

United States Department of Agriculture



Modifying Soil Data Viewer 3.0 Rules File for Local Interpretations

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1 Overview

Soil Data Viewer interface is controlled by a Microsoft Access database referred to as the Soil Data Viewer rules file. The rules file controls the display of available interpretations and properties in the tree view, the descriptions of the interpretations, and the valid options for processing.

The Soil Data Viewer 3.0 rules file comes with a complete set of national interpretations and a set of soil properties and features available for processing. Soil Data Viewer works without modification with a SSURGO dataset exported with only national interpretations. The Soil Data Viewer rules file needs to be modified to work with a SSURGO dataset that contains local interpretations.

2 How Soil Data Viewer interface works

The rules file for the Soil Data Viewer is named SDVRulesV2.mdb and is in c:\program files\usda\soil data viewer\database directory. When SDV is activated, it reads the rules file for the instructions to display in the interface. The tables in the rules file that control SDV interface are Folders, Attributes, AttrAlgorithms, ValidAlgorithms, and OptionList. See section 4 for a generalized view of the table relationships in the Soil Data Viewer rules file.

2.1 Table Descriptions

The names of the columns are the logical names or captions that appear in the column headings when viewed in datasheet mode. Physical names that appear in design view are not recorded.

2.1.1 Folders

This table controls the folders that appear in the tree view of Soil Data Viewer. Folders provide a means to organize groups of interpretations, features, or properties choices. Grouping like things together provides the users easier navigation to the interpretation or soil property they want to process. A new folder only needs to be added if a local interpretation does not logically fit in an existing folder. Columns are:

- ◆ FolderSeq
Sequence to sort folders in the tree view.
- ◆ Parent Folder Key
Key for parent folder. Enter “ROOT” to indicate a top-level folder. To create subfolders, enter the Folder Key of the ROOT folder to which the subfolder belongs.
- ◆ Description of Folder
This description is displayed in the description tab of Soil Data Viewer.

- ◆ **Folder Name**
Name to be placed in tree view. Names should be logical groups that will imply meaning to a user for finding a specific type of interpretation or soil property choice. Current groups are based on land use, interpretation groups, chemical and physical soil properties, qualities, and other features.
- ◆ **Display Folder Flag**
Display this folder. A check in this column will display the folder in the tree view. If you uncheck the display folder flag, the contents of the folder will not be displayed. This option can be used to hide folders for groups of interpretations that are not applicable to a survey area.
- ◆ **Folder Key**
Unique name to identify folder. This is a user-entered key. The Folder Key for new records must be unique and unique for the whole country. Use state identifier with a dash as a prefix to uniquely identify the folder across the country. For example for a new folder called Range Management created for the state of Nevada should be named something like NV-RangeMgt.

2.1.2 Attributes

The Attributes table contains the list of interpretations, soil properties, and features. This table will need to be modified for any new local interpretation or soil property that is to be added to the Soil Data Viewer. Columns are:

- ◆ **Theme Label**
This is the text that appears as the name of the theme added to ArcView. Keep as concise as possible to avoid the need to resize ArcView table of contents to see the theme name.
- ◆ **Description of Node**
This description is displayed in the description tab of Soil Data Viewer. Give enough detail for the user to understand the interpretation or soil property. Avoid describing detailed criteria so that improvements in the interpretation criteria in NASIS do not require continued updating of the Soil Data Viewer rules file.
- ◆ **Parent Node Key**
Key for parent folder. Enter the Folder Key from the Folders table that the attribute is to appear in.
- ◆ **Sequence**
Sorting sequence of attributes. This sorts the attributes in the folder the attribute is linked to (Parent Node Key).

- ◆ **NodeName**
This is the text that appears in the tree view. The text should be unique and clearly identify the interpretation or property. It should be as concise as possible to limit scrolling by user to adequately view. Avoid using organizational identifiers in the interpretation name that are unknown outside of the soil program, such as MO1, MRLA23, etc. Consider using a geographic identifier where the interpretation is valid, such as state or county name.

Example: Septic Tank Absorption Fields (CA, NV)

- ◆ **Attribute Type**
Type of attribute, either interpretation or property. This controls the appearance of either the world icon for an interpretation or an arrow icon for soil properties and features in the tree view.
- ◆ **NodeKey**
Unique key entered to identify node or attribute. This key must be not only unique for a specific SDV rules file but also universally unique. When adding a new NodeKey, use the state alpha code as a prefix followed by dash, then your key to identify the attribute.

Examples: WA-Forest1, NV-range2, etc.

If more than one rules file is needed in the state to serve soil data and interpretations that vary geographically, it is recommended that you maintain one master rules file with all the local interpretations and soil property settings. Then manage different rule files by turning the appropriate display flag on or off.

- ◆ **UnitsofColumn**
Units of measurement column if applicable. **Not currently used.**
- ◆ **SQLWhere**
Where part of select statement not including key references. For a interpretation, this includes rule depth and rule name. The mrulename must match the exact wording of the local rule in the SSURGO dataset.
- ◆ **DBFColumn**
Unique name of column to be added to ArcView Access database file to join with DBF database. Limited to eight characters. This will appear as the column name in the DBF file. Should be as connotative as possible.
- ◆ **DBFType**
Data type of column to be added to ArcView Access database file to join with DBF database.

- ◆ **DefinedSize**
Defined size for character strings. Used to shorten long strings if possible. Use the shortest possible string for known longest text length. If interpretation rating classes are used for this attribute, review the longest rating class in NASIS to determine the size needed.
- ◆ **TieBreak**
Tie breaker is used for breaking ties when processing interpretations that return two results. Enter “1” to break a tie with a higher fuzzy value. Enter “-1” to break a tie with a lower fuzzy value. Enter “0” to use first occurrence or when ties are not possible. Interpretations constructed as limitations usually have the most limiting rating when fuzzy values approach 1. If a tie occurs in the report of the most restrictive feature enter “1” in the tie breaker. Interpretations constructed as soil potentials, such as source for sand, have the most limiting rating or least suitable rating when fuzzy values approach 0. If a tie occurs in the report of the least suitable, enter “-1” in the tie breaker. For soil properties where the limitation of the property is dependent upon a user question, such as drainage class, or processing methods, such as weighted average, that return single answers, enter “0” in the tie breaker.
- ◆ **TieBreakColText**
Name of column (field) in the soil data used to compare for the tie breaker. The column used must be a number, not text. For interpretations, this is the physical name of the column in the cointerp table in the soil Access database. The national interpretations are using the fuzzy value column “Interp High Representative Value.” For soil properties or features, use the physical name from the table that is to be used for the tie breaker.
- ◆ **AttrColText**
Name of column (field) in the soil data to use in displaying results. For interpretations, this is the physical name of the column in the cointerp table in the soil Access database. The national interpretations are using the column “Interp High Representative Value Class.” For soil properties or features, use the physical name from the table for the property. For example, for slope RV, the physical name is slope_r, and for organic matter RV, the physical name is om_r.
- ◆ **OptionList**
Option list available for selection. Examples are crop names for crop yields. A check in this column requires data entry in the OptionList table.

- ◆ **Rate List Visible**
Rate list available for (fastest/slowest) or (higher/lower) selection (allow user to select rating). For some horizon properties, such as calcium carbonate, in which processing is allowed to return the highest or lowest value for any horizon within defined depths, check this box. A check in this column displays the rate options in the Soil Data Viewer interface.
- ◆ **RateLow**
Lower rate combo box text for attribute; use either slowest or lower. This is the text that appears on the Soil Data Viewer interface. Check Rate List Visible column to activate Rate Low.
- ◆ **RateHigh**
Higher rate combo box text for attribute; use either fastest or higher. This is the text that appears on the Soil Data Viewer interface. Check Rate List Visible column to activate Rate High.
- ◆ **Comp Options**
Component options available for selection. Checking this column displays in the Soil Data Viewer interface the options to select for interpreting Nulls as Zero and ignoring percentages below a specified percent.
- ◆ **AllNullsNoData**
If there are all nulls and/or no data for a mapunit symbol, treat as no data, even if the set nulls to 0 component option is turned on.
- ◆ **Soil Layer Options Visible**
A check in this column results in soil layer options available for editing. This adds the layer depth selection to the Soil Data Viewer interface. Layer options allow for top depth and bottom depth entry.
- ◆ **Season Options Visible**
A check in this column results in season options available for selecting (January – December, November – February, etc.). This adds the season selection to the Soil Data Viewer interface. This option applies to flooding, ponding, and water table.
- ◆ **Display Attribute**
Display this attribute in tree view. A check in this column means that the interpretation or property is displayed in the Soil Data Viewer tree view. No check means that this interpretation or property is not displayed. This can be used to turn off and customize the tree view for interpretations or properties not appropriate for the soil survey. Rather than deleting the interpretation or property row, use the display flag to turn off interpretations or properties not to be available.

- ◆ UseAVLFile
Check this column if using a preconstructed legend for the interpretation or property.
- ◆ AVLFileName
Legend file name *.avl. This is the name of the preconstructed ArcView theme legend stored in the **c:\program files\usda\soil data viewer\arcview extensions\legend** directory.
- ◆ NasisTable
Table name in the soil MS Access database. This is used in conjunction with the SQLWhere column.
- ◆ Domainname
Domain name of field if needed to determine choice sequence. Some domains in NASIS are ordered codes. Flooding frequency is an example. Ordered codes can be used to determine the most limiting or least limiting feature. If the domains are ordered codes and your local interpretation or soil property is using the most limiting or least limiting feature fill in this column with the domain name.
- ◆ WAMultipliers
Weighted average multipliers separated by a pipe symbol "|". For example, "*bulk_density|10" has 2 multipliers, bulk density and constant 10. **Not currently used.**
- ◆ RoundNumbers
Round to this number of decimals. For example, value of 2 in RoundNumbers would round 7.34567 to 7.35 for SDV output to DBF file or reports.

2.1.3 AttrAlgorithms

The AttrAlgorithms is the table that controls the valid processing methods for any given interpretation or soil property. A record for each valid processing method for an interpretation must be entered. The processing method is linked to the interpretation with the NodeKey. Columns are:

- ◆ NodeKey
Attribute node key. This is the link to the attribute table NodeKey. Enter the node key from the attribute table for the interpretation or soil property.
- ◆ AlgorithmName
Name of algorithm (processing method). Valid processing methods are found in the ValidAlgorithms table. Enter the processing method.

- ◆ **DefaultAlgorithm**
A check indicates the default algorithm. Check only one of the processing methods as the default for each group of NodeKey.

2.1.4 OptionList

The option list table is used to display dynamically a choice list from the soil database. This is commonly used for interpretations or soil properties, such as crop yields, forest site index, and depth to restrictive layer. The option list is used to find the crop names, tree species, or type of restriction. Columns are:

- ◆ **NodeKey**
Node key to link to attribute table record.
- ◆ **WhereColumn**
Column name in the soil database used to create the option list. Examples are “cropname” to get the crop names in the soil database and “rescind” to get the kind of restriction from the component restriction table.
- ◆ **SelectStmnt**
The select statement to generate the option list from the column (WhereColumn), select distinct (unique) and order by (sort).
- ◆ **Label**
Label to place on Soil Data Viewer interface for the option list.

2.1.5 ValidAlgorithms

The valid algorithms table lists the current valid processing methods in Soil Data Viewer. **Do not edit this table.** Soil Data Viewer uses the processing methods to direct the program to the appropriate code for processing component data. Columns are:

- ◆ **AlgorithmSeq**
Sorting order of algorithms (data filter options) to place in the combo box of the Soil Data Viewer interface.
- ◆ **Name**
Algorithm (processing method) name that appears in the choice selection box on the Soil Data Viewer interface. Valid choices are Weighted Average, Most Limiting, Least Limiting, Dominant Soil, Dominant Condition, Absence/Presence, and All Components.
- ◆ **Initials**
Initials of the algorithm. The initials used when a theme is processed by appending the initials to the name in the attribute table DBFcolumn. For example, if the Septic Tank Absorption Field interpretation is run twice, once for Most Limiting and once

for Dominant Soil, the two column names in the DBF file would be septicML and septicDS.

- ◆ Descriptions
The description of the algorithm (process method).

3 Steps in adding local interpretation

Following is a description of the steps needed to add a local interpretation or soil property to the Soil Data Viewer rules file.

3.1 Suggested Approach

If more than one Soil Data Viewer rules file is needed to support different views of local interpretations or soil properties, it is suggested that a single master rules file be created for the state.

- First create a test data set by exporting a soil survey from NASIS using all your local interpretations.
- This test data set then can be used in testing the modifications of your SDVRulesV2.mdb.
- If a state plans on having SDV rules files that are customized for geographic regions in the state, consider managing a single file with all the state's local interpretations or customized soil properties and using the Attributes table Display Flag to create individual rules files for a set of surveys or field offices.

3.2 Create Working Copy of Rules File

Make a working copy of the SDVRulesV2.mdb before making changes. The Soil Data Viewer rules file is located at c:\program files\usda\soil data viewer\database. You will find other SDV*.mdb files in this directory. **Don't mess with them.**

3.3 Review Local Interpretation

The first step is to get a complete list of the interpretations included in the SSURGO dataset.

3.3.1 Interpretation Name

Get the exact wording of the interpretation name by running System Reports "Dynamic Metadata – Import Information" in the soil Access database. When a soil database is opened in Access, a Soil Report window appears. Click on the System Reports button (bottom right of window). In the System Reports selection window, use the drop down choice list to select "Dynamic Metadata – Import Information", then click on Generate Report button. This report lists the Soil Interpretations included in the soil Access database. Print the report.

3.3.2 Interpretation Rating Classes

If an ArcView legend is going to be precreated for an interpretation, you will need to know the complete list of possible rating classes. The soil Access database of a given soil survey may not contain all possible rating classes. The safe approach is to review the possible

rating classes and exact wording in NASIS. Open the local interpretation in NASIS and review and record the rating class.

3.4 Adding a New Folder

To add a new folder that appears in the tree view of the Soil Data Viewer interface, open the Folders table in SDVRulesV2.mdb. Add a new record, completing all the Columns (see Tables – Folders section 2.1.1). To turn off available folders, uncheck the Display Folder Flag for that folder. The Folder Key for new records must be unique. Use the state identifier as a prefix to the key to uniquely identify the folder across the country.

For example, a new folder called Range Management created for the state of Nevada should be named something like NV-RangeMgt.

3.5 Adding a New Interpretation

After printing the list of interpretations in the soil Access database, you are ready to add a new local interpretation to the rules file.

3.5.1 Step 1 Copy/Paste

Open the Attributes table in the SDVRulesV2.mdb. If your local interpretation or property is based on a national interpretation or is very similar in nature to an existing interpretation or property, copy and paste the existing interpretation or property, then edit the new record to reflect the new interpretation.

3.5.2 Step 2 Required Edits

After coping and pasting an existing row, begin editing the required columns for the new local interpretation or property record in the Attributes table. See Tables Attributes section 2.1.2 for details about each column.

- ❑ NodeName to uniquely identify interpretation. Use guidance in section 2.1.2.
- ❑ NodeKey to uniquely identify interpretation. Use guidance in section 2.1.2.
- ❑ SQLWhere to make the mrulename the same as the local interpretation name. Use Dynamic Metadata – Import Information report to get the exact name of the interpretation.

3.5.3 Step 3 Optional Edits

Begin editing the optional columns for the new local interpretation or property record in the Attributes table. See Tables – Attributes section 2.1.2 for details about each column.

- ❑ Theme Label should be edited if both an existing interpretation and the new interpretation are kept in the rules

file. The theme label is used to name the theme in ArcView. Each theme should be unique.

- ❑ Description of Node should be edited so that it reflects the local interpretation. A line might be added at the end of the existing description for the geographic area in which the interpretation is applicable. For example, “This interpretation is valid for Nevada” or “This interpretation is valid for Shelby County, Indiana.”
- ❑ Parent Node Key is used if the interpretation or property is being organized into another folder.
- ❑ DBF Column should be edited if both an existing interpretation and the new interpretation are kept in the rules file. The DBF Column is used to identify the column in the DBF file in ArcView. Each column should be unique.
- ❑ AVLFileName should be changed if an existing interpretation or property was copied. The AVL filename is either created now or edited after the ArcView legend is created in section 3.6.3.

3.6 Adding Valid Processing Methods

For a map unit consisting of several major and minor components, a decision on how to process the components is needed to arrive at a single answer for the map unit. The Soil Data Viewer offers several map unit component processing methods. The same component processing methods are available when Soil Data Viewer is used in a non-GIS mode to create interpretation or soil property reports. The AttrAlgorithms table is used to link valid processing methods (ValidAlgorithms) with the interpretation or soil property. Add a record for each processing method.

3.6.1 Enter Node Key

Enter the Node Key for the interpretation or soil property from the Attributes table. The Node key is the link between the Attributes table and the AttrAlgorithms table.

3.6.2 Enter Algorithm Name

Enter the processing method. Following are valid processing methods.

- ◆ **Dominant Soil**
The interpretation or soil property of the component with the largest percent composition is used to class the map unit. Where two or more components have equal percent composition, the component with the most restrictive interpretation is used.
- ◆ **Dominant Condition**
For the components in the map unit, the interpretation rating classes or soil property values are grouped into like classes or

property values. The component percent compositions are summed for each group of rating class or soil property value. The rating class or soil property with the largest percent composition is used to class the map unit. Where two or more interpretation groups have equal percent composition, the group with the most restrictive interpretation is used.

- ◆ **Most Limiting**
Out of all the selected components in the map unit, the component with the most limiting restriction for the interpretation is used.
- ◆ **Least Limiting**
Out of all the selected components in the map unit, the component with the least limiting restriction for the interpretation is used.
- ◆ **Weighted Average**
Weighted average is a method of processing numeric soil properties or productivity values (i.e., crop yields) for multiple components and arriving at a single value for the map unit. Weighted average means that each component's value contributes to the final answer, based on the component's percent composition of the map unit. Major components contribute more to the final answer than minor components. For each selected component, the numeric property or productivity value is multiplied by the decimal percent of the component percent composition. These values are summed for all selected components and represent the weighted average value for the map unit.
- ◆ **Absence/Presence**
All the components in a map unit are evaluated for the presence or absence of an interpretation or soil property. The map unit can be classed where the interpretation is present in all components, absent in all components, partially present in all components, or unknown. This processing method is used for the hydric soil map unit rating.
- ◆ **All Components**
All the components in a map unit are evaluated for the soil property or feature. This component processing method is commonly used for physical or chemical soil properties, flooding, ponding, and water table

3.6.3 Setting Default Processing Method

Check one of the processing methods as the default. The default processing method will the automatically appear as the first choice in the Soil Data Viewer interface.

3.7 Creating Option Lists

The option list table is used to display dynamically a choice list from the soil database. This is commonly used for interpretations or soil properties, such as crop yields, forest site index, and depth to restrictive layer. The option list is used to find the crop names, tree species, or type of restriction.

3.7.1 Copy and Paste an Existing Record

Copy an existing option list record that is similar to your option record. Paste and then edit.

3.7.2 Edit Node Key

Enter the Node Key from the Attributes table for the interpretation or soil property. The Node Key is the link between the Attributes table and the Option List table.

3.7.3 Edit WhereColumn

Edit the physical column name for the table in the soil database that will be used to create your option choice list. For example, cropname is the physical name in the cocopyld table.

3.7.4 Edit SelectStmt

Edit the select statement by changing the physical column name in parentheses (), the physical name of the soil Access database, and the physical column name used to order (sort) the list.

3.7.5 Edit Label

Edit the label that will appear on the Soil Data Viewer interface next to the choice selection box.

3.8 Creating a Theme Legend

If you wish to have a precreated legend with labels and colors for an interpretation or soil property, a new ArcView legend must be created, edited, and saved. The ArcView avl filename needs to be added to the AVLFileName column in the Attributes table. It is common that several interpretations can share the same legend when the interpretation rating classes are the same.

3.8.1 Create Theme in SDV

Using Soil Data Viewer, select your new interpretation or soil property. Process the theme.

3.8.2 Legend Values

In ArcView double click on the theme. ArcView Legend Editor appears. Select a unique value for the legend type and the field name of the interpretation. Only the interpretation rating classes that are in

the soil database will appear. Add any legend classes that did not appear in the soil database but are potential rating classes for the interpretation. See 3.3.2 Interpretation Rating Classes.

The value is the data that ArcView uses to class the theme. The text must be an exact match (case sensitive) for ArcView to properly class the theme. Separate two known values that are to be classed the same with a comma. For example if the interpretation has been published with a rating class of slight and Not Limiting, then the ArcView legend value should be slight, Not Limiting.

3.8.3 Legend Label

Enter the label text that will appear in the legend in ArcView. This does not need to be the same as the value. An example is when two interpretation rating classes are reclassified into a single class or when property values are grouped into a rating class. See the permeability class legend by running SDV Permeability Class and then viewing the legend in ArcView.

3.8.4 Arrange Legend

The order of legend classes can be rearranged by dragging and dropping classes.

3.8.5 Edit the Legend Colors

Double click on the symbol to change the fill, symbol, or color.

3.8.6 Saving Legend

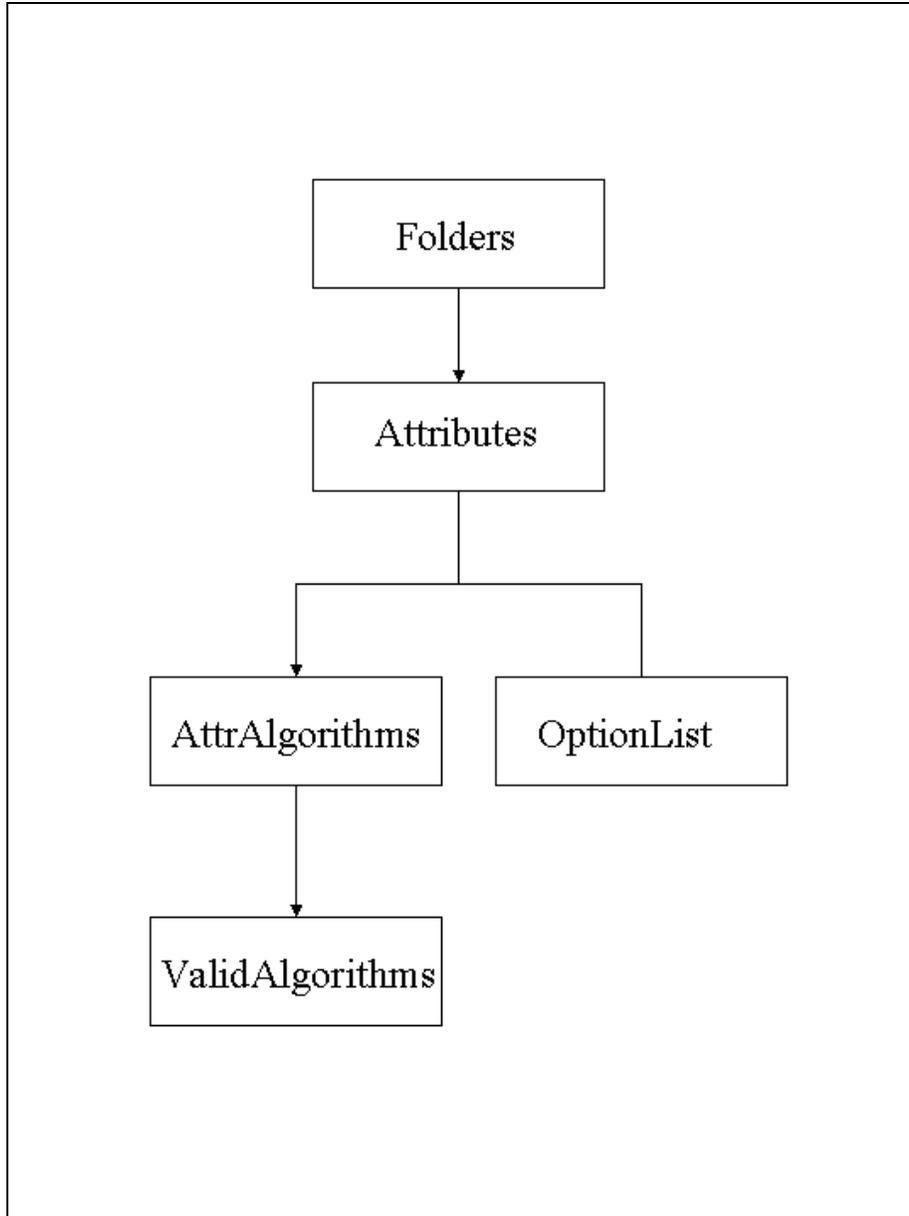
Click save button in ArcView Legend Editor. First browse to c:\program files\usda\soil data viewer\arcview extensions\legends. Then type in the legend filename. The filename.avl must be the filename used in the Attributes table AVLFileName.

3.8.7 Updating Attribute table AVLFileName

If you did not enter the AVL filename when entering a new record in Attributes table (See 2.1.2) you must go back and edit with the saved legend file name.

4 Soil Data Viewer rules file table relationships

4.1 Generalized Entity Relationship



Tables connected with arrowed lines represent a one-to-many relationship. The table with the arrow can have more than one record connected to a single record in the table it is connected to. Tables connected with only a line (no arrows) represents a one-to-one relationship. The OptionList table has only one record connected to one record in the Attributes table.

5 Deliver Custom Rules and Legends

When delivered to a customer, a custom SDV rules file must be named **SDVRulesV2.mdb** and placed in the **c:\program files\usda\soil data viewer\database** directory.

Custom Soil Data Viewer theme legends named *.avl must be placed on the customer computer in the **c:\program files\usda\soil data viewer\Arcview extensions\legends** directory.

6 Soil Data Viewer Rules File Reports

The SDVRulesV2.mdb contains two reports. These are Attribute Properties and Theme Descriptions.

The Attribute Properties report lists the Folder Name, Theme Name, Node Key, DBF Type, AVL filename, check boxes for Rate List, Comp, Nulls, Soil layer, Season, and processing methods and default method. This report should be reviewed after completion of local interpretations. The report allows for quality review to ensure that all your local interpretations have the correct settings.

The Theme Descriptions report shows the Group (Folder Name), the Name (Interpretation or soil property), and the Description. Review this report to ensure that your local interpretation or soil property has the correct description.