roles and responsibilities of the MO and MLRA-SSOs in Region 11.

The MO conducts the quality assurance review. The Senior Regional Soil Scientist (SRSS) will be the Review Team Leader for all reviews. The MLRA-SSO Leader and SDQS with responsibilities for the MLRA must be present. Other suggested participants for the Review Team are identified in NSSH, Part 609.05 (a). **[Note: until the SRSS position is filled in Region 11, the SDQS with responsibility for the MLRA will be the Review Team Leader.]**

MLRA soil survey project progress reviews will be conducted on a regular frequency, most often on an annual basis. Status of progress toward meeting the goals and objectives set out in the long-range and annual plans of operation will be reviewed. MLRA soil survey project completion review will be held when activities described in the project plan of operations are nearing completion.

For update soil surveys requiring *extensive revision*, an initial field review and a final field review are required. Most will need a yearly progress review.

The SRSS prepares the review report. The review report will be reviewed and signed by the MLRA-SSO Leader, the SRSS, and the MO Leader. The MO Leader is responsible for transmitting signed copies of the review report of the state conservationist(s) and others as appropriate.

In preparation for quality assurance reviews, the MLRA-SSO Leader will submit the following items to the Review Team at least 30 days prior to the review. These items should be submitted in electronic form to the extent possible:

- identification legend for the project area;
- list of map unit additions, deletions, and changes that have been made since the last review or that are proposed for approval at the current review;
- list of series and their classification;
- classification or series changes since last review;
- pedon descriptions for the map units to be added (including transect data);
- completed Region 11 MLRA Correlation Worksheets (see Region 11 technical note) or similar worksheet for map units to be added;
- itinerary for the review; and
- narrative of questions, concerns or comments on the planned field stops.

In addition, the following items should be available at the time of the review:

- progress map showing update status;
- current set of interpretations and properties tables for the map units being proposed for approval;
- updated Digital General Soil Map of the U.S. (STATSGO);
- Feature and Symbol Legend for Soil Survey (NRCS SOI-37A) and definitions;
- project plan showing major workload items and significant dates (for MLRA soil surveys);
- long-range plan of operations (for update soil surveys requiring *extensive revision*);
- spreadsheet showing status of all documentation;
- supporting documentation (lab data, transects, field notes, NASIS text notes, etc.);
- compiled map sheets or revised digital maps for review as applicable; and
- items requested by the SDQS for the completion of the Quality Assurance Worksheet for Update Soil Surveys Requiring Extensive Revision (see appendix IV) or for the completion of the Quality Assurance Worksheet for MLRA Soil Surveys (see appendix V) as applicable.

Field assistance visits by the MO may be requested by the MLRA-SSO, State Office, or a cooperating agency office as needed. The MO may also schedule field assistance visits as necessary. A written trip report is to be prepared by the SDQS documenting the activities from the field assistance visit and distributed to the participants, the State Soil Scientist(s), and any appropriate cooperating agencies. Decisions that affect the legend, data collection or recording,

classification of soils, or interpretations become part of the permanent and formal record of the survey upon inclusion in the final field review (for update surveys requiring *extensive revision*) or MLRA project completion report.

It is the policy of Region 11 to conduct a quality assurance review of attribute and spatial data that's been revised as part of MLRA soil survey operations. This includes revisions to spatial data that's been previously SSURGO certified. This quality assurance review is to be conducted prior to the data being posted to the Soil Data Warehouse.

DOCUMENTATION AND DATA COLLECTION

The MLRA-SSO will organize and analyze support data and documentation and store it in the National Soil Information System (NASIS) to the extent possible. This includes field notes, including pedon descriptions, map unit descriptions, transects, on-sites investigations, intensive (order 1) soil mapping, laboratory data, and notes of an interpretative nature that supplement soil maps. Creating links in NASIS such as between the pedon description and the map unit is necessary to fully utilize the analytical capabilities of NASIS. Soil maps and this descriptive information stored in NASIS are the primary records for the MLRA soil survey. Refer to NSSH, Part 627.08 for additional guidance on documentation requirements.

For MLRA soil survey activities, both major and minor components are to be populated sufficiently with data to meet nationally mandated requirements as well as state and local needs. Many minor components have gaps in the database due to a lack of supporting data. Field work should include the collection of data and documentation necessary to adequately populate the minor components in the database.

The Field Description Standards presented in NSSH, Part 627.08 (e) will be used to determine documentation needs for proposed series, map unit soil components, and map units.

Typical Pedons - There will be a "typical pedon" for each taxon on the MLRA identification legend. This pedon should represent the predominant range for most if not all the major soil properties of the taxon within the MLRA. Typical pedons will be selected based on an evaluation of present and historical data for that series, i.e., lab data, 232's, typical pedons from published surveys. The typical pedons will be located in representative map units and on representative landforms. Characterization data may need to be collected if there is no data or insufficient data. The selected typical pedon sites, those suitable for representing the taxon in the MLRA, may need to be re-visited in order to update the detailed description to current NCSS standards. The selected typical pedon description will be stored in NASIS Pedon.

Upon evaluation of the data, the following guidelines will be used in selecting the typical pedon and taxonomic unit description for the MLRA:

a. Each taxon in the MLRA is represented by one taxonomic unit description.
b. The current Official Series Description (OSD) typical pedon will be used as the representative pedon for the series in the MLRA except in the following circumstances:

1. If the OSD typical pedon is determined not to be suitable (i.e., concept changed, type location now paved over, etc.), the OSD typical pedon will be relocated to another type location within the MLRA and that new pedon will then be used as the representative pedon.

2. If the OSD type location is located in another MLRA, a representative pedon from within the MLRA will be selected to represent the series.

3. For update projects requiring *extensive revision* (and a new publication), if the OSD pedon is from a map unit not correlated in the subset, then a representative pedon may be selected that represents the range of characteristics of that subset.

MAP CHECKING – ROLES AND RESPONSIBILITIES

Plans to update soil mapping depend on the results of the formal evaluation. The mapping revisions are identified as either (i) *extensive revision* or (ii) *update*. Revisions to soil mapping under "*update*" include modernizing the soil base map and supplemental soil mapping. Most mapping revisions will be done in Region 11 using digital data as the mapping base.

Quality control of mapping is the primary responsibility of the MLRA-SSO Leader. The quality control template, Exhibit 609-10, can be used by the MLRA-SSO Leader to evaluate the mapping. Quality assurance of mapping will be done by the SDQS.

The procedure for geodatabase development, file naming, archiving and quality assurance described in NSSH, Exhibit 607-2 will be used in Region 11.

DELIVERING SOIL SURVEY INFORMATION

Products of MLRA soil surveys and progressive correlation will generally consist of updated NASIS databases and/or spatial data that will be made available to the public through updates to the Soil Data Mart (SDM) and Web Soil Survey (WSS).

In instances where a soil survey subset publication is specified in a project MOU, the publication will be submitted in the MUG (map unit generator) format. In addition, a complete (100%) quality control technical review of the publication will be completed by the MLRA-SSO Leader prior to submitting the publication to the MO for quality assurance. The Soil Survey Publication Quality Control Review checklist (see Region 11 technical note) should be used as part of the quality control review. The SDQS will then perform a quality assurance technical review of the publication. Depending on the condition of the publication, it may or may not be returned to the MLRA-SSO Leader to address technical review queries. If the publication requires only minimal modifications as a result of technical review, it will be submitted directly for English edit. In most cases, the publication will not be returned to the MLRA-SSO Leader after English edit.

PROCEDURES FOR PROCESSING OFFICIAL SERIES DESCRIPTIONS

This instruction establishes the procedure for processing Initial Review Drafts (IRD) and revising established OSDs. Refer to (NSSH, Part 614.06 for additional information.

New Series. New series, if needed for taxonomic and interpretive differences, need to have sufficient documentation to determine the range in soil characteristics, if the proposed series has clear differentiae from all existing series, and if the proposed series is different in use and management from other series.

Generally, if the extent of the new series is less than 2,000, at least 5 pedons descriptions are needed. New series with an extent of over 20,000 acres require 10 pedon descriptions. The number and distribution of pedon descriptions must be adequate to classify, differentiate, and develop range of characteristics. Lab characterization data is also recommended, especially if separating from adjoining class limits--for example, a coarse-loamy control section from a fine-loamy control section.

Initial Review Drafts

The following procedure is used to reserve the series name and classification.

a. The MLRA-SSO Leader will prepare the IRD of the proposed series. The following materials are submitted to the SDQS assigned responsibility for the MLRA:

1. An electronic copy of the IRD. All sections of the IRD will be completed.
2. The NASIS DMU ID that represents the typical pedon should be included in the IRD under Remarks. The DMU should be populated sufficiently with data to meet nationally mandated requirements as well as state and local needs.
3. Electronic copies of documentation used to develop the range in characteristics and the series concept. Documentation includes lab data, pedon descriptions, transect summaries, etc. This documentation will be filed in the "series" folder in the MO.
4. An electronic copy of that portion of the 15 or 7.5 minute quadrangle or soil survey field sheet that has the type location marked. The name of the quadrangle, geographic coordinates, section, township, and range are to be included. Use a GPS unit in the field to determine the exact location.

b. The SDQS will review the IRD and supporting documentation. If the name and classification are appropriate, the SDQS will enter the series name and classification into the National Soil Classification (SC) database as a tentative series and enter the IRD of the series into the National OSD database. When the IRD is submitted for inclusion in the National OSD data base, a ".a file" will be created by the SDQS which provides a brief background or notes pertaining to the series. The ".a file" will be maintained in NASIS by the MO. The location of the ".a file" in NASIS is: MLRA11_Office, Local Query, Query Name: Files by series name.

Routing Initial Review Drafts for Comment

a. After the IRD has been entered into the OSD database, the Region 11 MO will send an electronic notification and request for comments to adjoining MOs and to any other MOs that have soil series in the same family as the proposed series.

b. Comments should be returned to the SDQS by the date listed on the notification letter, usually within 2 to 4 weeks.

c. Comments will be collected and evaluated by the SDQS. Revisions will be made by the SDQS in consultation with the MLRA-SSO Leader. The competing series section will be reviewed again and updated to include any series proposed or established subsequent to the IRD.

d. The SDQS will update the ".a file" and resubmit the IRD to the OSD database.

e. After the IRD is revised in the OSD database, the SDQS will notify those that received the initial routing that the series description has been updated and that the IRD can be downloaded from the national database. A copy of the ".a file" or a summary of its contents will be provided along with this notification.

f. 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 MO Team Leader. New series set up during progressively correlated MLRA soil surveys become established when the record of correlation decisions stored in NASIS is generated, printed, and signed by the MO Team leader.

g. Information on series classification, competing series, and OSDs are available on the internet at http://soils.usda.gov/technical/classification/scfile/index.html and http://soils.usda.gov/technical/classification/osd/index.html

Revising Established Official Series Descriptions

The following procedure will be used when revising established OSDs:

a. Requests for changes to an established OSD will be made to the SDQS assigned responsibility for the MLRA in which the type location is in. Changes to properties, type location, or series concept should be supported by documentation (lab data, 232's, transects, etc.).

b. If the series classification or type location is changed, or if changes are made that alter the original series concept, the SDQS will review these changes within Region 11 and with other MOs in which the soil series or competing series are known or expected to occur. Comments should be returned to the SDQS by the date listed on the notification letter, usually within 2 to 4 weeks.

c. All OSDs submitted to the MO for processing should be georeferenced, with current classification, metric units of measure, current horizon nomenclature, current competing series, and with diagnostic horizons and features listed

GUIDES FOR WRITING PEDON DESCRIPTIONS AND OFFICIAL SERIES DESCRIPTIONS

The following information is intended to supplement the guidelines for developing OSDs in the NSSH, Part 614.06 (1).

Surface Features

In describing surface features include amount, distinctness, color, kind, and location, e.g., common distinct brown (10YR 5/3) clay films on faces of peds. In addition, texture may be described if it adds to the understanding of the soil.

In soil horizons where clay and organic mater have moved together to form films on ped faces, the term "organo-clay films" can be used. Organo-clay films have moist value and chroma of 3 or less. For example, in a Bt horizon with 10YR 3/2 surfaces on ped faces, the coatings would be most accurately described as organo-clay films rather than just clay films.

Range in Characteristics

In describing the depth to carbonates the preferred terminology is "depth to carbonates." "Calcium" can be used as a modifier. The term "free lime" should not be used.

Soil characterization data should be evaluated when OSDs are updated. A comment will be made in the Additional Data section of the OSD stating that available lab data was evaluated in revising the Range in Characteristics. For example, "Pedon data from soil characterization lab at xxxxx University and the NSSL were evaluated in June 1997 in revising the Range in Characteristics."

When lab data is available for the Type Location, the typical pedon description must match the lab data (i.e., textures, reaction, rock fragment content, etc.). If the lab data does not support the series concept or series range in characteristics, a new Type Location should be selected.

Template for Official Series Descriptions

LOCATION ?? MI

Established {or Tentative}Series
Rev. {Author initials-last two editors for maximum of 3 sets of initials}
{Date} ??/????

?? SERIES

The ?? series consists of {depth class}, {drainage class} soils that formed in {parent material}. ?? soils are on ? {landform(s)}. Slope ranges from ? to ? percent. Mean annual precipitation is about ? mm (? inches), and mean annual temperature is about ? degrees C (? degrees F).

TAXONOMIC CLASS: ???

TYPICAL PEDON: {series name and surface texture}, on a ?-facing {optional}, slope shape {i.e., convex, concave; optional}, landform position {optional}, ? percent slope in {land use at site} at an elevation of ? meters (? feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

{horizon designator}--? to ? cm (? to ? inches); {color}{texture}({textures rubbed and unrubbed for organic soils}**,** {dry color} dry; {grade, size, type of structure};{consistence}; {amount, size, location} roots; {amount, size, kind} pores; additional features {see list below}; {?ly effervescent}; {reaction}; {distinctness, topography} boundary. [? to ? cm (? to ? inches) thick] {for individual horizon} *or* [Combined thickness of the 2Bt horizon is ? to ? cm (? to ? inches).] {for subhorizons of a major horizon}

Additional features. List these features separately because they do not occur in all soils or horizons. They include <u>in recommended order</u>:

Slickensides
Clay films and bridging
Organic, silt coatings
Krotovinas
Concretions (other than redoximorphic)
Sodium content (from lab data)
Redoximorphic features
Rock fragments
Pararock fragments
Brittleness
Carbonates

TYPE LOCATION: ? County, {state}; distance from nearby town; Township name {optional}; ? feet {N,S,E,W} and ? feet {N,S,E,W} of the ? {corner or center} of sec. ?, T. ?., R. ?.; USGS {quad name} topographic quadrangle; lat. ? degrees ? minutes ? seconds N. and long. ? degrees ? minutes ? seconds W., NAD ??; UTM Zone ?, ??? easting and ??? northing, NAD ??.

RANGE IN CHARACTERISTICS: Note: The preferred format in Region 11 is semi tabular. As OSDs are revised, convert the narrative format to semi tabular. Metric units are to be used. Including English units in addition to the metric units is acceptable. List properties or features that apply to the soil as a whole first, such as mineralogy or range in soil temperature. The following examples are not totally inclusive or applicable to every series. Items can be added or deleted as needed and justified.

Depth to {lithic contact, paralithic contact, densic contact, first lamellae, carbonates, fragipan, buried soil, etc}: ? to ? cm (? to ? inches)
Depth to the top of {or base of} the {cambic, argillic, glossic, natric} horizon: ? to ? cm (? to ? inches)
Thickness of the {mollic, umbric, histic} epipedon: ? to ? cm (? to ? inches)
Thickness of the {loess or other parent material cap, solum}: ? to ? cm (? to ? inches)
Depth to base of soil development: ? to ? cm (? to ? inches)
Particle-size control section: averages ? to ? percent clay, ? to ? percent fine sand or coarser, ? to ? percent rock fragments

The following format for the ranges for individual horizons should be used. The properties in the format below are not inclusive or applicable to all pedons. Properties may be added or deleted as needed and justified. Give emphasis to those properties that define the series concept.

?? horizon:
Hue: {list range of hues from red to yellow, i.e., "7.5YR to 2.5Y"; use the term "to" in place of "through" when listing a range of 2 or more hues, values, or chromas"
Value:
Chroma:
Texture:
Structure:
Moist consistence:
Clay content:
Sand content:
Rock fragment content:
Pararock fragment content:
Moist bulk density:
Calcium carbonate equivalent:
Sodium absorption ratio:
Reaction:

COMPETING SERIES: These are the ?, ?, and ? series.

NOTES: The list of competing series is available on the Internet at:
http://soils.usda.gov/technical/classification/scfile/index.html or at
http://ortho.ftw.nrcs.usda.gov/cgi-bin/sc/screports.cgi

Before writing competing statements, it is critical that the soil series being described has a complete and concise range of characteristics and other properties identified. Poorly written OSDs make it much more difficult to differentiate series. Competing statements should only identify the "major" difference in properties. Generally, only one property is listed. Differences in every property

should not be described. When writing competing statements address only those properties that are distinctly different between the competitors. **Properties that overlap should not be used to differentiate series. Only properties occurring within the series control section can be used to compete series.** For additional information, refer to Keys to Soil Taxonomy, Tenth edition, Page 308, and NSSH Exhibit 614-2 (f).

Differentiae used to separate series must be stated in the Range in Characteristics section. For example, in order to state that "? soils have more than 8 percent sand in the lower part of the series control section**,**" the RIC section must indicate that the OSD series has less than 8 percent sand in the lower part of the series control section.

GEOGRAPHIC SETTING: ?? soils are on {landform}. Slope ranges from ? to ? percent. The soils formed in {parent material}. Climate is ? {optional}. Mean annual precipitation ranges from ? to ? mm (? to ? inches). Mean annual temperature ranges from ? to ? degrees C (? to ? degrees F). Frost-free period is ? to ? days. Elevation is ? to ? meters (? to ? feet) above mean sea level.

NOTES: Temperature and precipitation data can be obtained from the Web site: http://www.wcc.nrcs.usda.gov/climate/

GEOGRAPHICALLY ASSOCIATED SOILS: These are the ?, ?, and ? soils.

NOTES: List the soils that most commonly associate with the OSD series. For each soil listed give its landform position in relation to the named series and a brief comment to distinguish each of them from the series being described. Drainage class is commonly listed. Soils in a drainage sequence are sometimes listed. Soils in vegetative sequence are sometimes listed. Some associated soils may be competing series, but generally are not.

For example: These are the Alpha, Beta, and Delta soils. The well drained Alpha soils are less than 102 cm (40 inches) to sandstone bedrock and are on summits of ridges. The moderately well drained Beta soils do not have argillic horizons and are on similar positions. The poorly drained Delta soils have a mollic epipedon and are on toeslopes farther from the dissecting drainageways.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: ? drained. The depth to the top of a(n) {perched or apparent} seasonal high water table ranges from ? to ? cm (? to ? feet) between {month} and {month} in normal years. The potential for surface runoff is ? {or, to} ? {optional}. Saturated hydraulic conductivity is ? {or Saturated hydraulic conductivity is ? in the upper part and ? in the lower part of the series control section; or Saturated hydraulic conductivity is ? in the (parent material) and ? in the underlying (parent material)}. Permeability is ? {optional}. ??? series is subject to {frequency} flooding for {duration} periods between {month} and {month} in normal years.

USE AND VEGETATION: Soils are used to ?. Native vegetation is ?.

DISTRIBUTION AND EXTENT: MLRA ? in {state(s) or parts of states}. The type location is in MLRA ? {include if the series occurs in more than one MLRA}. The series is of {small, moderate or large} extent {or The series is {not extensive, moderately extensive, or extensive}.

MLRA OFFICE RESPONSIBLE: Indianapolis, Indiana.

SERIES ESTABLISHED {PROPOSED}: ? County, {state}, 20??.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
{list and give depths and horizons from typical pedon}.
Mollic epipedon: from the surface to a depth of 61 cm (Ap, A horizons).
Argillic horizon: from a depth of 61 to 127 cm (Bt1, Bt2 horizons).
{including English depth units is optional}

NASIS data mapunit ID xx,xxx represents the typical pedon. {Identify the DMU ID for the OSD pedon. DMU's for other component phases can also be listed.}

ADDITIONAL DATA: {If available state it as follows: ? data is available for the typical pedon (give pedon number) from the {NSSL, University Lab}}. Also list other pedons if they provide supporting data along with type of data available and source of data.

National Cooperative Soil Survey
U.S.A.

DATA ELEMENTS FOR POPULATION OR EDITING OF NASIS DATA

Each data element needs to be carefully checked to ensure that the database is accurately and consistently populated for soil survey reports, SDM, WSS, eFOTG, SSURGO Certification, Customer Tool Kit, etc. For MLRA soil surveys, both major and minor components will be populated sufficiently with data to meet nationally mandated requirements as well as state and local needs.

The data in NASIS should also be compared against the OSD ranges. The representative value (rv) should be within taxonomic class limits and OSD ranges. The low and high values are allowed to extend beyond the established limits on the taxon from which the component gets its name, but only to the extent that interpretations do not change. Low and high values that extend beyond the limits of the taxon will be noted as being outside the series or taxon range in a correlation text note stored in NASIS. Refer to Soil Survey Technical Note No. 4 for additional guidance.

In addition, in order to ensure an exact join, joined soil polygons must share the same basic soil properties and selected soil qualities. Refer to NSSH Exhibit 609-2 for this list of soil properties and qualities. The MLRA-SSO Leader is responsible for ensuring that the requirements for an exact join are achieved during MLRA soil survey activities.

PROCEDURES FOR NAMING DATA MAPUNITS

It is recommended that MLRA-SSOs develop a standard naming convention for their DMUs to help them organize and recognize the updated MLRA DMUs.

Information in the DMU name can be abbreviated so that the maximum amount of information can be used in the name, based on naming length limitations. The parts of the DMU name should be comprehensible to those who did not develop the DMU.

PROCEDURES FOR MAKING CHANGES TO DATA MAPUNITS

In Region 11, it's recommended that DMUs linked to *published* legends undergo a peer review process prior to making any changes (other than correcting obvious errors or changes due to National mandates for programs). This kind of review process will ensure that "stakeholders" have a say and are aware of changes to data they use.

Each MLRA-SSO should establish a "Data Mapunit Review committee" to review requested changes to published data map units. Committee members may consist of the following: State Soil Scientist (Chair), MLRA-SSO Leader(s), SDQS(s), Resource Soil Scientist(s), state Technical Soil Specialist(s), cooperators, other disciplines, and other "stakeholders" as needed. Changes to DMUs linked to *published* legends are typically edited by the state Technical Soil Specialist from the state where the DMU ownership resides.

In addition, the Data Mapunit Review committee may assist the MLRA-SSO Leader in developing and technically reviewing newly established DMUs for the MLRA. The MLRA-SSO Leader has responsibility for maintaining newly established DMUs and for quality control until the DMUs have been correlated and published.

INSTRUCTIONS TO POPULATE AND CAPTURE NASIS TEXT NOTES

In Region 11, all MLRA soil survey activities are managed in NASIS. All SSURGO soil business and all soil survey correlation activities are captured in NASIS. NASIS provides us with an opportunity to document and store all pieces of information that go into the production of a soil survey. That opportunity resides in the "Text" tables available in NASIS. To make the most of that opportunity there needs to be some sort of structure and organization of these pieces of information so that they can be easily entered into the database and later retrieved and understood by our successors. The Region 11 NASIS Text Note Guide (see Region 11 technical note) will help provide consistency in capturing soil business and correlation activities. In the text field, the soil scientist should place their name and date for each note captured.

WATER TABLES AND DRAINAGE CLASSES

The objective of the water table and drainage class guidelines is to attempt to assign standard water table depth, type, and duration to be used in the region.

In developing these guides drainage classes are used rather than taxonomy in assigning water table properties. Since the drainage classes of Somewhat Excessively and Excessively drained are determined more on the basis of permeability and available water capacity, these two classes are not considered in these guides for assigning water table properties.

Also, due to historical differences in assigning water table properties, these guides set broad ranges for water table depths. **The entire range in water table depths will seldom be used in assigning water table depths. Each MLRA should work to establish a standard set of water table properties that fit within the guidelines presented here.** The ranges are for the depth to the top of the water table. They apply to both the drained and undrained phases. There generally is no difference in water table depths between undrained and drained conditions. The difference is in when the water table is present and/or how long the water table persists (time and duration).

Drainage Class	**Depth to Top of Water Table cm (ft)**	**Duration - Undrained**	**Duration - Drained**
Very Poor	+61 – 15 (+2.0 - +0.5)	Oct - Sep	Nov - May
Poor	+15 – 30 (+0.5 - 1.0)	Oct - Jun	Nov - May
Somewhat Poor	15 – 61 (0.5 - 2.0)	Oct - Jun	Nov - May
Moderately Well	30 – 102 (1.0 - 3.5)	Oct - May	Nov - Apr
Well	$\geq$ 102 ($\geq$ 3.5)	Oct - May	Oct - May

An *apparent water table* having Endosaturation or a *perched water table* having Episaturation is not true 100 percent of the time for the entire region.

Most soils that were in the Typic subgroup of a udic moisture regime and have a fragipan or dense till (permeability $\leq$ 0.2 in./hr) (ksat $\leq$ 1.41 micrometers/second) above 100 cm are now in the Oxyaquic subgroup.

SIMILAR/DISSIMILAR COMPONENTS GUIDE

Use this guide to assign similar/dissimilar concepts to components and map units. Although the guide is comprehensive and will cover most situations, soil components may be encountered that are not addressed in the guide. If these circumstances arise, please contact your Regional Soil Data Quality Specialist. An effort will be made to incorporate new criteria in the guide as necessary to cover these circumstances.

1. This similar/dissimilar key is based mostly on soil properties and on some soil interpretations. Similar/dissimilar status is based on the differences encountered in properties and interpretations, either individually or combination.

2. We identified the following properties and interpretations to be used in a key:
   Drainage Class or Difference in representative (rv) depth to the top of wet soil moisture status (saturation)
   Family particle size class
   Depth and Kind of Component Restriction
   Surface texture
   Surface layer rock fragment class
   Surface stones and boulders
   Erosion class
   Flooding frequency
   Surface calcium carbonate content
   Organic soils (Dysic versus Euic reaction classes)
   Epipedon thickness
   Slope

Drainage class:

Similar soils: Adjacent classes
Dissimilar soils: Skip one class; except very poorly drained is dissimilar to poorly drained; better drained soils are non-limiting; more poorly drained soils are limiting
Very contrasting: Skip 2 classes except very poorly drained is very contrasting to poorly drained.

OR

Difference in representative (rv) depth to the top of wet soil moisture status (saturation):

Since the population of soil moisture status based on measured data and soil morphology is somewhat variable throughout the Region, the soil scientist may define the depth differences that represent dissimilar and very contrasting. In the ***CORR-MO10/11 Component***

Similar/Dissimilar Comparator report depth differences are defined by the soil scientist in the parameter boxes that display at the beginning of the report.

Note: It is recommended that either the drainage class criteria or the depth to the top of the wet soil moisture status criteria be used consistently within an MLRA Soil Survey. Both options are presented to allow the soil scientists to decide which set of criteria best applies to the soils in their MLRA.

Family particle-size class:

Sandy or sandy-skeletal (sandy and sandy-skeletal components with average rock fragment content in the series control differing by >= 10 percent would be considered dissimilar)

coarse-loamy, coarse silty, loamy (< 18 percent clay), or loamy-skeletal (loamy and loamy-skeletal components with average rock fragment content in the series control differing by >= 10 percent would be considered dissimilar)

fine-loamy, fine-silty, or loamy (>= 18 percent clay)

fine or clayey < 60 percent clay

very fine or clayey >= 60 percent clay

Difference of one group is dissimilar and 2 groups is very contrasting.

For components with a contrasting particle size class, only the class for the upper part of the control section will be used. Dissimilar components will be non-limiting. Components with organic control sections are very contrasting to components with mineral particle size control sections.

Kind and Depth of Component Restriction:

Kind of Component Restrictions

- Lithic and Paralithic Contacts
- Dense Till
- Fragipans
- Strongly contrasting textural stratification
- Sand and or gravel (although not considered a component restriction)

Any difference in kind of component restriction is dissimilar regardless of the depth.

Depth classes (in centimeters):		
	< 25	very shallow
	25 - 50	shallow
	50 - 100	moderately deep
	100 - 150	deep
	> or = 150	very deep

Difference of one class is dissimilar and 2 classes is very contrasting. Components in adjacent (shallow, moderately deep, or deep) classes with representative (rv) values that differ by 25 cm or more are also dissimilar. Shallower components are limiting. Deeper components are non-limiting. Very shallow components are very contrasting to components in all other depth classes.

Surface texture:

coarse	(s, ls, cos, lcos, fs, lfs, vfs, lvfs)
moderately coarse	(sl, cosl, fsl)
medium	(l, sil, si, vfsl)
moderately fine	(scl, cl, sicl)
fine	(sc, c, sic)
organic	(muck, peat, mucky peat)

Difference of one group is dissimilar and 2 groups is very contrasting. All dissimilar components are limiting.

Surface layer rock fragment class (percent by volume):

Less than 15%
15 - 34%
35 - 59%
60% +

Difference of one class is dissimilar and 2 classes is very contrasting. Components with more rock fragments are limiting and those with less rock fragments are non-limiting. Components in adjacent classes with representative (rv) values that differ by 10 percent or more are also dissimilar, and by 20 percent or more are also very contrasting.

Surface stones and boulders:

Class 1
Class 2
Class 3
Class 4
Class 5

Difference of one class is dissimilar and 2 classes is very contrasting. The more stony components are limiting the less stony components are non-limiting.

Erosion class:

Class 1 (slight)
Class 2 (moderate)
Class 3 (severe)
Class 4 (very severe/gullied)

Difference of one class is dissimilar and classes 1 or 2 and class 4 are very contrasting. More severe erosion is limiting, except that class 2 is not limiting to class 1. Less severe is non-limiting.

Flooding frequency:

Flooding classes:
- none
- very rare and rare
- occasional
- frequent and very frequent

The adjacent groups above are dissimilar. None and occasional, and none and frequent or very frequent are very contrasting. Very rare and rare are similar. Frequent and very frequent are similar. Very rare and rare are very contrasting to frequent or very frequent. More frequent flooding is limiting.

Surface calcium carbonate content:

Well drained soils 5% or more $CaC0_3$ (high value) in the surface layer are dissimilar and limiting to well drained soils with no calcium carbonate in the surface layer.

Organic soils:

Organic soils with Dysic reaction classes are dissimilar (but not limiting) to those with Euic reaction classes.

Epipedon thickness:

The relative difference in representative (rv) thickness of the epipedons (ochric, mollic) of mineral soils is as follows:

50 to 75 percent (of the thickness of the thinner epipedon) for dissimilar

75 percent or greater (of the thickness of the thinner epipedon) for very contrasting

Slope:

Slope Class Table

Slope range	Similar	Dissimilar	Very Contrasting
	Absolute Difference		
0 to 1	< 3	3	4
2 to 3	< 4	4	6
4 to 8	< 5	5	8
9 to 16	< 7	7	10
17 to 30	< 9	9	14
> 30	< 12	12	20

A component must have a slope which differs by the indicated amount from the high or low slope of the map unit to be dissimilar. Dissimilar components with greater slopes are limiting.

Example 1 - A component with 20% slope within a map unit with a slope range of 6-12%. Since the component has slopes greater than the upper limit of the map unit slope range, compare the component with the upper limit of the map unit slope range. The upper limit of the map unit slopes is 12%, which fits within the 9-16% slope group. To be dissimilar the component must have at least 7 % more slope (7% + 12% = 19%) than the map unit. The component on 20% slope, therefore, is dissimilar. To be very contrasting, the component must have at least 10% more slope (10% + 12% = 22%) than the map unit. The component on 20% slope, therefore, is not very contrasting. Since the component has greater slopes than the upper slope limit of the map unit, it is limiting.

Example 2. Compare components on 3% and 7% slopes. Find the difference required for the lower slope component. The 3% component fits into the 2-3% group, which requires a difference of 4% to be dissimilar, therefore, the 7% component is dissimilar. However, the difference required for the 7% component, which fits into the 4-8% group is 5%. Therefore, the 3 % component is not dissimilar to the 7% component.

Example 3. Compare slopes of 5-10% with slopes of 8-16%, using the lower slopes for each component (5 & 8) and the upper slopes for each component (10 & 16). A slope of 5% requires a difference of 5%, therefore, 8% is not dissimilar. A slope of 10% requires a difference of 7%, therefore, 16% is not dissimilar. Therefore, components with 8-16% slopes are not dissimilar.

Slope Groups and Slope Percent

Refer to Soil Survey Manual, pages 64-66, for Definitions of Slope Classes when establishing MLRA slope classes. In addition, the following Q & A provides additional guidance.

Questions and answers about slope

Q. Can we live with 1 set of slope breaks throughout the MLRA?

A. No. The documentation likely will not support a single set of slope breaks for the entire MLRA. However, the same soils on the same landform in the same MLRA could and should have the same slope breaks for sloping phases.

Q. Should slope breaks be the same on each landform?

A. Yes. All other things being equal, like landforms within the same MLRA should have the same slope phases.

Q, Should slope breaks be based on transect and research data?

A. Yes. This is the best source of information for establishing the slope ranges for map units. The adjustment of slope ranges based on available data must be weighed against other similar map unit slope ranges and against the user's needs (or lack of needs) for making the adjustment.

Q. Should slope breaks be defined by geographical area?

A. Yes. This is not always possible, but as much as landforms can be defined geographically the corresponding slope ranges can also be defined geographically. End moraines and terminal moraines can be defined or displayed by a geographical area. The same can be said for ground

moraines, outwash plains, dune fields, areas of loam till, silty clay till, etc. Geologic processes of transport and delivery have occurred in specific areas. These processes result in surface geomorphometry that lends itself to a certain set of soil slope phases.

Q. Where does mapability come into the picture?
A. Slope ranges need to be mappable, meaning they are repeated on the same landform within the MLRA, or at least within a geographical area within the MLRA. This may become an issue when updating a survey area where a different set of slope groups were used by the original soil mappers. There may not always be a convenient conversion of slope phases from the old legend to the update soil survey legend.

Q. Should slope breaks be set at major breaks for interpretations?
A. Yes. As much as possible, slope breaks should not cross major interpretive breaks. A crossover of a few percent is not critical, but major interpretive breaks that occur in the mid-range of allowed map unit slopes could cause problems for some uses/users.

GEOMORPHOLOGY/GEOLOGY

A Geomorphology/geology work group was established in 1996 to develop guidelines for use and standardization of geomorphic and geologic terms used in Region 11. The use of the recommended geomorphic and geologic terms provide for consistent application and use in soil survey publications and in the coding used by various applications used in the cooperative soil survey, e.g. PEDON PC, MUG, and NASIS.

The original source document for the list of recommended landscape, landform and microfeature terms was the NSSH, Part 629, and its Exhibits (rev. 1996). The list of terms (see Region 11 technical note) includes the original list of terms recommended by the work group plus additional terms recommended by field soil scientists in Region 11. There are no terms on the recommended list that are not in the current edition of NSSH, Exhibit 629-1.

To add a term not listed or recommended for use in Region 11, submit the proposed term to the SDQS assigned responsibility for the MLRA. Include a block diagram showing the landform and associated soils. If the term is not defined in the Glossary of Landform, NSSH, Part 629.02 (c), also include a proposed definition.

SOIL BUSINESS – POLICY AND PROCEDURES

Required materials should be sent to the Region 11 MLRA Office for Quality Assurance review. All map compilation, digitizing and Digital Map Finishing is performed according to NRCS specifications as described in the National Soil Survey Handbook (NSSH), Part 647, Soil Map Development**.**

Compilation

Exhibit 1 *Certification signed by compiling office and sent for review as early in the compilation process as possible. Include 10% sample of compilation mylar quarter quads or quadrangles (full county digital coverage and digital source materials for automated compilation).*
Exhibit 2 *Checklist of necessary compilation source materials.*
Exhibit 3 *Checklist for review process. Errors found in QA review to be corrected and all data reviewed for similar errors.*

Digitizing

Exhibit 4 *Certification signed by digitizing unit sent with 10% hard copy sample (full county digital where applicable) for QA review of digitized products prior to SSURGO archiving and before DMF begins.*
Exhibit 5 *Checklist of necessary compilation source materials.*
Exhibit 6 *Checklist for review process. Errors found in the QA review to be corrected and all data reviewed for similar errors.*

Digital Map Finishing (DMF)

Exhibit 7 *Certification statement signed by DMF unit sent with 10% sample for QA review (w/ and w/o photo background plus topo maps).*
Exhibit 8 *Checklist of the necessary compilation source materials.*
Exhibit 9 *Checklist for review process. Errors found in the QA review to be corrected and all sheets reviewed for similar errors.*

Forms to Download

37A
Form Special Features
SOI7 Fillable

The exhibits mentioned above as well as forms NRCS-SOI-7 and NRCS-37A front and back page can be downloaded from this web site:
http://www.in.nrcs.usda.gov/mlra11/Soil_Business/soil_business.htm