United States Department of Agriculture

NRCS Natural Resources Conservation Service

USDA

Analysis PC 1.0
USER'S
Guide

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Analysis PC 1.0 USER'S GUIDE

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1.0 GENERAL INFORMATION

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1.1 System Overview

Analysis PC is a stand-alone Microsoft Access database application. It is a client database application that contains a front end Graphical User Interface, an embedded pedon database, a link to a SSURGO database, and imports/exports data from/to an intermediate ArcMap database.

Analysis PC provides an interface for viewing and analyzing soil survey point and lab data in Access, Excel and ArcMap. The actual analysis_pc.mdb database file is a Microsoft Access database that contains the pedon database, administrative tables and links to other databases. The tables contained in the database pedon.mdb are embedded within the analysis_pc.mdb database. The database named templatedb.mdb is the SSURGO template file retrieved from the Soil Data Mart. The ArcMap database named arcmap_link.mdb is used to send data back and forth between Microsoft Access and ESRI ArcMap.

Analysis PC has an intuitive and easy-to-use, Graphical User Interface (GUI) based on forms. The Analysis Form uses Access-built queries to view and display selected sets which can be sent to an Excel spreadsheet or ArcMap.

Note: Analysis PC stores the pedon data in its database file (analysis_pc.mdb). The related application, Pedon PC, contains a link to the pedon database (pedon.mdb) and does not store the pedon data in its database file (pedon_pc.mdb).

1.2 Points of Contact

1.2.1 Information

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1.3 Acronyms, Abbreviations, Terms and Files

Acronym	Meaning
NASIS	National Soil Information System
NRCS	Natural Resources Conservation Service
NGDC	National Geospatial Development Center
USDA	United States Department of Agriculture
MS	Microsoft
PC	Personal Computer
GUI	Graphical User Interface
PG	Personal Geodatabase
FIPS	Federal Information Processing Standard
DSS	Digital Soil Survey
SSA	Soil Survey Area
MU	Map Unit
MUD	Map Unit Description
AM	ArcMap
FD	Feature Dataset
FC	Feature Class
DMS	Degrees Minutes Seconds
DD	Decimal Degrees
UTM	Universal Transverse Mercator
SRITB	Soil Resource Inventory Toolbox
NAD83	North American Datum 1983
NAD27	North American Datum 1927
SQL	Structured Query Language
RMS	Root Mean Square
STD	Standard Deviation
GCS	Geographic Coordinate Systems
GIS	Geographic Information System

Abbreviation	Meaning
MT645	MT = Montana and 645 = Soil Survey Area FIPS code
MT645_f	f = flags
MT645_l	l = lines
MT645_p	p = points
MT645_a	a = area
MT645_b	b = boundary
MT645_upd	upd = update layer

Terms Used	Meaning
Back-end	The database that holds all data
Front-end	The User Interface; where you enter data

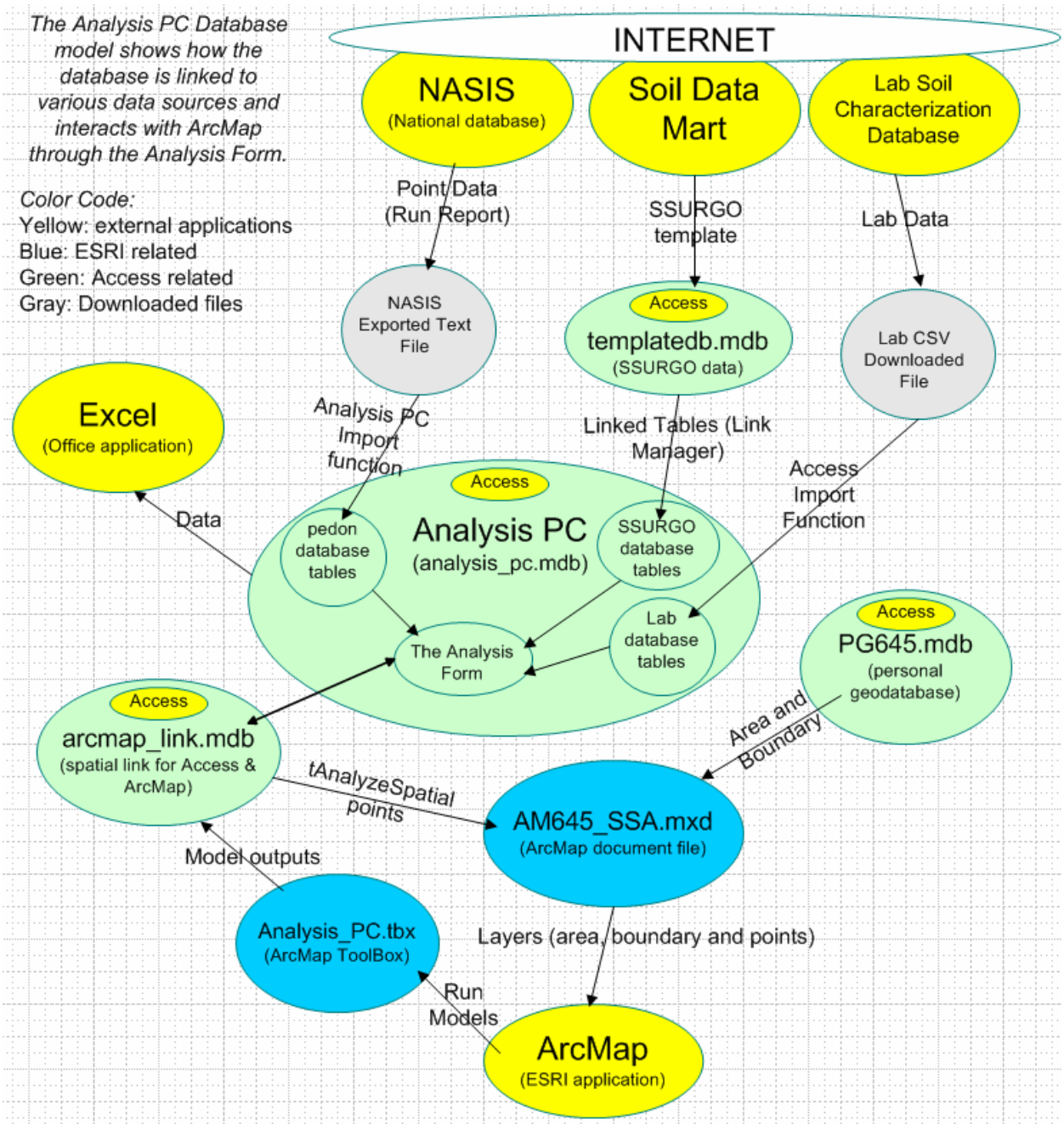
Files	Meaning
analysis_pc.mdb	The front-end user interface database
templatedb.mdb	The SSURGO database
arcmap_link.mdb	File used to communicate with ArcMap and Access
PG645.mdb	Sample personal geodatabase (Montana)
AM645_SSA.mxd	Sample ArcMap project file (Montana)
Analysis_PC.tbx	ArcToolbox file containing Arc Models

File extensions	Meaning
MDB	Microsoft DataBase (native Access file) extension
MXD	ArcMap Document file extension
TBX	ArcToolbox file extension

2.0 SYSTEM SUMMARY

2.0 SYSTEM SUMMARY

2.1 Analysis PC Database Model



The default Analysis PC Database Model contains four Access mdb files, one mxd file and one tbx file, for a total of six files. NASIS is the National Soil Information System database, the Soil Data Mart is where the SSURGO download is obtained and lab data is retrieved from the NSSC Soil Survey Lab. ArcMap is an ESRI application, and Microsoft Excel and Access are Office applications. These objects are shown in yellow

and are external to the Analysis PC application. The Microsoft Access files are displayed as green objects and the ArcMap files are shown in blue. User-specific databases may be added to this model. Notice the only way Analysis PC interacts with ArcMap is through the arcmap_link.mdb file.

The analysis_pc.mdb is the file used to launch Analysis PC. Point and spatial data are downloaded from NASIS and the Soil Data Mart into the analysis_pc.mdb and templatedb.mdb files, respectively. The templatedb.mdb file is a template downloaded from the Soil Data Mart's template databases. Some tables contained in Analysis PC are linked tables from the templatedb.mdb file (these tables will have arrows next to them in the table view in analysis_pc.mdb). Lab data may be retrieved from the NSSC Soil Survey Lab in CSV files which can be imported into Access tables. Note that the pedon database (pedon.mdb) tables are integrated within the analysis_pc.mdb file.

The Analysis PC contains an Analysis Form which communicates with ESRI ArcMap through the arcmap_link.mdb file. ArcMap uses document files that have an mxd extension. This document file must contain the soil survey area, boundary and point layers. The area and boundary layers are contained within a personal geodatabase file (such as PG645.mdb), and the point layer is contained within the arcmap_link.mdb file.

ArcMap models are run within the toolbox named Analysis_PC.tbx. The model outputs are placed within arcmap_link.mdb in order to update the Analysis Form data in Access.

Note that the PG645.mdb and AM645_SSA.mxd files are sample files from the state of Montana for the soil survey area with code 645. The name PG645.mdb represents a **P**ersonal **G**eodatabase for Montana soil survey area **645** in a Microsoft Access format (**mdb** file extension). The name AM645_SSA.mxd represents an **A**rc**M**ap document file for county **645 S**oil **S**urvey **A**rea with an **mxd** extension. Your filenames and data would be specific to your soil survey area.

2.2 Folder Structure

Currently, the default parent folder in which all files are placed is called "analysis" and resides on the C letter-designated hard drive (i.e. C:\analysis). The Analysis PC filename is "analysis_pc.mdb".

2.3 User Security Access Levels

No security exists for the Analysis PC database application. No User ID or password is necessary in order to launch the application. A user simply needs to launch the database file analysis_pc.mdb which subsequently opens Microsoft Access.

3.0 Getting Started

3.0 GETTING STARTED

3.1 System Requirements

The Analysis PC application requires the following:

1. Microsoft Windows operating system (XP, XP Tablet Edition)
2. Microsoft Office 2003: Access 2003 and Excel 2003
3. ESRI ArcGIS 9.2: ArcMap and ArcToolbox
4. Pentium 4 or higher CPU
5. 512 MB RAM
6. Desktop, Laptop or Tablet PC

3.2 Setup

Assumptions
These setup steps assume the user has Internet access, a functional web browser and NASIS access.

Summary of steps

1. Download the analysis_pc.mdb file and support files from http://www.soils.usda.gov/technical/nasis/downloads/ and place them in the folder C:\analysis.
2. Import a pedon data (txt) file from NASIS.
3. Download a SSURGO template database and data from http://soildatamart.nrcs.usda.gov/, unzip the SSURGO template database and the SSURGO data, place in C:\analysis and rename the file to “templatedb.mdb”. Import the SSURGO data .txt files into the templatedb.mdb file.
4. Create an Access personal geodatabase.
5. Add the Analysis_PC.tbx toolbox in ArcMap and check an option under **Tools >> Options** (Under the “Geoprocessing tab”, check the box next to “Overwrite the outputs of geoprocessing operations” if it is not checked).
6. Open ArcMap, create a new document and create the point layer for your ArcMap project, or run the model “_Setup for Point Layer” in the Analysis_PC toolbox.
7. Within ArcMap, add area and boundary layers to your previously created personal geodatabase. Rename your area layer to “soilpolygons”. Optionally rename your boundary layer to “boundary”.

Once you are done with the setup steps you may navigate to the location of “analysis_pc.mdb” (the default is C:\analysis) and double-click the file to launch the program.

1. Download the analysis_pc.mdb file and support files; place in C:\analysis

a. From your web browser go to the URL http://www.soils.usda.gov/technical/nasis/downloads/
Under Analysis PC, click on the link Download Analysis PC (04/16/08), and save the zip file "analysis_pc.zip" to your computer.
b. Create the folder "analysis" on your C drive, if needed.
c. Unzip the file "analysis_pc.zip" and save the extracted file "analysis_pc.mdb" and all support files to C:\analysis. The full path of the program file should be C:\analysis\analysis_pc.mdb. This is the default location and may be changed through the Setup Menu.

The files included in the "analysis_pc.zip" file package are as follows.

analysis_pc.mdb -- This is the file you use to launch Analysis PC. This is the Analysis PC program. It contains the tables from the pedon.mdb database and links to the SSURGO database, templatedb.mdb.

All examples in this user's guide are for sample data for the state of Montana, Soil Survey Area 645 - Bitterroot Valley Area. You will use data from your own soil survey area.

templatedb.mdb -- This is the SSURGO template file. The example data is for the state of Montana, Soil Survey Area 645 - Bitterroot Valley Area. Download your own file for your soil survey area. The default filename is templatedb.mdb. If you use a different name for the SSURGO template, make sure to change the name and relink the tables in the Setup Form via the "Relink Manager" button.

PG645.mdb -- This is the sample personal geodatabase. The example data is for Montana, Soil Survey Area 645 - Bitterroot Valley Area. Create your own file and name it appropriately for your soil survey area.

arcmap_link.mdb --- This file is used to communicate with ArcMap. The default filename is arcmap_link.mdb. If you change the default name, make sure to change the name in the Setup Form.

Analysis.mxd -- This is the sample ArcMap project file. Create your own file and name it appropriately for your soil survey area.

Analysis_PC.tbx -- This is the Toolbox for ArcMap that contains Models. This toolbox is opened in ArcMap and is added to the Arc Toolbox.

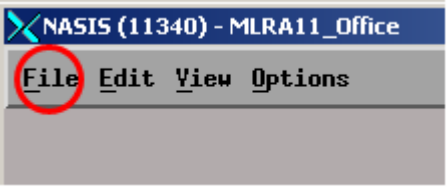
2. Import a Pedon Data File From NASIS

Summary of steps
1. Load "placeholder" site, pedon, and transect into a selected set using the National Query.
2. Load the sites, pedons *and* transects you wish to analyze into your selected set.

3. Run the National report to export the data.
4. Save this report as ASCII using the .txt extension.
5. Use Analysis PC to import the NASIS data file.

Directions on how to export pedon data from NASIS

You may access NASIS through the web (Citrix) or the Exceed client (NASIS Secure Access). Citrix is a tool that allows you to access applications on a remote server through a web browser. It provides greater security and faster performance than NASIS Secure Access. For instructions on how to use NASIS with Citrix, copy and paste the following link to your web browser: http://nasis.usda.gov/products/citrixinfo.shtml#login.

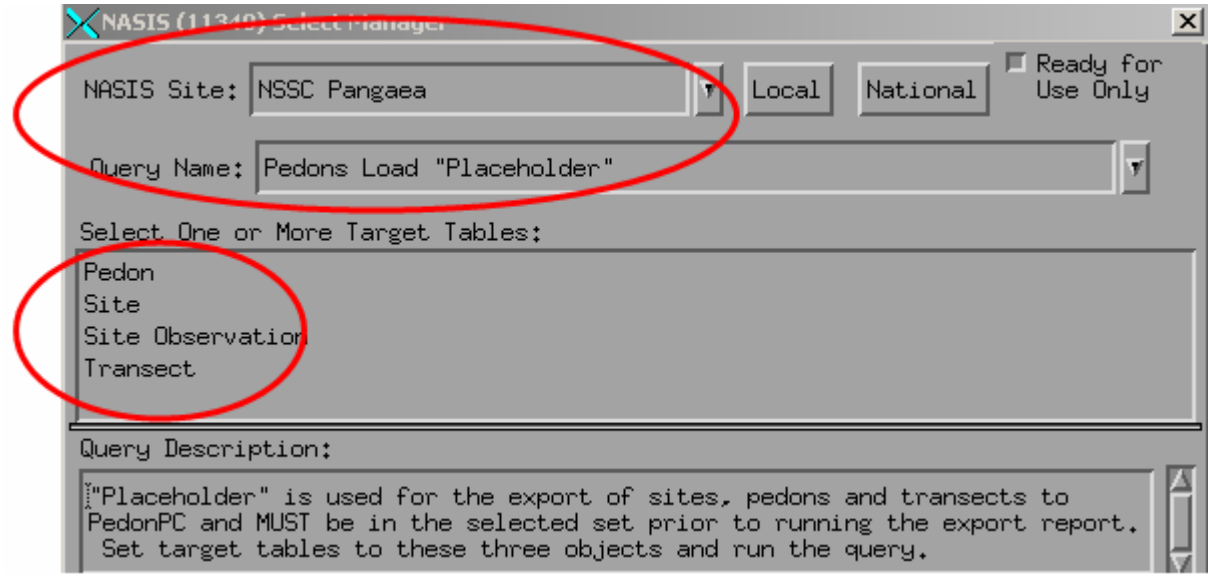


The NASIS Main Menu is shown above.

Navigate to **File >> Select** from the NASIS main menu to access the Select Manager.

The NASIS File menu options screen is shown above.

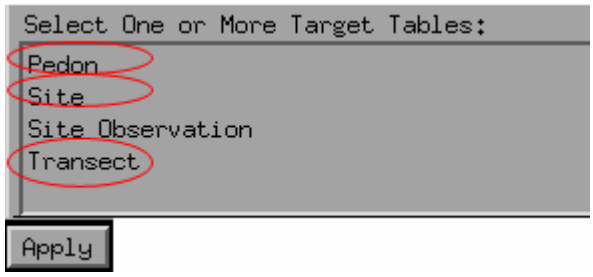
From the Select Manager, select “NSSC Pangaea” for the NASIS Site and “Pedons Load Placeholder” for the Query Name. ***If Placeholder is not loaded, the report will have an error message that “Your Selected Set is Empty”.***

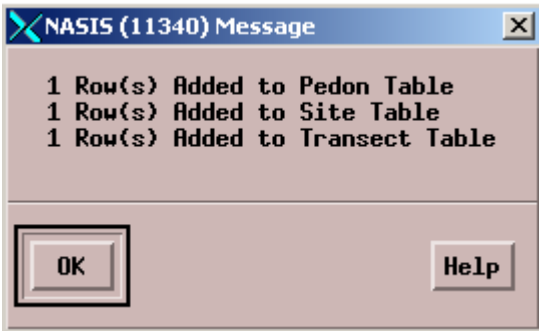


The NASIS Select Manager is shown above.

"Placeholder" is used for the export of sites, pedons and transects to Analysis PC and **must** be in the selected set prior to running the export report. Set the target tables to ***Pedon, Site and Transect***, and run the query.

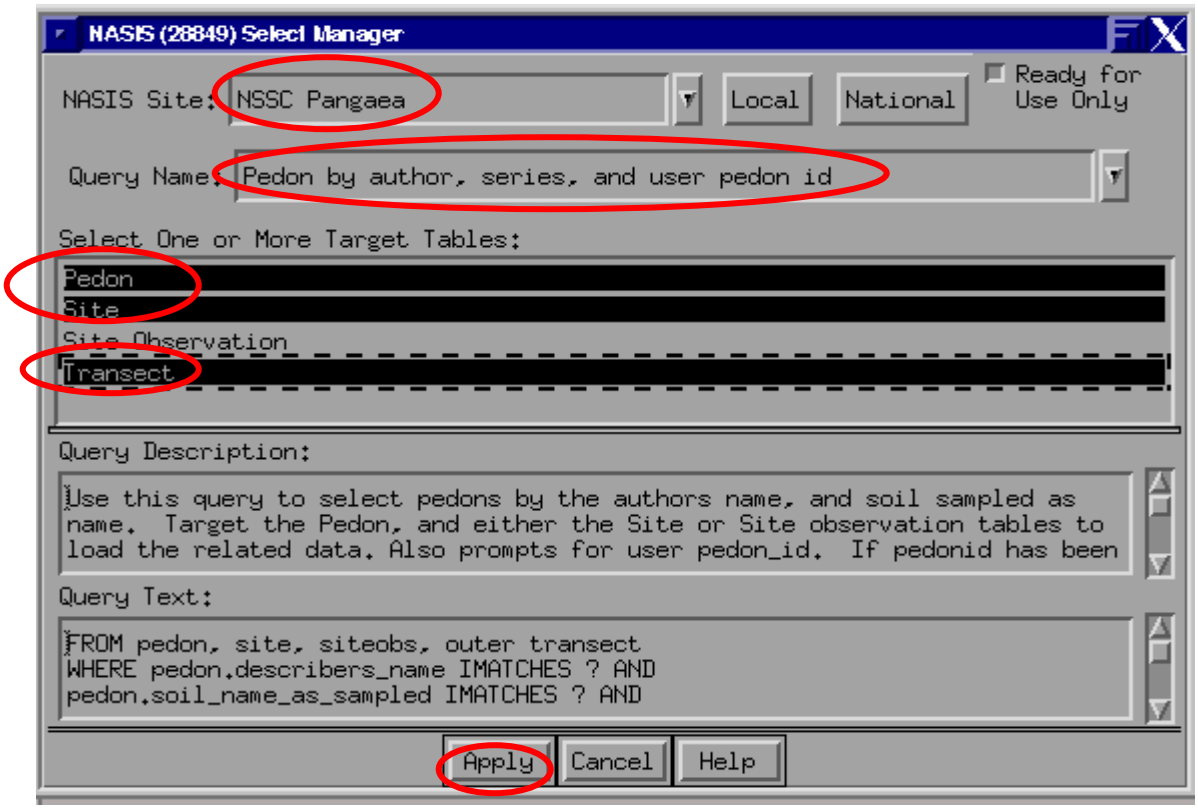
Select the three target tables, press the “Apply” button, processing will occur and an informational message will be shown. At that point, press the “OK” button.





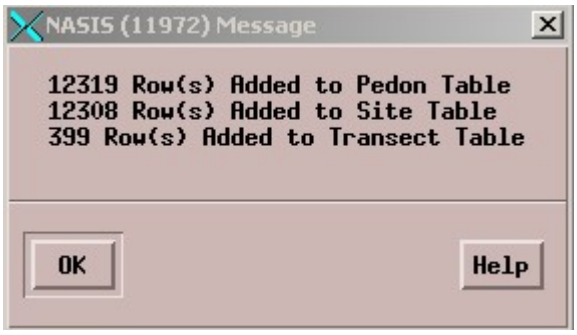
You need to select the three target tables Pedon, Site and Transect for the download process to work properly. You should see a similar message when processing ends.

The next step is to load pedon data from a report into pedon tables using the Select Manager. You may load your data by any number of queries in NASIS. The only qualification is that pedons, related sites and transects should be loaded. One report which is available is the query "Pedon by author, series and user pedon id" in the NASIS Site "NSSC Pangaea". If this report is chosen, select pedon, site and transect as the target tables as you have done before.



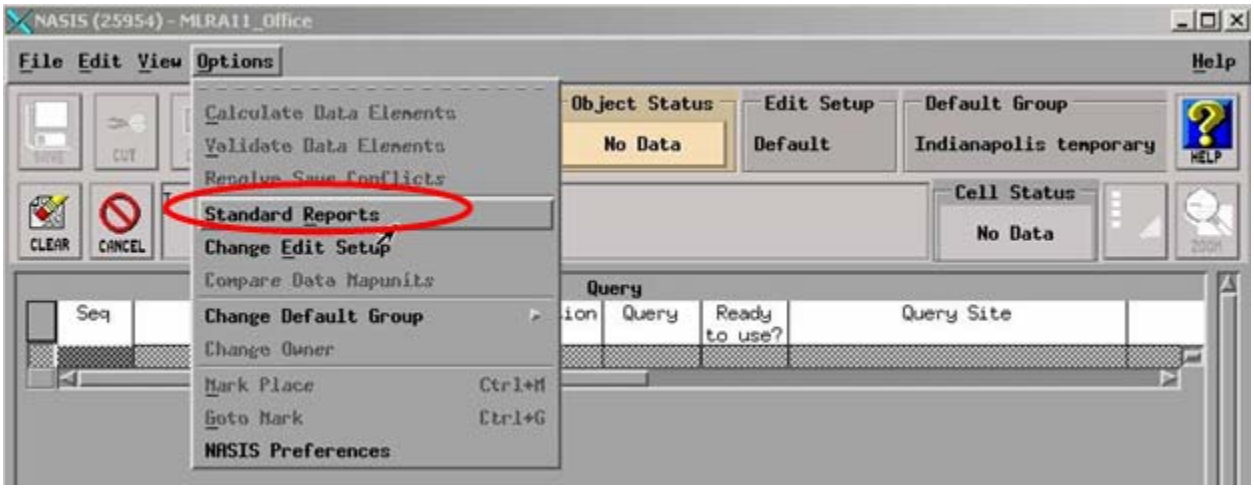
You need to select the three target tables Pedon, Site and Transect.

Press the Apply button and if you receive a parameter list, enter a wildcard (a single asterisk means return all) for “Describer’s Name” and “Soil Name As Sampled”. For the UserSiteID you may enter a wildcard for your state, for example the wildcard for the state of Montana would be *MT*. For a survey area, say 645 in Montana, you would enter “*MT645*” instead. The survey used in the sample files included with Analysis PC is MT645.



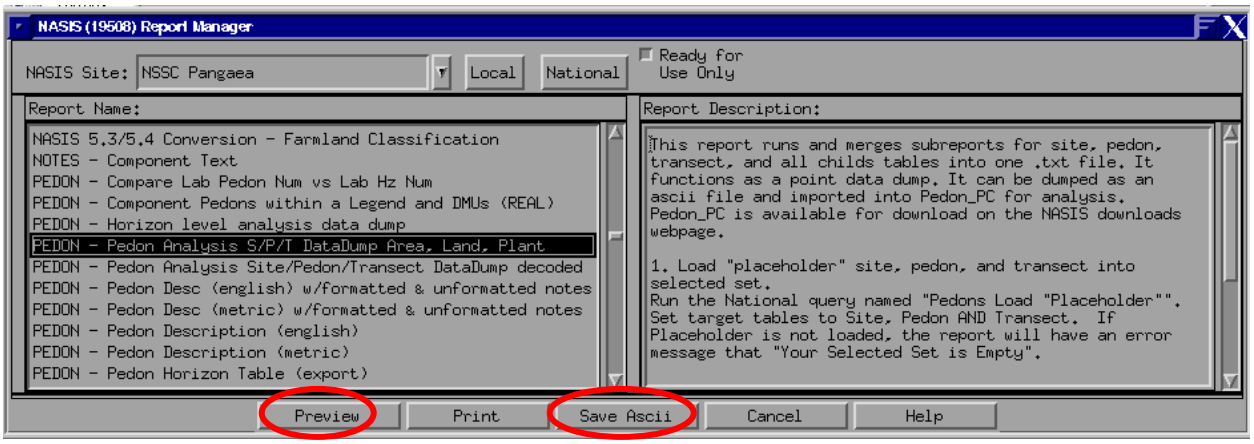
You should see a similar message when processing ends.

Once rows have been added to the pedon, site and transect tables, access the Report Manager by navigating to **Options >> Standard Reports** from the NASIS main menu. ***These first two steps dealt with the NASIS Select Manager. We are now moving to the NASIS Report Manager.***



*The NASIS Main Menu is shown above. Navigate to **Options >> Standard Reports**.*

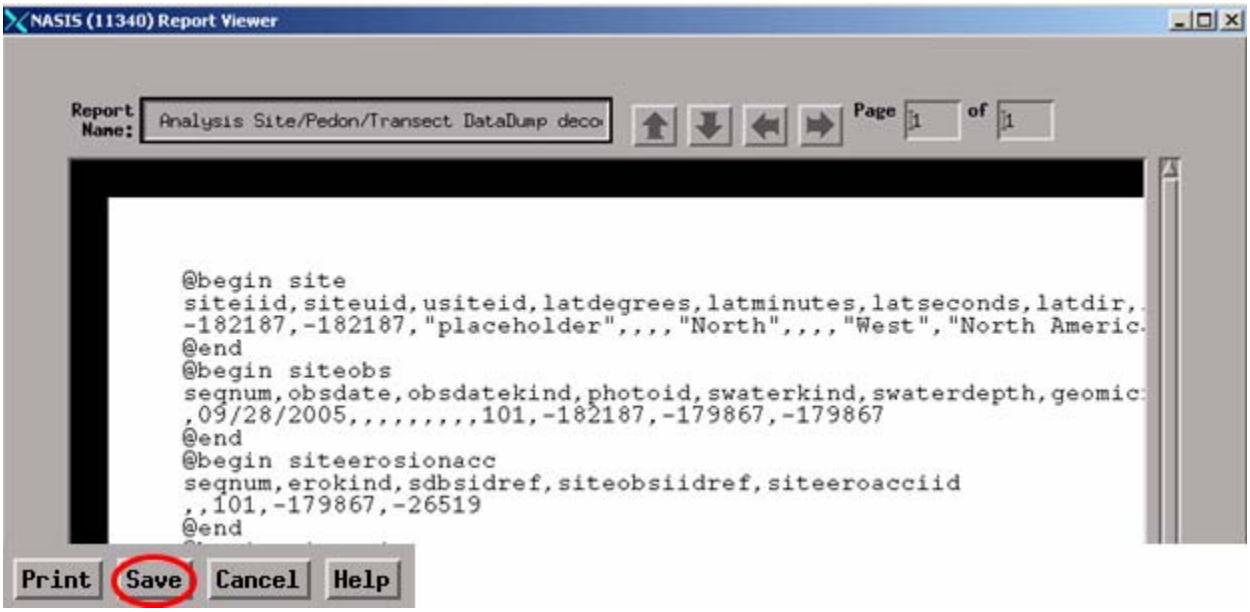
From the Report Manager, choose “NSSC Pangaea” as the NASIS Site and “PEDON - Analysis PC uncoded DataDump with support data”



The NASIS Report Manager is shown above. The report is called "PEDON - Analysis PC uncoded DataDump with support data". *Either the "Preview" or "Save Ascii" button may be chosen.*

The report runs and merges subreports for site, pedon, transect and associated child tables into one text (.txt) file. This report contains "begin" and "end" statements that function as delimiters to separate tables. It can be dumped as an ASCII file and imported into Analysis PC for analysis. The user can press the "Preview" or "Save Ascii" buttons at this point. In this example, we chose to press "Preview" so we could take a look at the results. If you press the "Save Ascii" button instead, the preview will not be shown and you will be taken straight to the NASIS File Save Manager.

After some processing the NASIS Report Viewer appears, and displays a preview of the results.



A portion of the NASIS Report Viewer is shown above with a partial view of the data.

If you chose the Preview button in the Report Manager, press the “Save” button in the Report Viewer to access the NASIS File Save Manager.

From the NASIS File Save Manager, you may Save to Workstation or Save to NASIS Server.

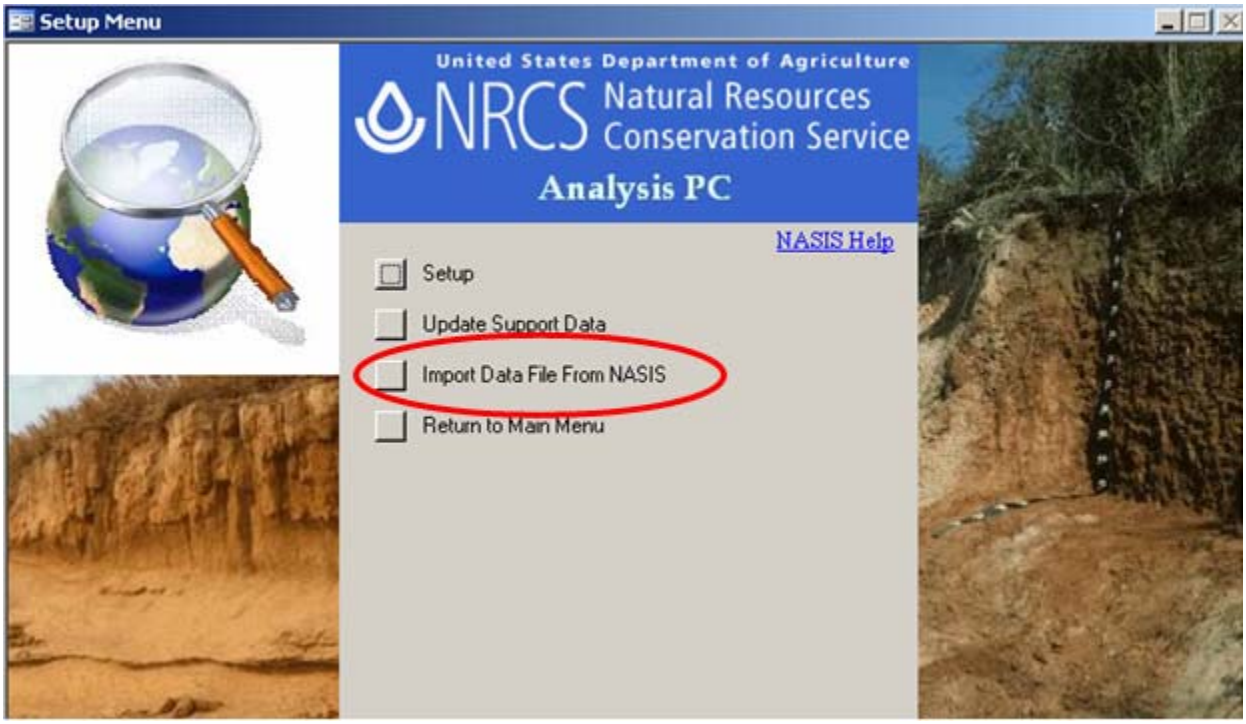
If you save to the NASIS Server, you will have to download the file as a separate step.

It is important to note that the user needs to take care in selecting data from NASIS. There are interdependencies between the site, pedon and transect objects. If a pedon is loaded and the related transect is not included in the selected set, the data for that pedon will not load into the Analysis PC application. The use of the load related commands can help avoid this situation.

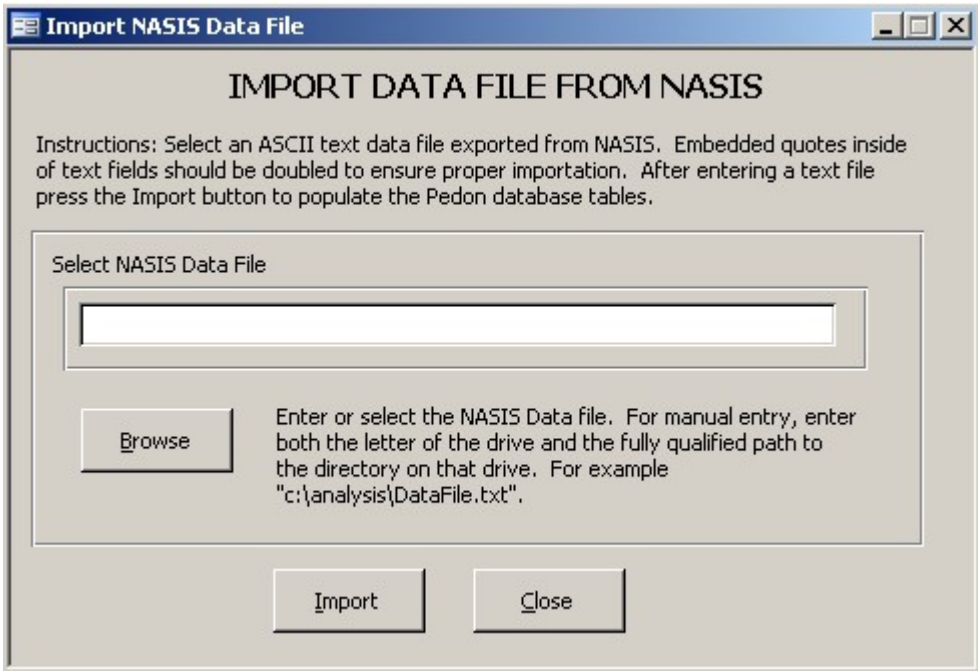
In addition to object dependencies, it is also important to note that if the field that is being queried is null in NASIS the related data often will not be loaded into the selected set. Once again, a load related command, or choosing data using different fields may be required to pull all of the desired data into the selected set.

Using Analysis PC to import the NASIS data file

The Analysis PC Setup Menu allows the user to import a data file from NASIS. Navigate to the Import Menu by selecting: **Main Menu >> Setup Menu >> Import Data File From NASIS**.



The above screenshot displays the Setup menu option Import Data File From NASIS.



The Import Data File From NASIS form is shown above.

A report data file downloaded from NASIS is used to import data into Analysis PC. This data file must be an ASCII text data file and the fields must be delimited. Embedded quotes inside of text fields must be doubled to ensure proper importation. For example, the text field:
"Sam said, **"**That's all folks**"** and then left" should be changed to:
"Sam said, **""**That's all folks**""** and then left" (notice the doubled double-quote before the word *That's* and after the word *folks*). Also, all text fields should be delimited by quotes. You should not have to worry about these details if you use the directions for exporting pedon data from NASIS.

The input file named mt645_download_02_13_08.txt is included in the "analysis_pc.zip" file package. This is the sample input file for the state of Montana, Soil Survey Area 645 - Bitterroot Valley Area.

A blank pedon database must exist before the import process begins. You can let Analysis PC clean your pedon database by deleting all pedon records. After entering a NASIS Data File manually or using the Browse button, press the Import button to populate the pedon database tables.

3. Download a SSURGO dataset and empty template database, place in C:\analysis and rename it to templatedb.mdb

a. From your web browser go to the Soil Data Mart at http://soildatamart.nrcs.usda.gov/

b. Follow the Soil Data Mart instructions for your soil survey area (geographical location) and download the SSURGO dataset and appropriate template database file. This step will need to be repeated for each soil survey area you are working with.

c. Create the folder "analysis" on your C drive, if needed.

d. Place the SSURGO template database file in C:\analysis. Rename this file to "templatedb.mdb". Unzip the SSURGO download and import the tables into the templatedb.mdb. The full path of the SSURGO file should be C:\analysis\ templatedb.mdb. This is the default location and may be changed through the Setup Menu.

So far, the following files should be in the C:\analysis folder: analysis_pc.mdb and templatedb.mdb.

Note: It is not required to download a SSURGO template database file every time a new Analysis PC version is released. You may use the same one you have been using with previous releases. You would follow this step if you wanted to start with a new templatedb.mdb database.

4. Create an Access personal geodatabase

For instructions on creating an Access personal geodatabase, copy and paste the following link to your web browser, and download and unzip the zip file.

http://www2.ngdc.wvu.edu/~smagnotta/AnalysisPC/Geodatabase/Geodatabase_Setup.zip

For job aids on creating an Access personal geodatabase, copy and paste the following links to your web browser.

http://www2.ngdc.wvu.edu/~hferguson/analysis_tools/beta/geodatabase_setup_initial_Mar4_2008.ppt

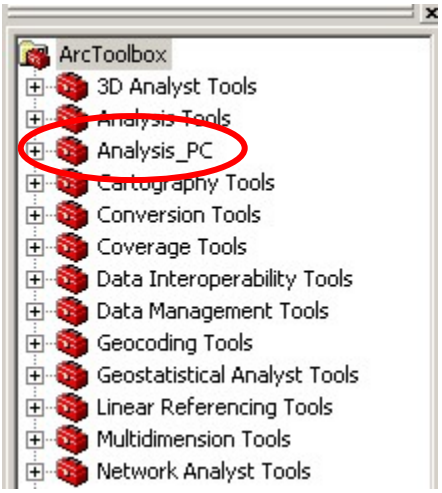
http://www2.ngdc.wvu.edu/~hferguson/analysis_tools/beta/geodatabase_setup_update_Mar4_2008.ppt

For the soils training page, please visit:
http://www.soils.usda.gov/education/training/descriptions.html#GIS_JA

5. Add the Analysis_PC.tbx toolbox in ArcMap and check an option under Tools >> Options

Open the ESRI ArcMap application and add the ArcToolbox "Analysis_PC.tbx". Open ArcToolbox by clicking on the ArcToolbox icon . After the toolbox appears, right click on **ArcToolbox >> Add Toolbox…** and browse to the toolbox file location on your system (default is C:\analysis) to load the toolbox "Analysis_PC.tbx". A detailed explanation follows.

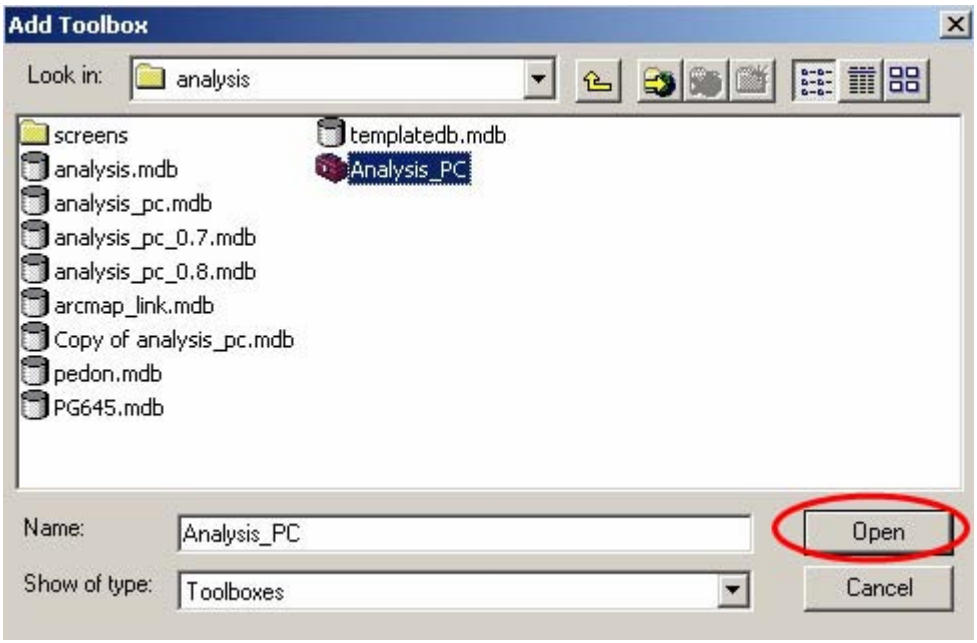
Press the following icon until it "sinks" showing the ArcToolbox pane. Right click on the "ArcToolbox" text (the root) and select "Add Toolbox…".



The ArcToolbox pane.

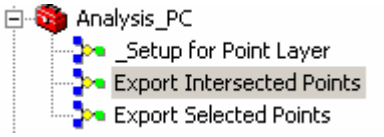
Choose Add Toolbox…

Browse to the toolbox file location on your system (default is C:\analysis) to load the toolbox “Analysis_PC.tbx”. If there is another toolbox named “Analysis Tools” ignore it because it is built into the ESRI toolbox and is not related to Analysis PC.



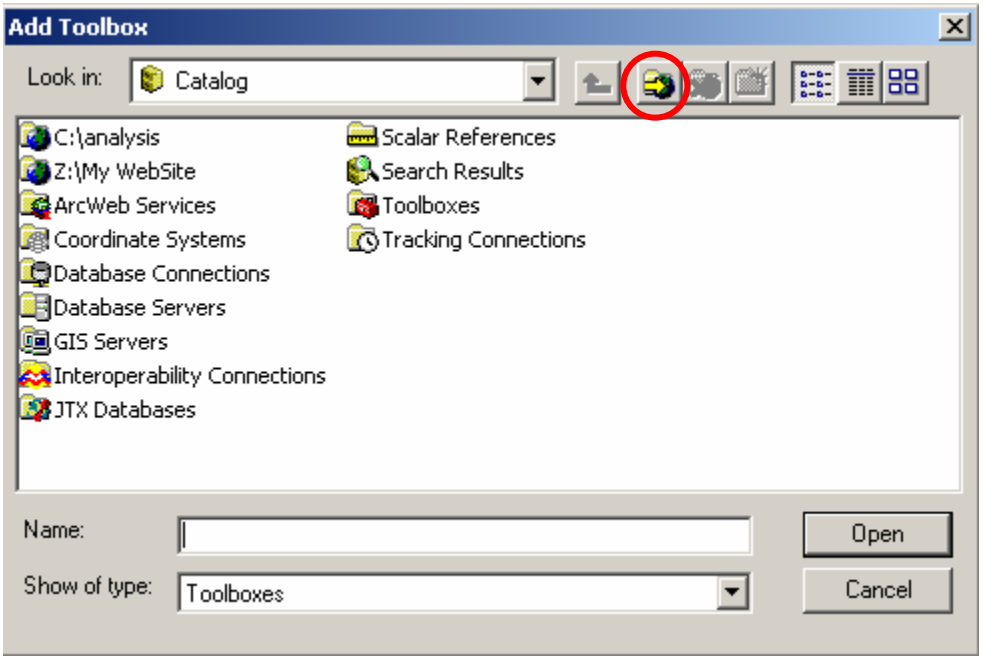
*The Add Toolbox popup is shown above. Select Analysis_PC and then press the Open button to continue. Do **not** double-click the Analysis_PC file; in this case you must select it one time with the left mouse button and then press the “Open” button.*

Upon completion you will receive the following toolbox. This toolbox contains models which you will run in order to synchronize ArcMap with Microsoft Access.

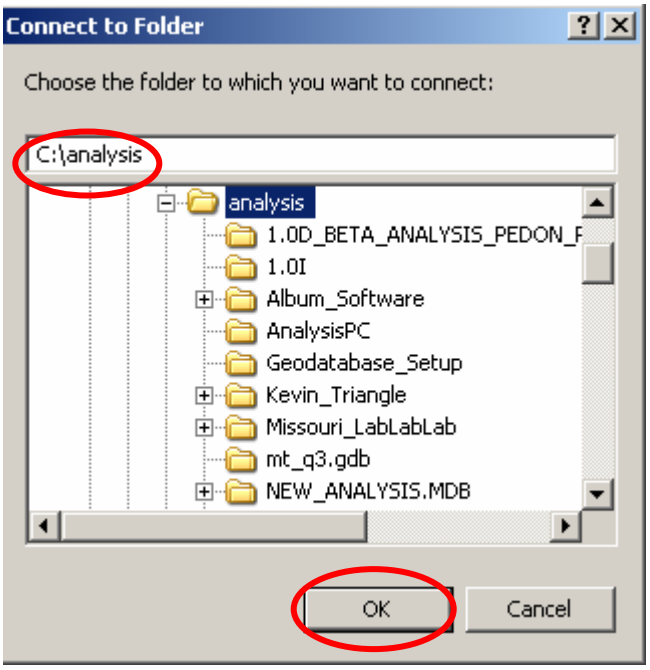


The Analysis PC Toolbox contains three models.

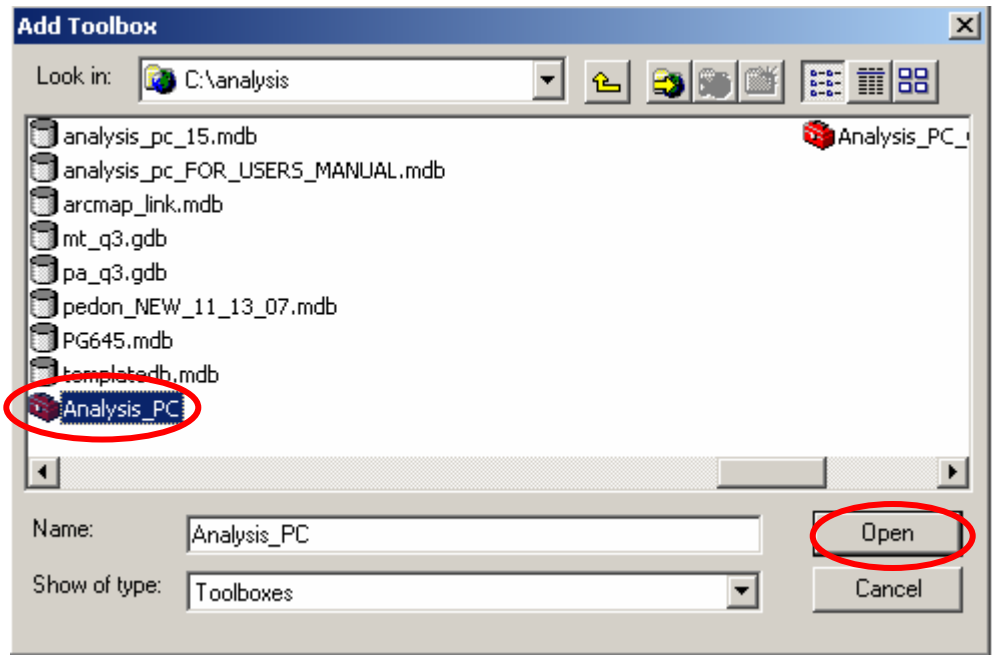
If you do not see the location of your folder in the Arc Catalog "Add Toolbox" dialog above (the "Look in" drop down list), you may have to connect to the folder in which your toolbox resides. The right yellow arrow in the dialog is the "Connect To Folder" button.



Press the Connect to Folder button to find where your toolbox resides.

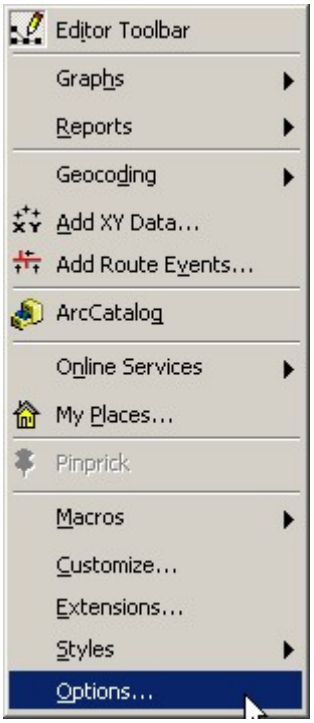


The default location is C:\analysis. Browse to the folder containing Analysis_PC.tbx and then press the OK button.

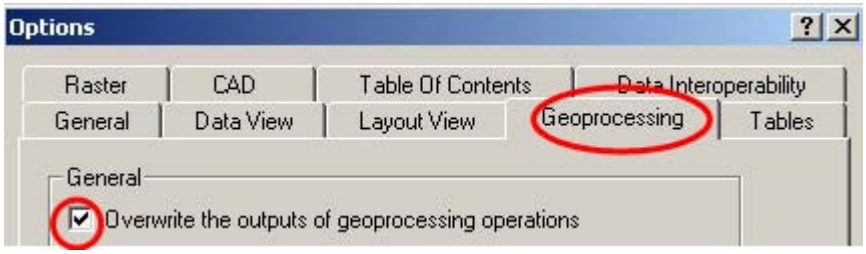


In the Add Toolbox dialog, Browse to find Analysis_PC.tbx, click on it and then press the Open button (do not double click the file).

The last part of this step is to make sure an option is checked within ArcMap. Within ArcMap navigate to **Tools >> Options**, and under the "Geoprocessing tab" check the box next to "Overwrite the outputs of geoprocessing operations" if it is not checked.



Tools>>Options…



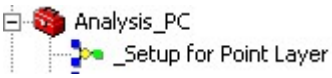
Make sure the box is checked.

6. Create a new ArcMap document with a point layer

For this step you will be creating a new ArcMap document and then a point layer.

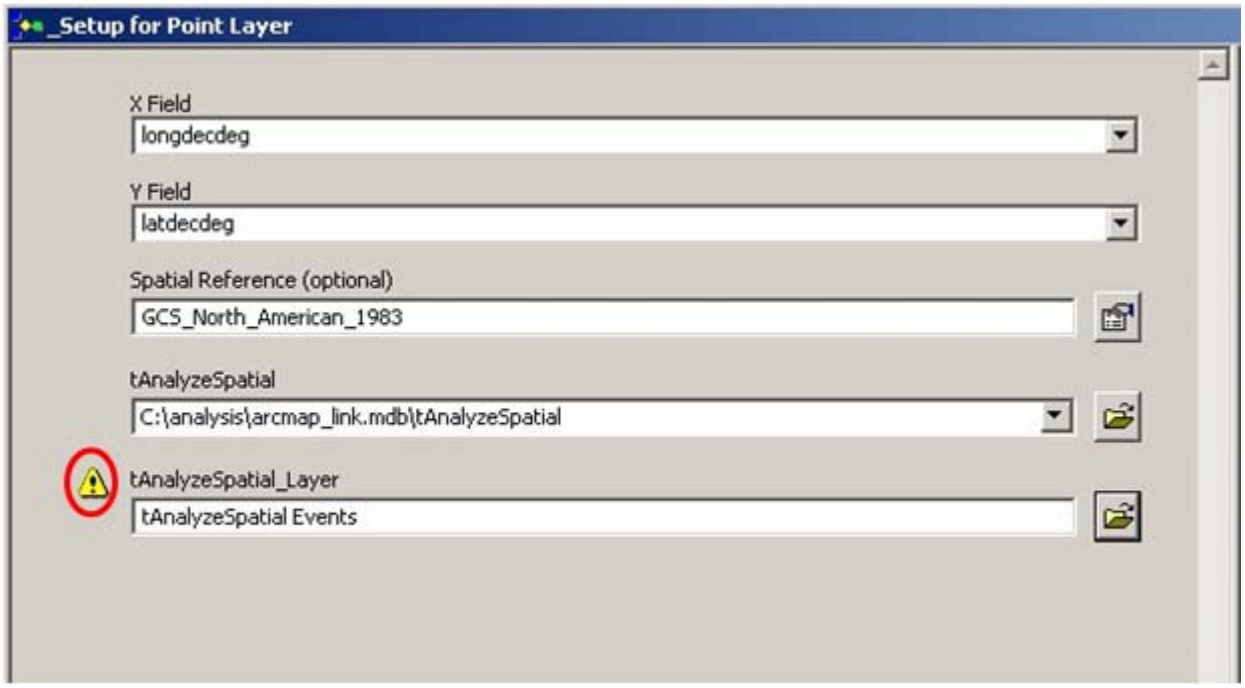
There are two ways to proceed. You can choose the manual method of creating the point layer for the ArcMap project or you can run the model "_Setup for Point Layer" (easier). This is the first model in the Analysis_PC Toolbox and starts with an underscore character (_). ***Note that this model defaults to the NAD83 projection, so you need to change the model to reflect your projection if it is not NAD83.***

Automatic Method:

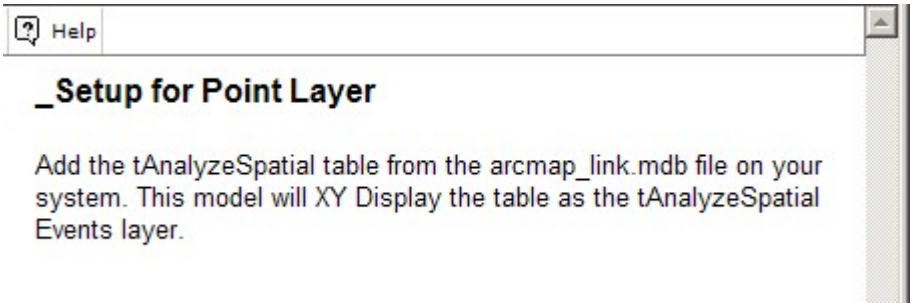


The model _Setup for Point Layer defaults to NAD83.

Double click the _Setup for Point Layer and a dialog box similar to the following will open. Do not worry if you receive a yellow warning triangle as seen highlighted below. It is a warning message conveying the file already exists and will be replaced. As long as you checked the box next to "Overwrite the outputs of geoprocessing operations" as discussed previously, no problems will occur (to check this box, within ArcMap navigate to **Tools >> Options** and then go under the "Geoprocessing tab").



The model warns you that the tAnalyzeSpatial table already exists through the yellow warning icon. This is OK because we are overwriting the old file.



This is the description for the Setup model.

After running the model another dialog box is displayed showing success.

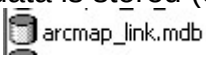
The setup model has completed execution.

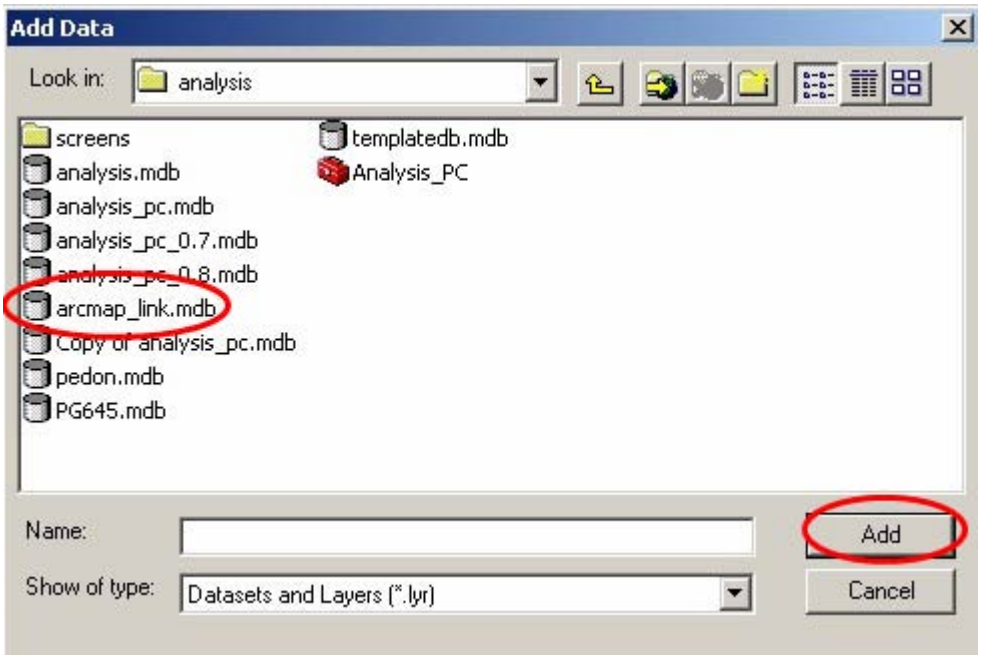
The automatic method entails running a model. That's it. The manual method is more complicated and requires a series of steps.

Manual Method:

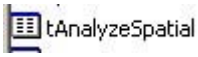
The goal is to add the “tAnalyzeSpatial” table in the “arcmap_link.mdb” database to a new project in ArcMap.

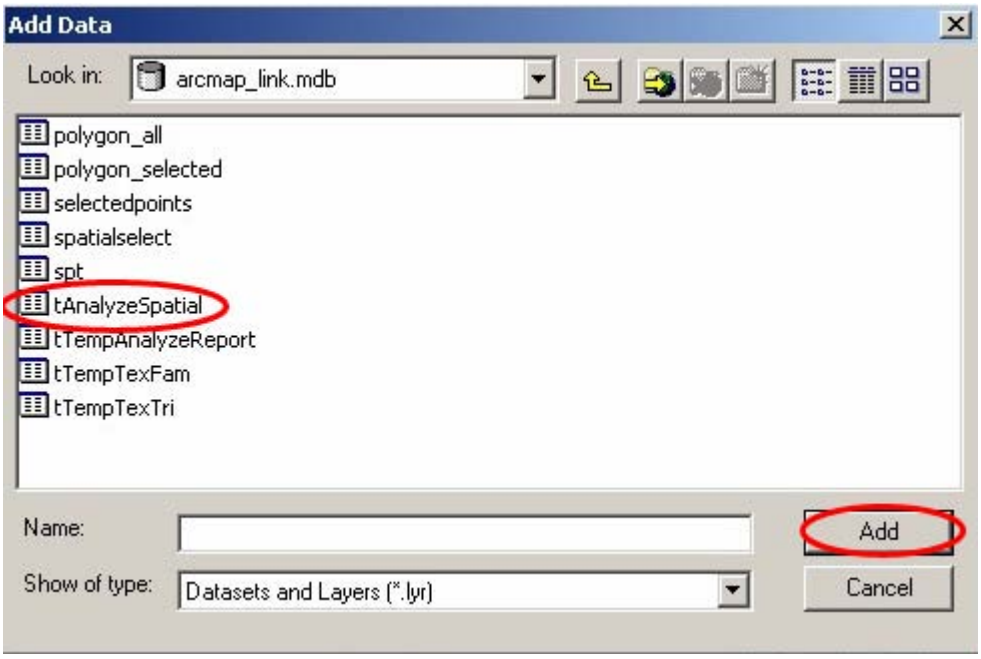
Step 1: Open ArcMap and create a new ArcMap project or open an existing one, and navigate to **File >> Add Data** or click the Add Data icon (plus sign) .

Step 2: Navigate to where your data is stored (e.g. C:\analysis). Add the “arcmap_link.mdb” geodatabase 



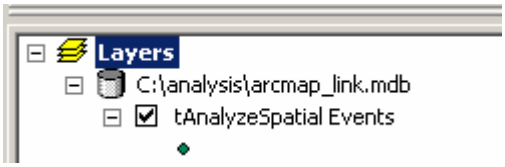
Select the spatial link database (arcmap_link.mdb) and then press the Add button.

Step 3: Then add the "tAnalyzeSpatial" table (dataset) 

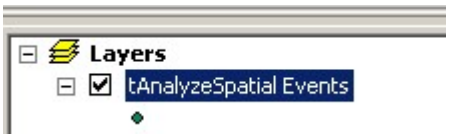


Select the tAnalyzeSpatial dataset and then press the Add button.

You should see the table on the Source and Display tabs of the Table of Contents.



The Source tab is shown above.

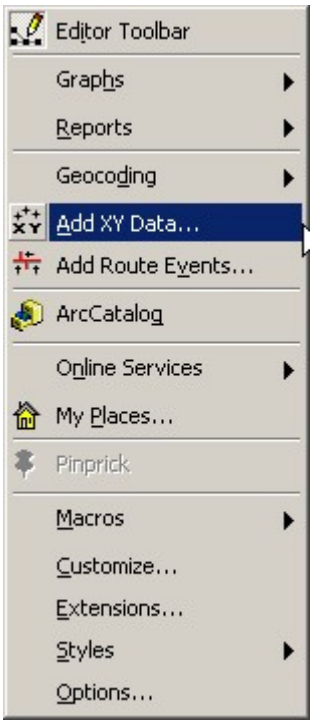


The Display tab is shown above.

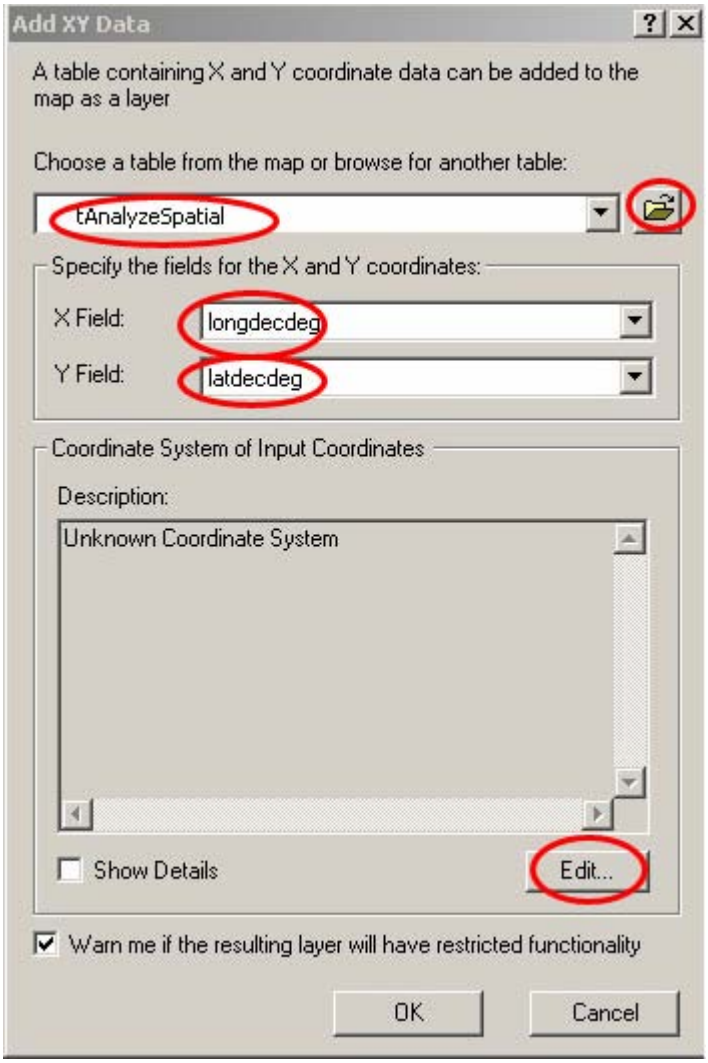
Step 4: Save your project by navigating to **File >> Save** and choose a name if needed.

Next are steps on how to “Display XY Data”

Step 5: To add the XY data into ArcMap, click “Tools” on the main menu toolbar and click on “Add XY Data”.



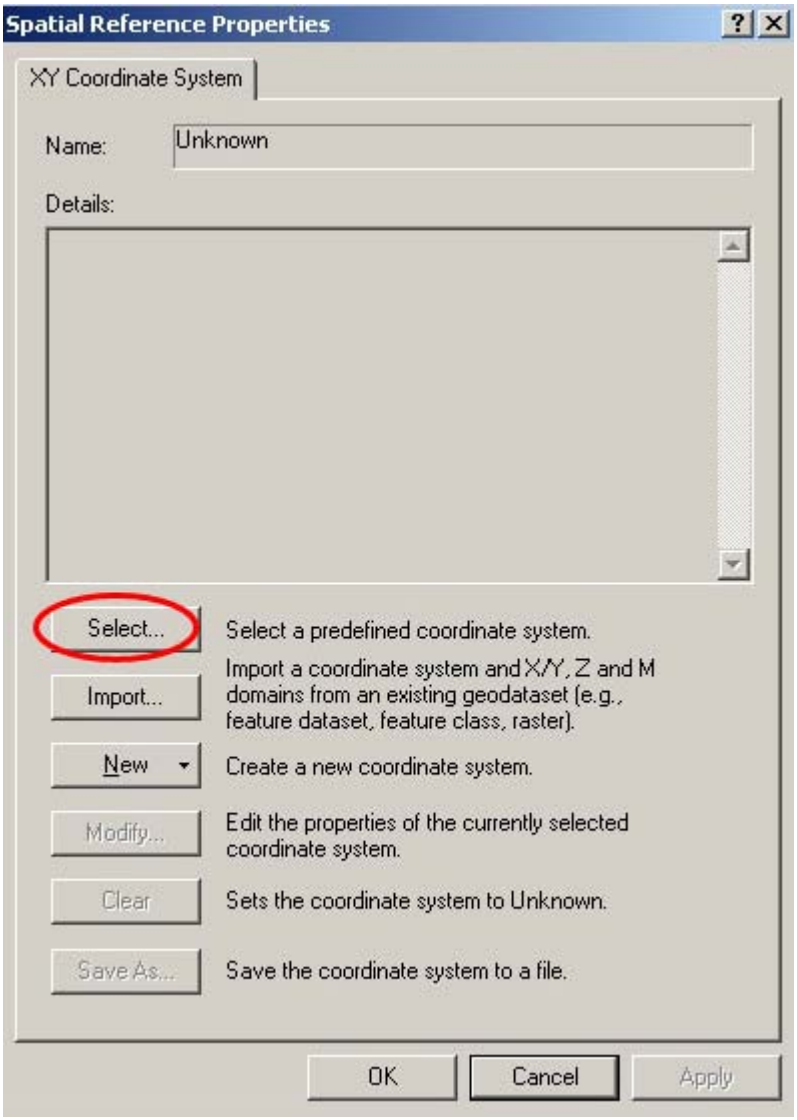
*Navigate to **Tools >> Add XY Data…***



The Add XY Data dialog box is shown above.

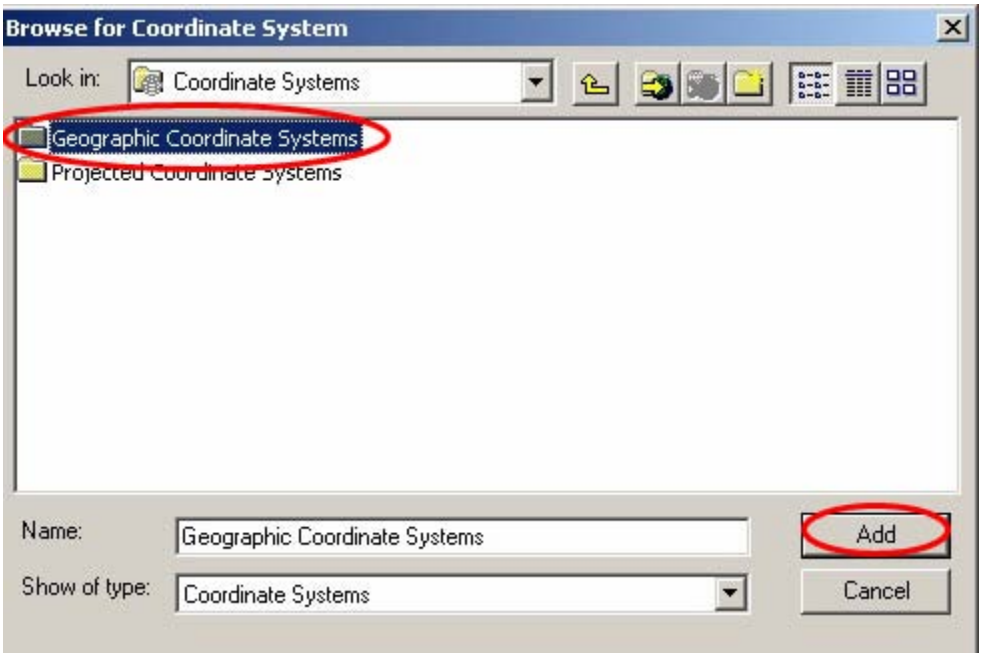
Make sure the table selected is "tAnalyzeSpatial" (if necessary click on the "Browse" button or folder icon to navigate to the table). Also, click the X Field drop down and change the value to "longdecdeg" and then click the Y Field drop down and change the value to "latdecdeg".

Step 6: Next, press the "Edit" button Edit... to give the XY data a projection. After you have pressed the "Edit" button to get to the "Spatial Reference Properties" box, press the "Select" button to select a predefined coordinate system.



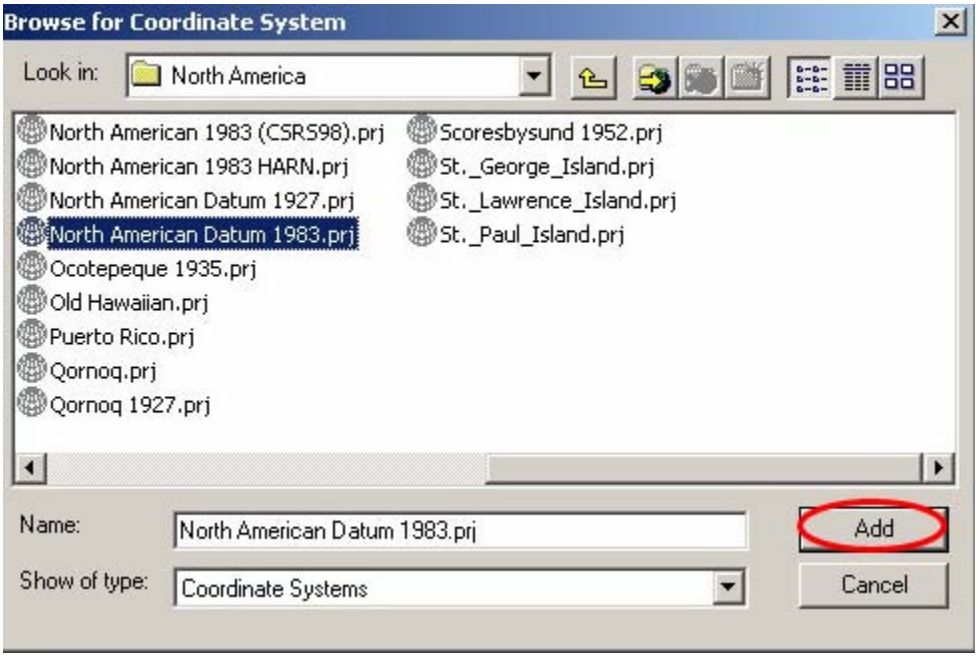
On the Spatial Reference Properties dialog press the Select… button.

Step 7: After pressing the "Select" button, the "Browse for Coordinate System" box will open and the options displayed will be "Geographic Coordinate Systems" and "Projected Coordinate Systems". For this particular application, select the "Geographic Coordinate Systems" and press the "Add" button. Afterwards, select the "North America" folder, press the "Add" button, and then select the "North American Datum 1983.prj" projection (NAD 83) and press the "Add" button. Press the "Apply" button and then the "OK" button twice and the point layer file will be added to the ArcMap project with the projection information.



On the Browse for Coordinate System dialog first select Geographic Coordinate Systems and then the Add button.

Within the Geographic Coordinate Systems folder, select the North America folder and then the Add button.



Finally select the North American Datum 1983.prj projection and then the Add button.

After adding the point layer, you may see a map of points in the map pane (if you have data). You can add more tables (layers) to your ArcMap project by following the above process.

7. Within ArcMap, add the area and boundary layers from your personal geodatabase. Rename your area layer to "soilpolygons". Optionally rename your boundary layer to "boundary".

Follow the procedure in the previous step to add the area and boundary layers from your personal geodatabase. The sample geodatabase contained within the Analysis PC is called PG645.mdb. The letters "PG" represent "Personal Geodatabase", the number "645" is a Montana Soil Survey Area FIPS code and the mdb extension is an Access database file extension. See the table below for an explanation of the sample geodatabase (PG645.mdb) tables. The area and boundary tables are highlighted in bold in the table below.

Abbreviation	Meaning
MT645	MT = Montana and 645 = Soil Survey Area FIPS code
MT645_f	f = flags
MT645_l	l = lines
MT645_p	p = points
MT645_a	**a = area**
MT645_b	**b = boundary**
MT645_upd	upd = update layer

The various table names contained within the PG645.mdb database all have the MT645 prefix, an underscore and then an abbreviation for what they contain.

The area and boundary tables are MT645_a and MT_645_b in this case. These two tables need to be added to the ArcMap project.

In order to show the area, you need to add your “ST###_a” polygon layer. The polygon layer naming convention is:

ST###_a

where ST = State FIPS code, ### = Soil Survey Area FIPS code and a = area.

An example name is “MT645_a” for the state of Montana and “645” for the Soil Survey Area 645 - Bitterroot Valley Area.

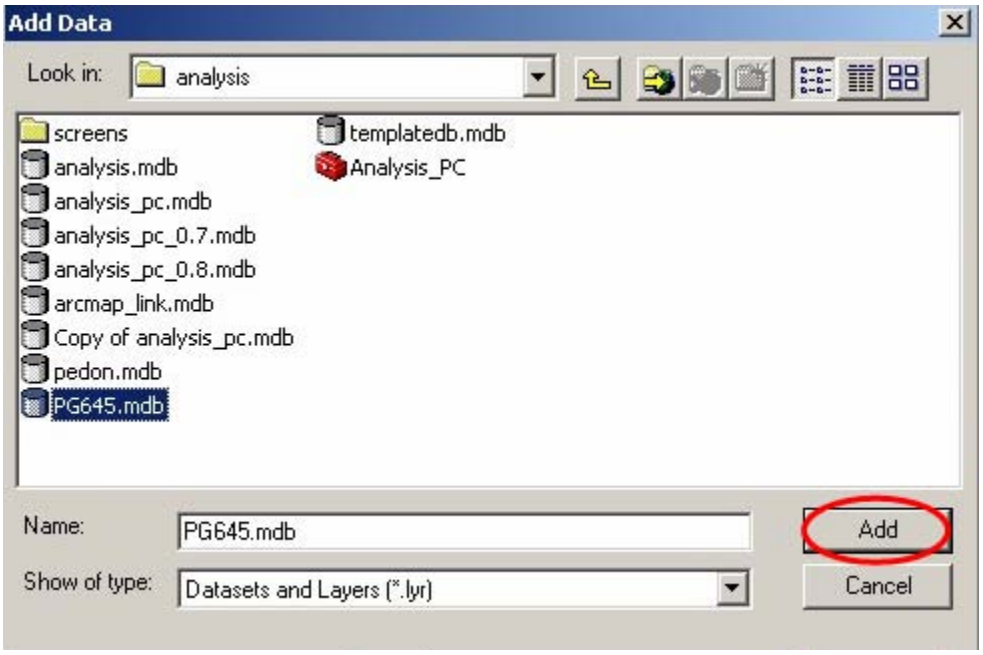
In order to show the boundary, you need to add your “ST###_b” polygon layer. The polygon layer naming convention is:

ST###_b

where ST = State FIPS code, ### = Soil Survey Area FIPS code and b = boundary.

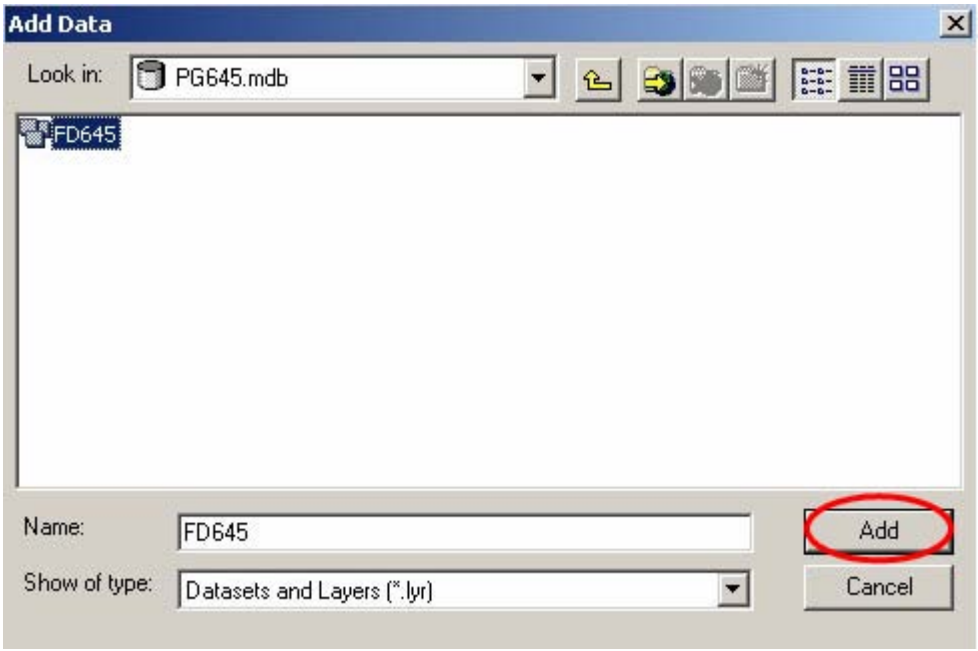
An example name is “MT645_b” for the state of Montana and “645” for the Soil Survey Area 645 - Bitterroot Valley Area.

Navigate to **File >> Add Data** or click the Add Data icon (plus sign) . Next, navigate to where your data is stored (e.g. C:\analysis). Add your personal geodatabase file (in our case it is PG645.mdb).



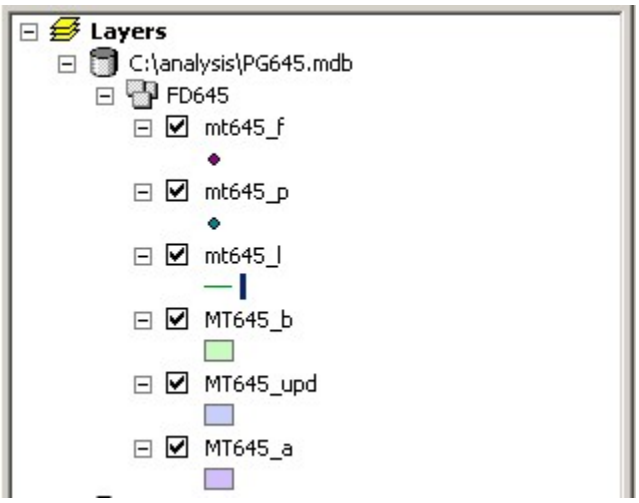
Select the personal geodatabase (PG645.mdb) and then the Add button.

Next select the dataset (in our case it is FD645).



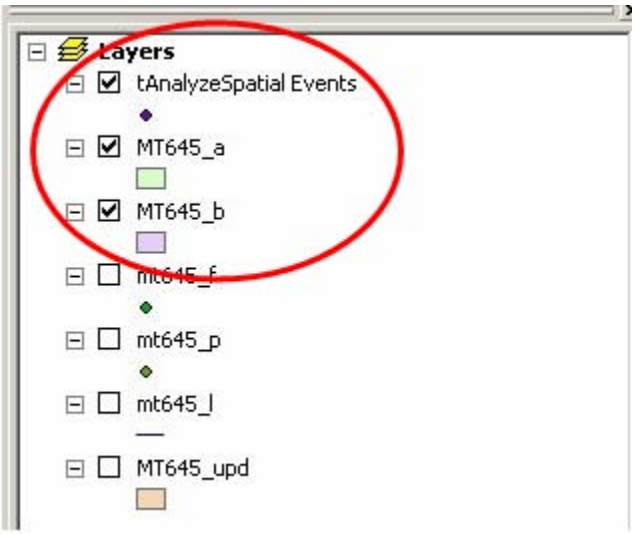
After selecting the geodatabase, select the dataset and then the Add button.

Note that you may add as many layers as you want. The area and boundary layers are the only required ones. Below is a snapshot of the contents of the PG645.mdb file and FD645 feature dataset. It contains flags, points, lines, boundary, update and area layers.



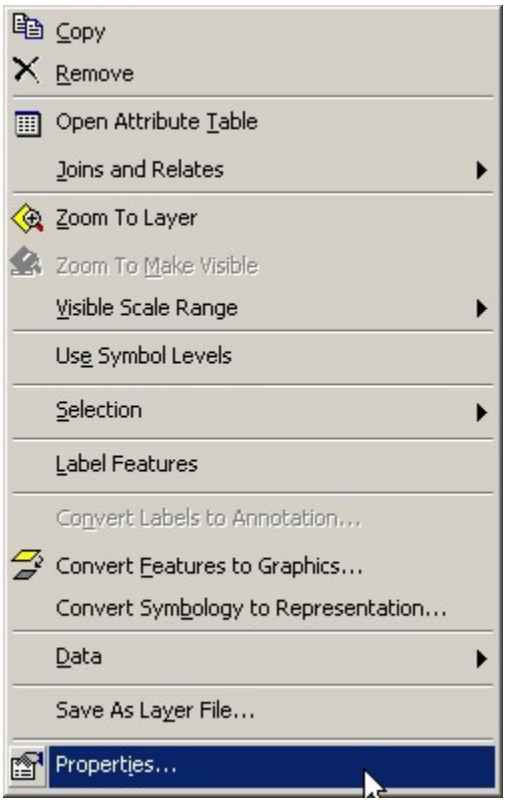
There are many layers in the PG645.mdb dataset; we only need area and boundary.

In our case, we do not need to show all these layers so we uncheck (hide) the layers not needed or just remove them. The necessary layering is the tAnalyzeSpatial Events layer (created in the previous step) on top of the area layer on top of the boundary layer as seen below (tAnalyzeSpatial >> soilpolygons (MT645_a) >> boundary (MT645_b).



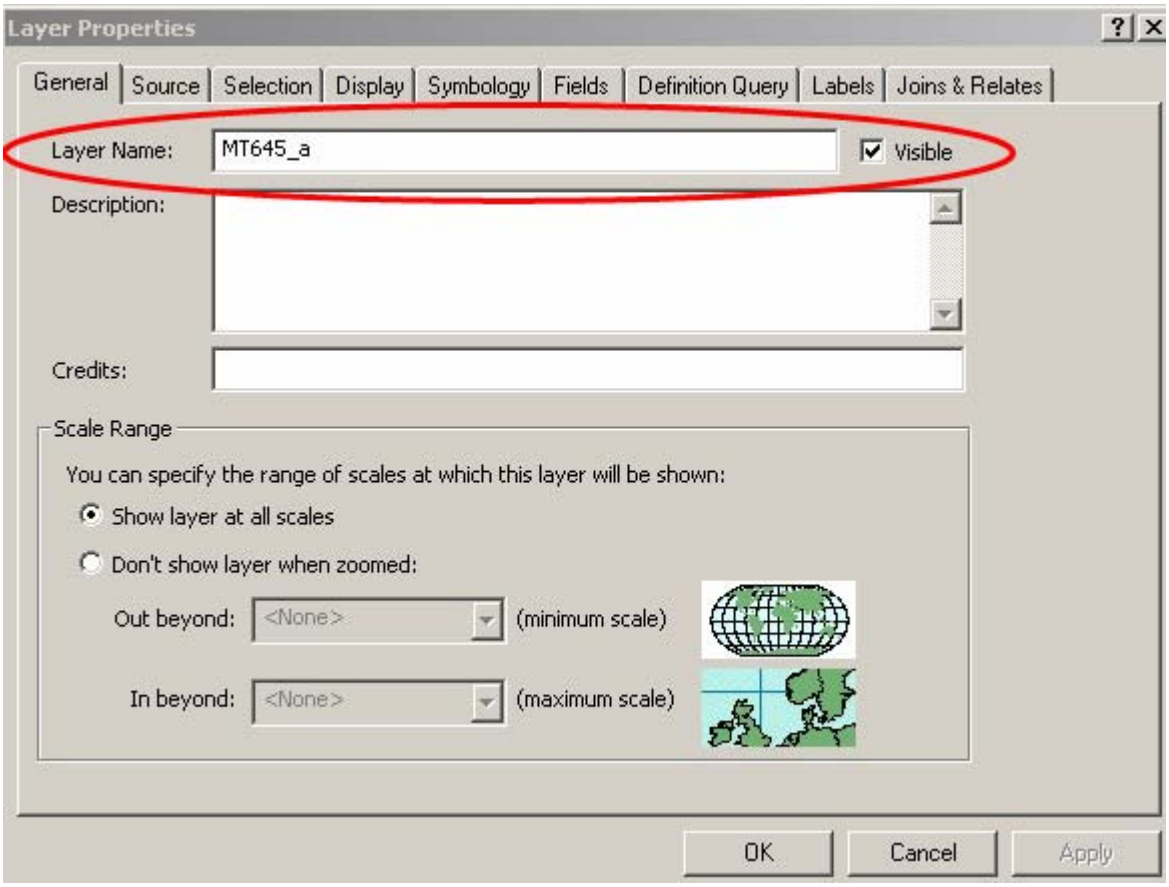
Only three layers are needed: points (tAnalyzeSpatial), area and boundary.

Right click on your area table (in our case it is MT645_a) and then click on "Properties…" in the context menu as shown below.



Right click on your area table and then choose "Properties…"

The next step is to change the Layer Name in the Layer Properties form under the General tab. The area layer name needs changed to "soilpolygons" so the "Export Intersected Points Model" works properly.

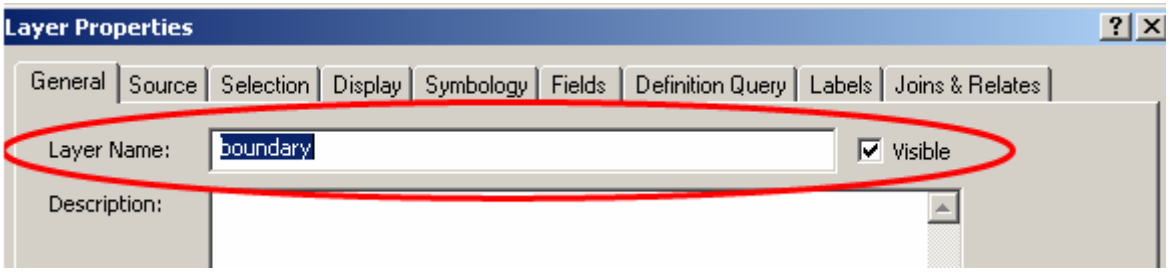


You should rename your area layer; ***this is highly recommended****.*

Rename the area layer (in our case MT645_a) to “soilpolygons” (all one word, all lowercase letters).

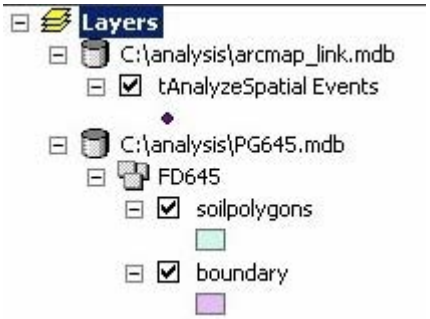
The area layer name needs changed to soilpolygons for the “Export Intersected Points Model”.

You may also rename the boundary layer (in our case MT645_b) to “boundary” (all one word, all lowercase letters), but this is not a requirement.



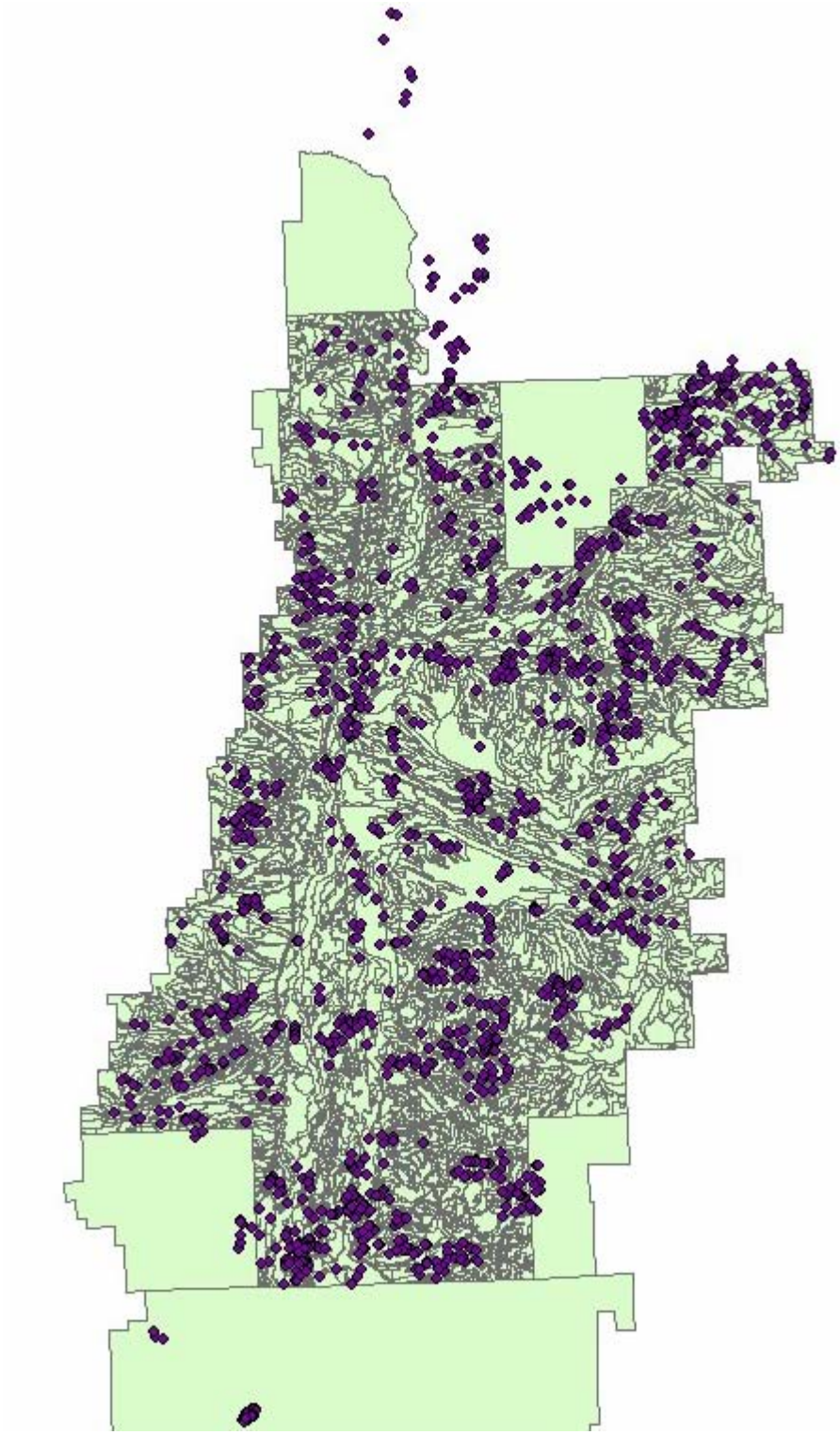
The boundary (in our case MT645_b) layer name can be changed to “boundary” for convenience, but is not required.

The final layer box displaying all the files and tables needed is displayed below.



The Layers pane displaying all the data source names and locations is shown above.

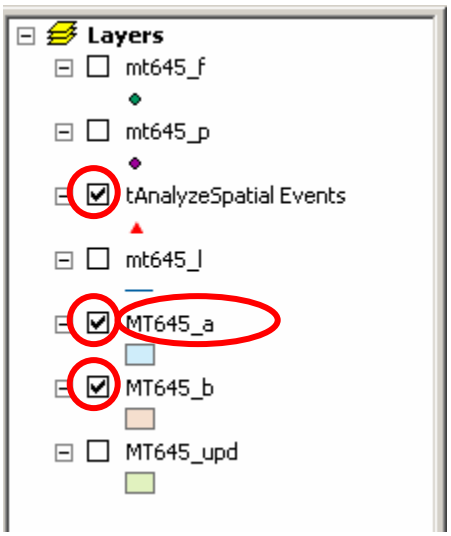
A sample map is shown below with the point, area and boundary layers.



Point, area and boundary layers make up this sample map.

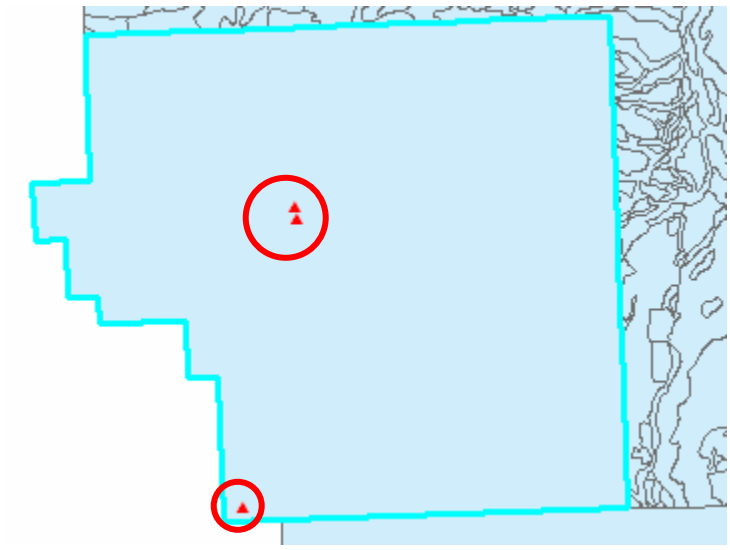
The Area Layer Name

Although it is recommended to change your area layer name to “soilpolygons”, it is not a requirement. The screenshot below shows the current layers (points, area and boundary layers are shown) in our ArcMap project. Notice there are many layers but only three are being shown, represented by the checked boxes.



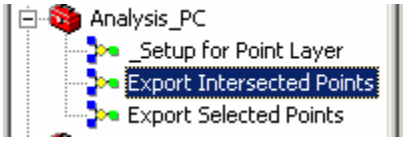
*The area name was **not** changed to soilpolygons.*

Also notice we have not changed the area layer name to “soilpolygons”; it is still set to “MT645_a”. Next, in the map, we select one polygon containing three points.



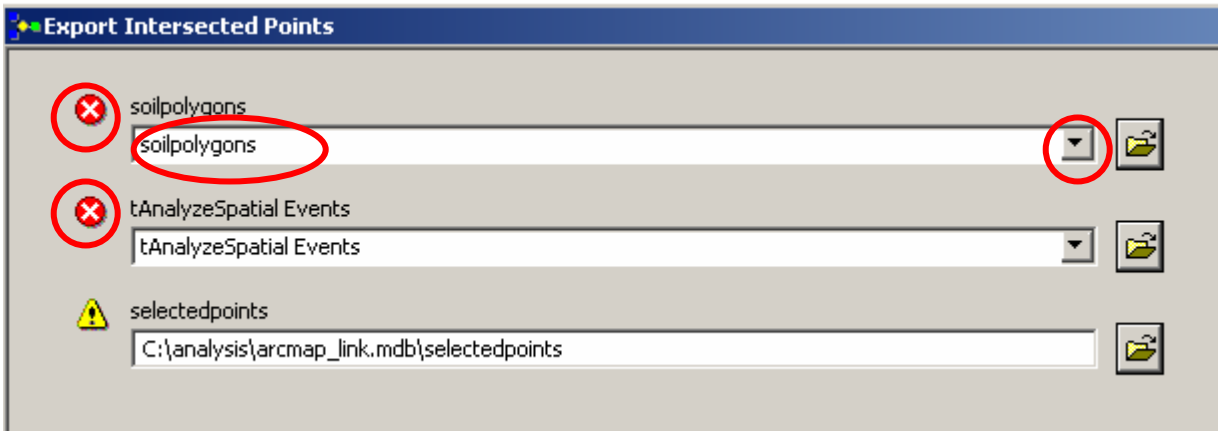
One polygon is selected, containing three points.

Next, we double-click the “Export Intersected Points” model to run it.



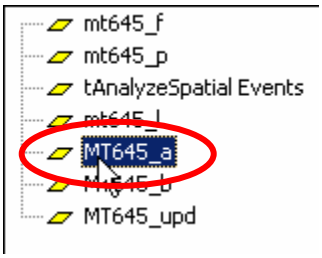
The "Export Intersected Points" model is chosen.

The Export Intersected Points run form is shown with two errors, represented by a white X inside a red circle. The program cannot find the "soilpolygon" layer in the current ArcMap project.



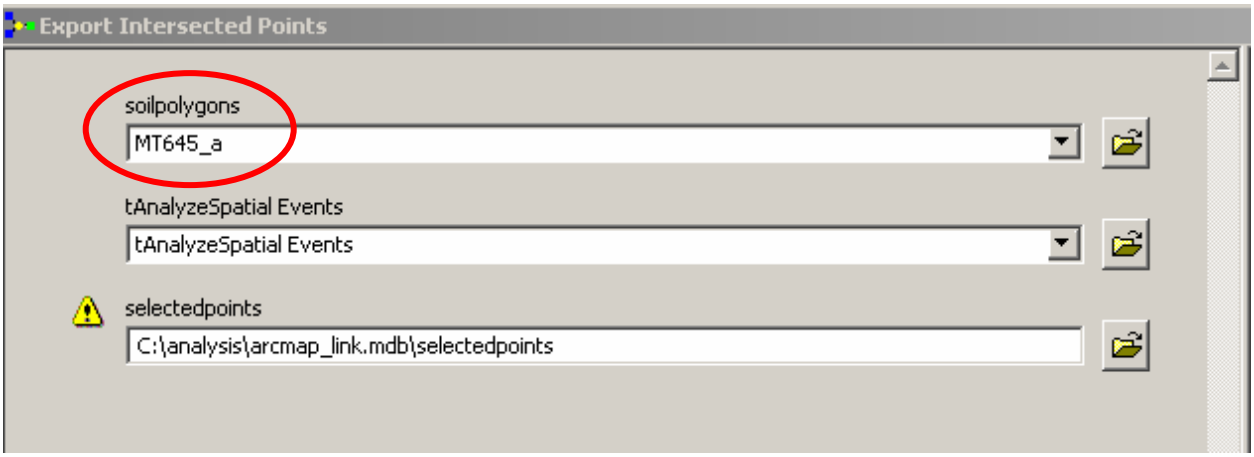
Errors exist because the area name was not changed. Use the soilpolygons drop down list (press the down arrow shown highlighted above), to display the currently available layers.

The solution is to use the drop down list box for soilpolygons, and select the current area layer. This area layer name is MT645_a so we select that one.



The model defaults to the area layer name "soilpolygons". Because of this, the user needs to point to the proper area layer name using the drop down list box.

By doing so, the run screen errors are eliminated and the model can run.



The errors are eliminated once we point to the current area layer name in the ArcMap project.

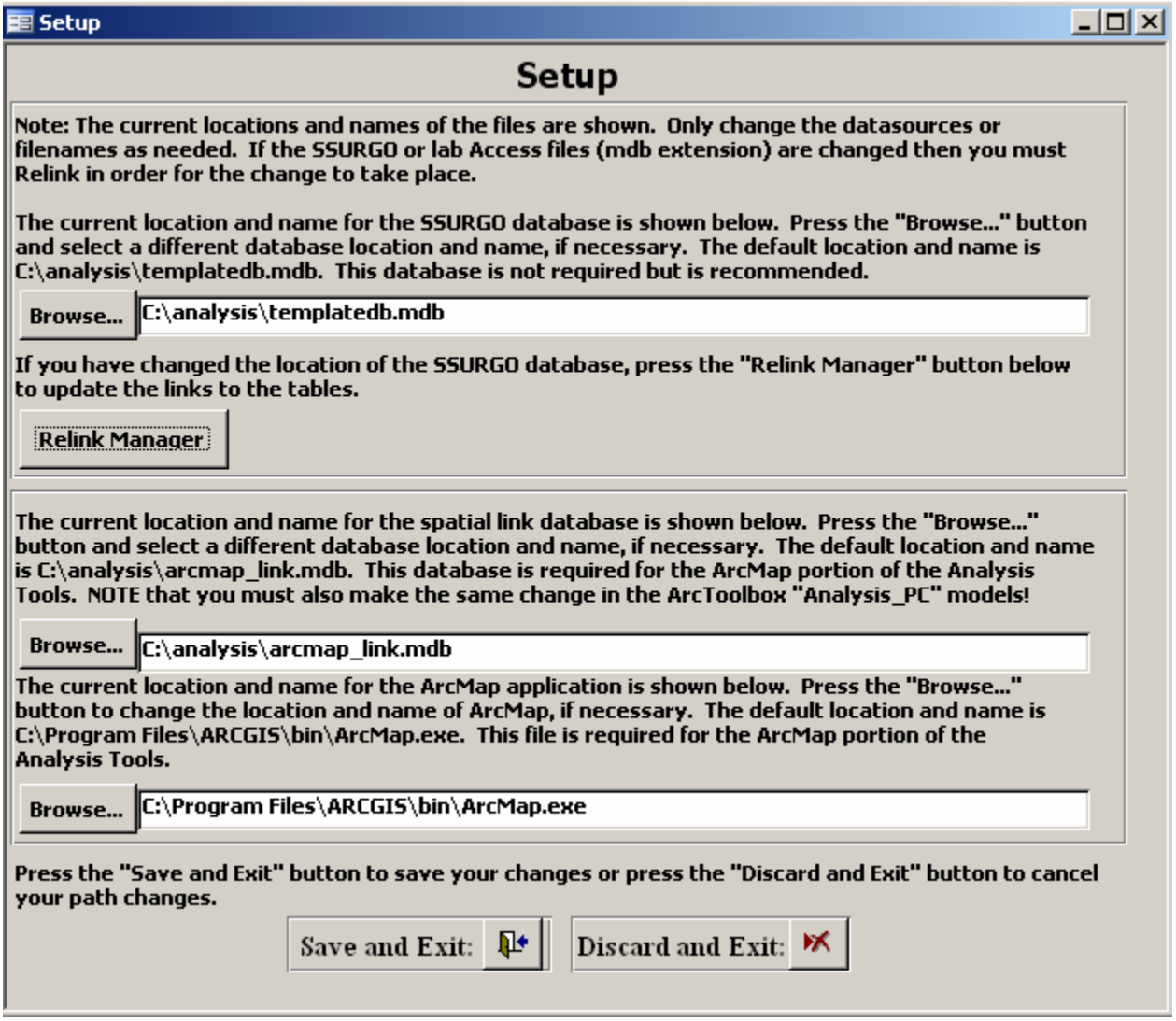
Notice that every time the model is run, this process will have to be repeated. It is much easier to change the area name one time as discussed previously: Right click on your area table (in our case it is MT645_a) and then click on "Properties…" in the context menu. Next, change the Layer Name in the Layer Properties form under the General tab. Remember, the area layer name needs changed to "soilpolygons" so the "Export Intersected Points Model" works properly.

Setup Form

Once the setup steps are complete, navigate to the location of "analysis_pc.mdb" and double-click the file the launch the program. It is not necessary to have ArcMap open at this point.

You can rename files and change their locations after initially setting up Analysis PC. You may rename the Microsoft Access files analysis_pc.mdb, templatedb.mdb and arcmap_link.mdb. You do not have to use a specific location or a specific drive letter to hold the files and you may move the files to any location. The analysis_pc.mdb file is known as the Analysis PC program, the templatedb.mdb file is known as the SSURGO file and the arcmap_link.mdb file is known as the spatial link file. The default folder structure (name and location of the Access files) can be changed using the setup form which is accessed from the Setup Menu (**Main Menu >> Setup Menu >> Setup**).

The setup form layout and functionality is similar to the Pedon PC Setup Form with the addition of ArcMap related files as seen in the screenshot below. The arcmap_link.mdb file defaults to the C:\analysis folder and the ArcMap executable defaults to the C:\Program Files\ARCGIS\bin folder. You may change these default locations using the Browse buttons.

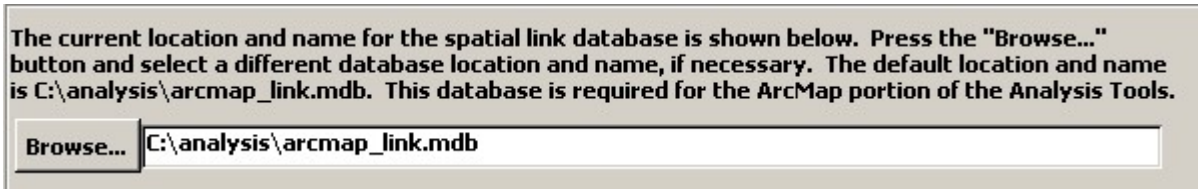


The Setup Form is shown above, from which the SSURGO data source and program locations may be changed. The ArcMap related Setup items are the spatial link database and ArcMap executable.

After launching the Setup Form notice that you may change the name and location of your SSURGO data source (templatedb.mdb). If you change the templatedb.mdb file location or name you must relink the tables to the Analysis PC program by pressing the “Relink Manager” button. It is also necessary to save your changes (Save and Exit).

All files may be changed but the arcmap_link.mdb file must be resynchronized in order for the ArcMap environment to work correctly. Analysis PC and the ArcToolbox models both write to the arcmap_link.mdb file. In order to change the name and/or location of the spatial link (arcmap_link.mdb) file successfully, you must change the name and/or location in the Analysis PC Setup Form and also make changes to the ArcToolbox models. There are currently three ArcMap models and each writes to the C:\analysis\arcmap_link.mdb default location. This location would need to be changed wherever it appears in each of the models.

Navigate to the Analysis PC Setup Form through **Main Menu >> Setup Menu >> Setup**. Scroll to the spatial link (arcmap_link.mdb) location as seen in the screenshot below.

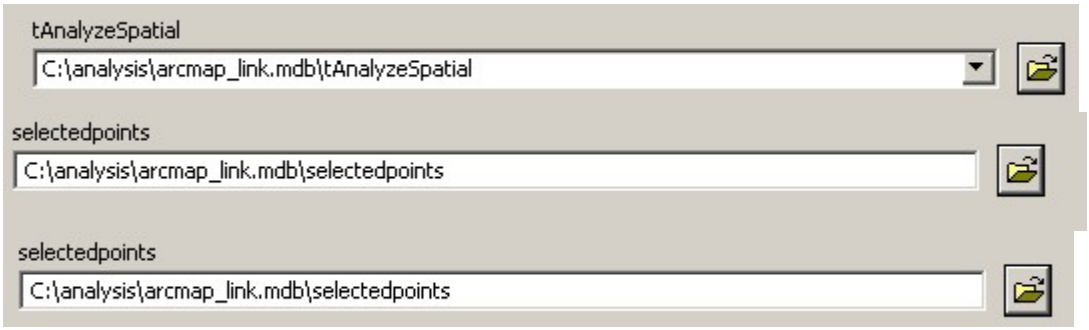


The spatial link database name and location can be changed using the Browse… button in the Analysis PC Setup Form.

Make the desired change using the Browse… button. Once this change has been made, open the ArcMap program and show the "Analysis_PC" toolbox. Double-click each of the models in the ArcToolbox "Analysis_PC":

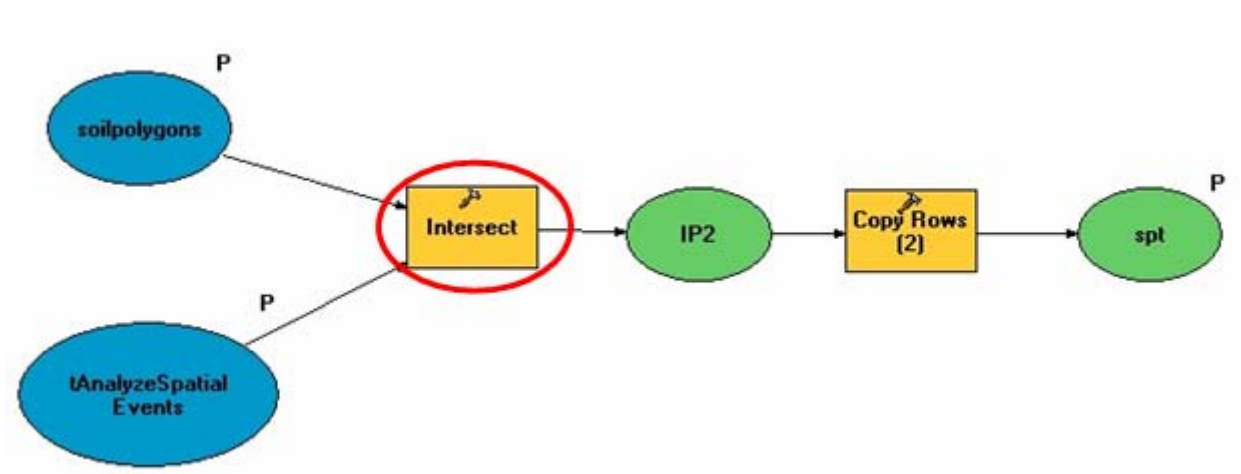
The three models in the Analysis_PC toolbox must each be modified when changing the name or location of the spatial link database.

Each occurrence of "arcmap_link.mdb" in each of the models must be changed using the Browse button (folder icons on the right) as seen in the snapshots below.



The default location for the spatial link database is C:\analysis\arcmap_link.mdb. If this changes then you must also change it here.

You will also need to make another change in the model "Export Intersected Points". Right click on the "Export Intersected Points" model and choose "Edit" from the context menu. The model is shown below. Double-click on the "Intersect" rectangle and change the path of the output feature class.



The Export Intersected Points model needs to be modified such that the Intersect portion contains the correct output path.

Modify the output feature class for the Intersect portion using the folder icon to the right.

3.3 Required Files

The software needed to run Analysis PC includes Microsoft Windows, Microsoft Access, Microsoft Excel and ESRI ArcMap. Other entities include the national transactional soils database for the United States (NASIS), the Soil Data Mart, and Lab Soil Characterization database. Please visit the following websites for more details.

http://nasis.nrcs.usda.gov/

http://soildatamart.nrcs.usda.gov/

http://ssldata.nrcs.usda.gov/

http://www.microsoft.com/Windows/default.mspx

http://office.microsoft.com/en-us/access/FX100487571033.aspx

http://office.microsoft.com/en-us/excel/FX100487621033.aspx

http://www.esri.com/

There are a total of four Microsoft Access database files within the Analysis PC application. They are analysis_pc.mdb, templatedb.mdb, PG645.mdb and arcmap_link.mdb. The analysis_pc.mdb contains its own local database tables, the

pedon database and a link to the SSURGO database called templatedb.mdb. It also contains imported tables from the arcmap_link.mdb database in order to synchronize the data in the Analysis Form.

A way to think of these files is through their functionality. The analysis_pc.mdb file is the “application”, the templatedb.mdb can be thought of as the “SSURGO” database, the PG645.mdb is the “personal geodatabase” containing point, line, flag, area, boundary and update layers, and the arcmap_link.mdb file is the “spatial link” database.

On the ArcMap side, two files are required. One file is the ArcToolbox named “Analysis_PC.tbx” and the other file is the ArcMap document file (mxd file). The total number of files required is therefore six (four mdb files, one mxd file and one tbx file).

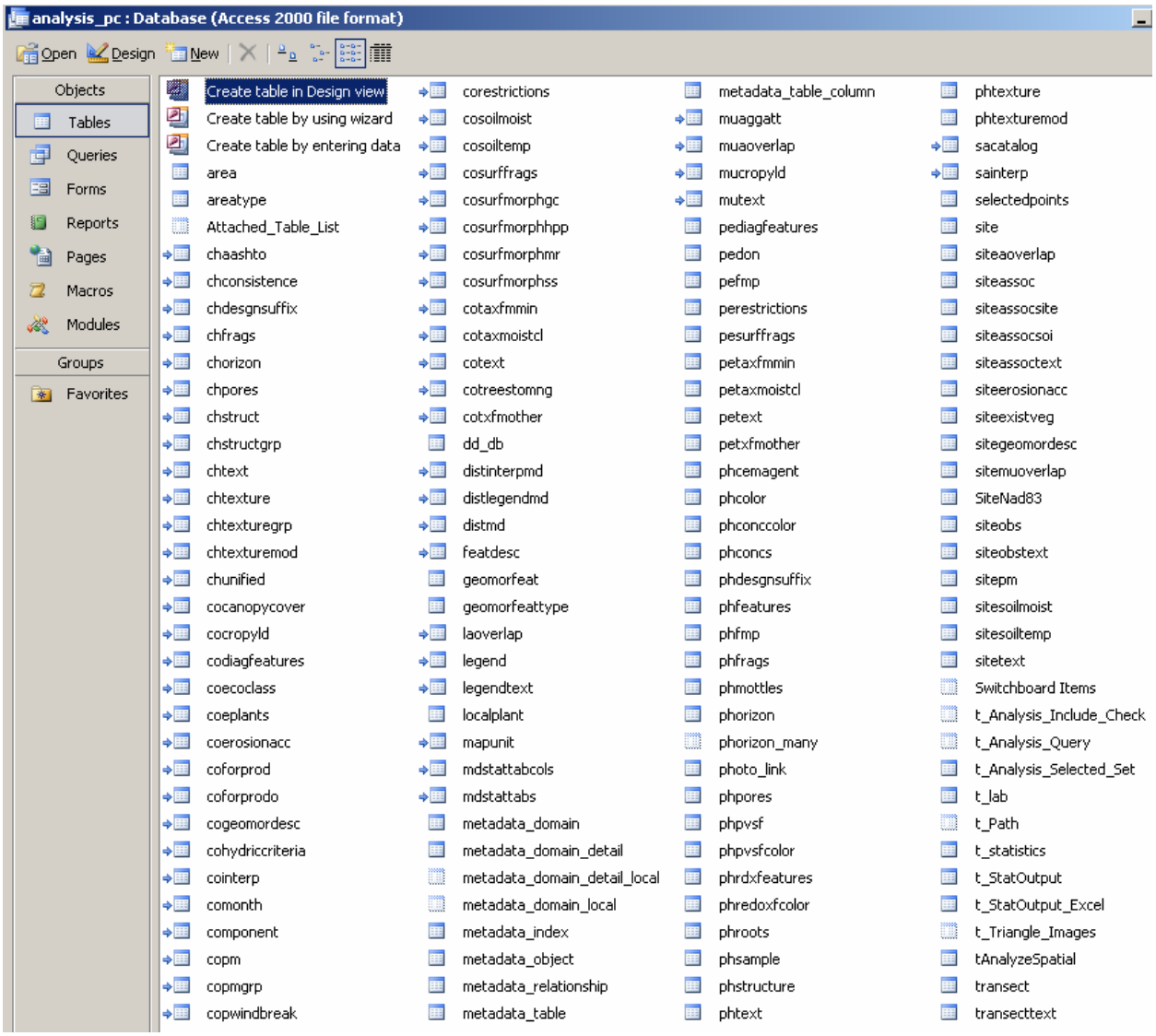
The most likely configuration is to leave the default names as is, except for the ArcMap document name and the personal geodatabase name. The sample files included in the Analysis PC package include AM645_SSA.mxd and PG645.mdb. These files contain objects for the state of Montana in Soil Survey Area 645, the Bitterroot Valley Area. For example, for a user in the state of Texas for Soil Survey Area Andrews County (let’s assume it is FIPS code 003), a suitable ArcMap document filename may be TX003_SSA.mxd and the personal geodatabase name may be PG003.mdb. The templatedb.mdb file must also be created by the user, because the data contained in this file is specific to the soil survey area. The pedon database is embedded within the analysis_pc.mdb file and is populated through the “Import Data File From NASIS” form in Analysis PC.

Since many databases can be linked to analysis_pc.mdb (currently it is one), how can one tell what tables belong to what database? The answer is the Access “Linked Table Manager”. To get to this manager, navigate to **Tools >> Database Utilities >> Linked Table Manager.** You will receive a list of linked tables in analysis_pc.mdb. For the most part, you will see the tables linked to C:\analysis\templatedb.mdb (the SSURGO template database).

A visual indication of a linked table in Analysis PC is an “arrow” icon next to the table name in the main database window form under **Objects >> Tables**. Local Analysis PC tables do not have an arrow next to them. For example, the “legend” table has an arrow next to it because it is located in the templatedb.mdb database, but the “localplant” table does not have an arrow next to it because it is part of the analysis_pc.mdb database.

3.4 Database and File Details

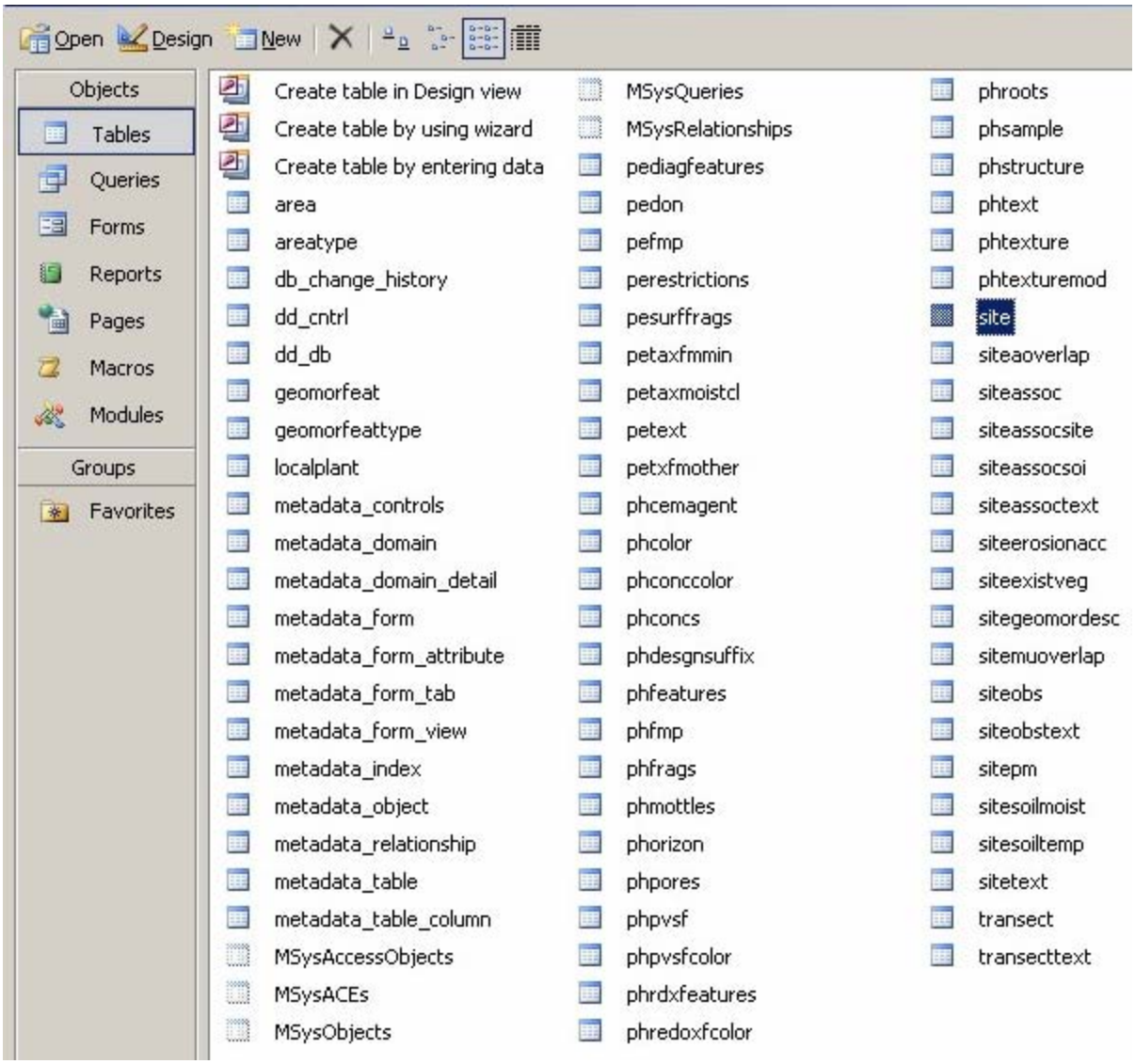
The analysis_pc.mdb Database



The analysis_pc.mdb database is the actual Analysis PC program. It contains the pedon database tables, a link to the SSURGO database, and is the database used to import/export data from/to the spatial link database.

The analysis_pc.mdb file contains the user interface for the Analysis PC program. Example tables in analysis_pc.mdb include “t_lab”, “t_Analysis_Query”, “pedon” and “tAnalyzeSpatial”. The Analysis Form in Analysis PC writes data points to a table called “tAnalyzeSpatial” and exports this table to the arcmap_link.mdb database.

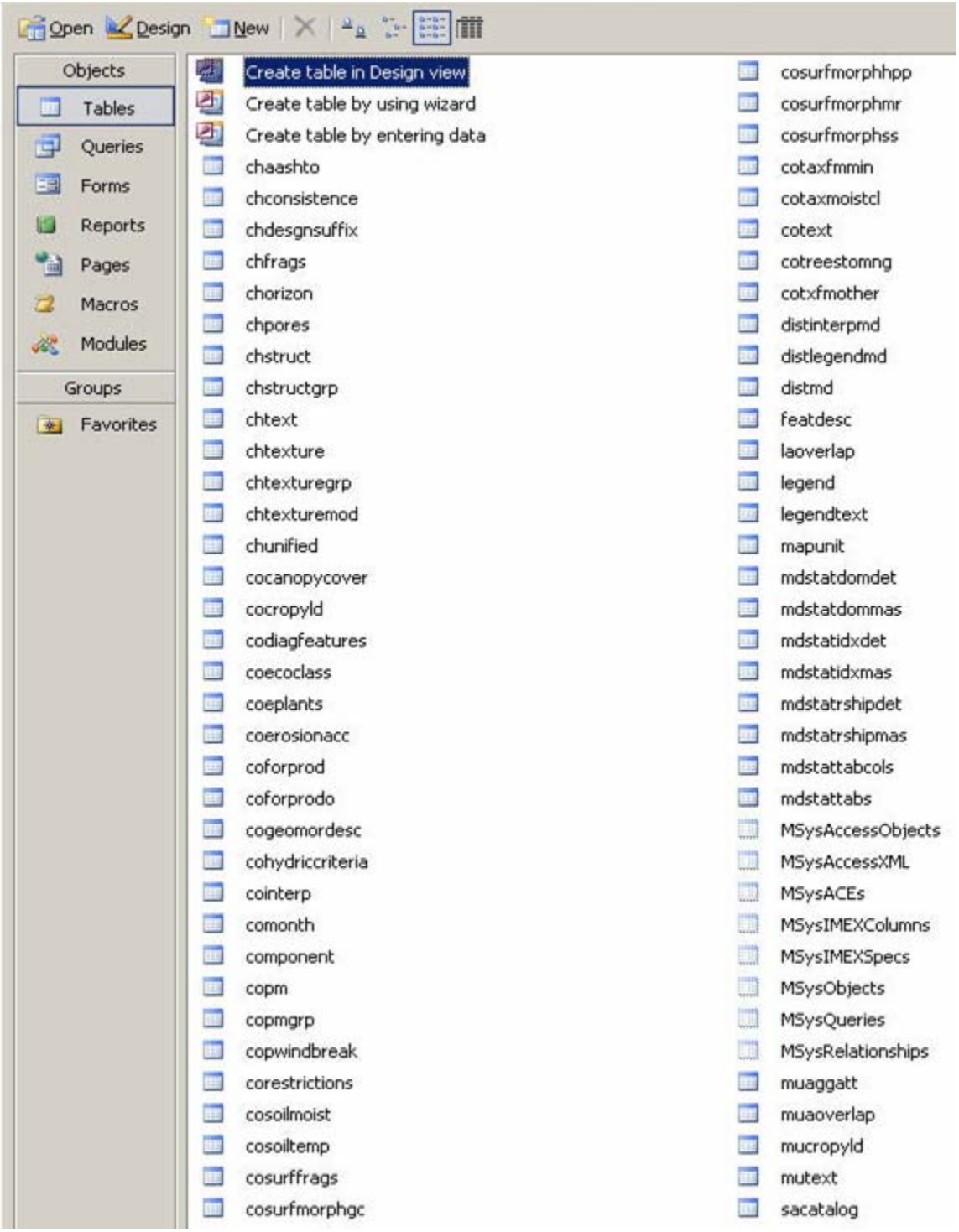
The pedon database (embedded within the analysis_pc.mdb file)



The pedon database is part of the analysis_pc.mdb file.

The pedon database is the database where all your pedon data is stored. It is included in the Analysis PC file “analysis_pc.mdb”. Example tables include “site”, “pedon”, “phorizon” and “transect”. This is unlike Pedon PC, where the pedon database was external to the main program file.

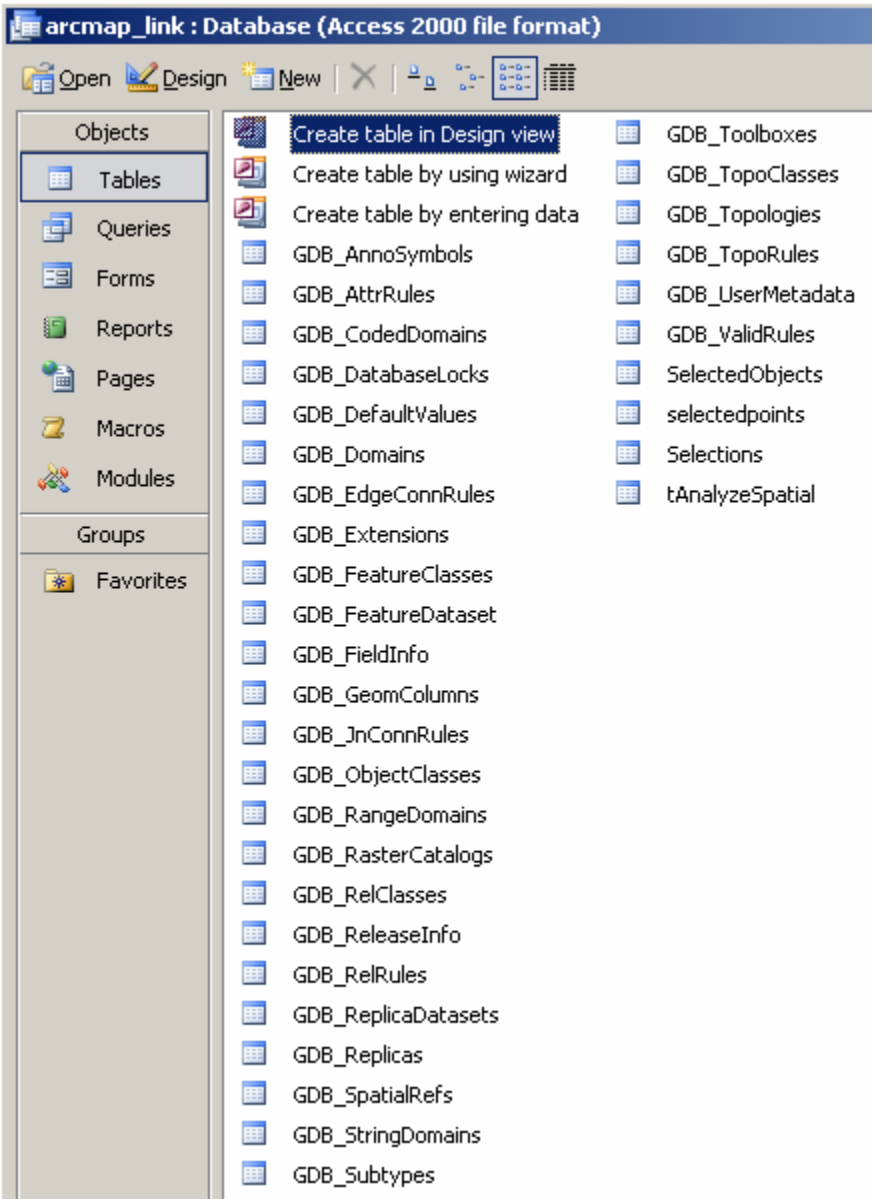
The templatedb.mdb Database



The templatedb.mdb database is the SSURGO template database.

The templatedb.mdb file is your local SSURGO database file renamed to "templatedb.mdb". Example tables include "component", "mapunit" and "legend".

The arcmap_link.mdb Database



The arcmap_link.mdb database is used as the link between Access and ArcMap.

The Analysis Form interacts with a database called arcmap_link.mdb. It is necessary because of locking issues associated with opening an ArcMap project, and is used for moving database tables to and from ArcMap. The Analysis Form in Analysis PC writes data points to a table called tAnalyzeSpatial and exports this table to the arcmap_link.mdb database. ArcMap models also export data to the tAnalyzeSpatial table in the arcmap_link.mdb database. This means that this table exists in both “analysis_pc.mdb” and “arcmap_link.mdb”. The database file arcmap_link.mdb is the spatial connection between Access and ArcMap.

The arcmap_link.mdb table tAnalyzeSpatial

tAnalyzeSpatial : Table

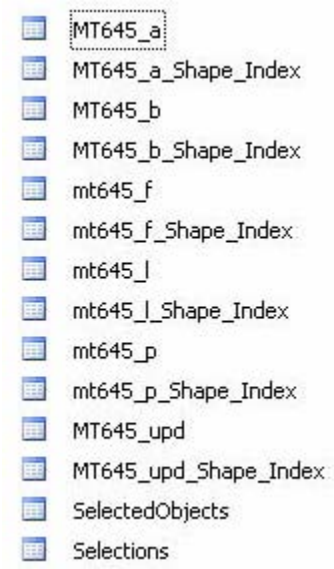
Field Name	Data Type
Rec_ID	AutoNumber
Field1	Text
Field2	Text
Field3	Text
latdecdeg	Number
longdecdeg	Number
Primary_Key	Number
Field4	Number
Field5	Number
Field6	Number
siteiid	Number
usiteid	Text

The tAnalyzeSpatial table is used to send points to ArcMap and Access.

The table “tAnalyzeSpatial” has twelve fields. The primary key for this table is “Rec_ID” and is automatically numbered. The “siteiid” field is the site internal identification number (the primary key for the “site” table) and the “usiteid” field is the “User Site ID” field from the “site” table. The “latdecdeg” and “longdecdeg” fields are your point data in decimal degrees. The fields “Field1” though “Field6” are additional user-defined fields to be used as text labels in ArcMap. The text fields “Field1”, “Field2” and “Field3” hold textual data and the number fields “Field4”, “Field5” and “Field6” hold numerical data. The “Primary_Key” field is used on the Access side to uniquely identify a record.

Sample Personal Geodatabase

Below are some of the tables contained within the PG645.mdb database for the Montana Soil Survey Area “Bitterroot Valley Area”. These tables can be contained in an Access personal geodatabase. You would create a similar database for your own soil survey area. An example name is “PG645.mdb” where PG = personal geodatabase and 645 is the Soil Survey Area 645 - Bitterroot Valley Area. You may name this file whatever you wish, as this is just an example.



A sample personal geodatabase named PG645.mdb containing tables for the Montana soil survey area 645 is shown above.

The example tables listed below hold the area, boundary, flags, lines, points and update layers. These table names begin with the text “MT645”. These tables are listed for illustrative purposes; your names would be appropriate for your state and soil survey area.

MT645_a (a = area; your soil polygons). This is the table you want to add to ArcMap and rename to “soilpolygons”.

MT645_b (b = boundary). This is the table you want to add to ArcMap and rename to “boundary”.

MT645_f (f = flags). This is a special feature layer. It contains springs, wet spots and gravel pits.

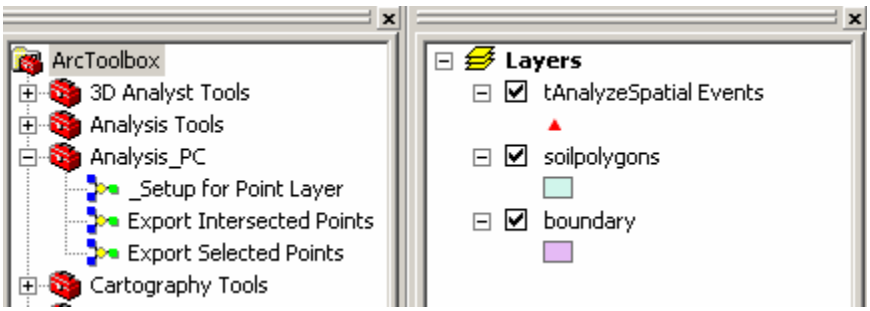
MT645_l (l = lines)

MT645_p (p = points)

MT645_upd (upd = update). The update layer used to manage the mapping progress. It has fields for the status of the mapping: not completed, in progress, completed, date of completion and so on.

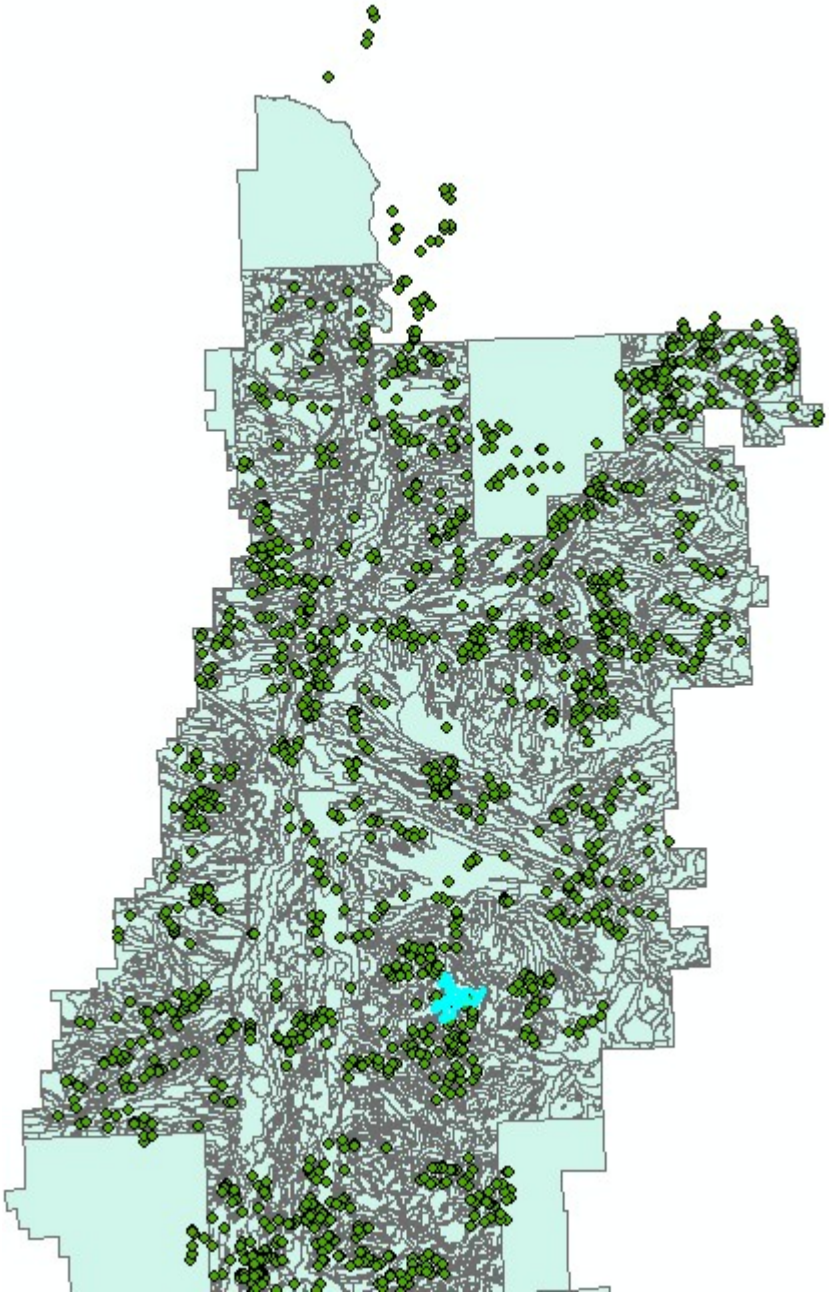
Sample ArcMap Project

The sample ArcMap project named “AM645_SSA.mxd” is for the state of Montana and Soil Survey Area 645. You would create your own ArcMap project file specific to your soil survey area. There are three main panes that should be shown in the project. The first is the ArcToolbox, displaying the “Analysis_PC” toolbox. The second is the layer pane displaying the tAnalyzeSpatial Events layer (the points layer from file “arcmap_link.mdb”), and the area layer (renamed to “soilpolygons”) and boundary layer (renamed to “boundary”), both from the personal geodatabase file “PG645.mdb”.



A sample ArcMap project (document file) containing the tAnalyzeSpatial Events, soilpolygons and boundary layers is shown above. The Analysis_PC toolbox has also been added in the left pane.

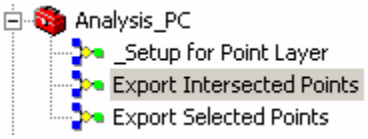
The third pane will have a map showing the soilpolygons and points for the survey area, if data exists.



A sample map displaying soil polygons and points is shown above.

Toolbox Models

There are three models associated with the toolbox, “Analysis_PC.tbx”.



The three Analysis_PC models are shown above.

_Setup for Point Layer – This model will add the “tAnalyzeSpatial” table located in the arcmap_link.mdb file on your system. You may choose a projection of your choice (NAD83 is the default). The “_Setup for Point Layer” model “XY Displays” the table as the tAnalyzeSpatial Events layer. This model should only be run one time when setting up your ArcMap project file (mxd file). Users may not choose to run this model if they prefer to manually create the point layer.

Export Selected Points – After you have selected **points** on your Map, run this model to send those points back to the Microsoft Access side. This model exports the selected points from the tAnalyzeSpatial Events layer to the “selectedpoints” table in the arcmap link database at the following default path C:\analysis\arcmap_link.mdb. This model should be run every time a different set of point(s) is selected on a map in ArcMap, and you want to see the results in Access.

Export Intersected Points – After you have selected **polygons** on your Map, run this model to send the points contained within those polygons back to the Microsoft Access side. This model intersects the selected points in the tAnalyzeSpatial Events layer with the soilpolygons layer and exports the intersected points to the “selectedpoints” table in the arcmap link database at the following default path C:\analysis\arcmap_link.mdb. This model should be run every time a different set of polygon(s) is selected on a map in ArcMap, and you want to see the results in Access.

3.5 Microsoft Access Problems

When an error occurs in Access such as a validation error, the Microsoft Access program has its own built-in error screens. An example is when a user types in the wrong data type in a table field or types in a number outside a defined range. These kinds of errors produce error screens that may prevent the user from continuing to enter data. In these cases, the user has to simply press the ESC key to cancel out of the data entry operation. The ESC key may have to be pressed consecutive times to back out or "undo" data that was just entered. This will allow the user to continue in his/her current Access session and not have to exit the entire Access application and then re-launch it.

Below are some helpful keyboard shortcuts.

To do this	Press
To open the Zoom box to conveniently enter expressions and other text in small input areas	SHIFT+F2
Undo the changes you have made to the current field	ESC
Undo the changes you have made to the current record	ESC ESC (press ESC twice)
To quit Microsoft Access, close a dialog box, or close a property sheet	ALT+F4
To open a combo box	F4 or ALT+DOWN ARROW
To toggle forward between views when in a table, query, form, report, page, or view. If there are additional views available, successive keystrokes will move to the next available view.	CTRL+RIGHT ARROW or CRTL+COMMA (,)

Helpful Access keyboard shortcuts are shown above.

4.0 Using The System

4.0 USING THE SYSTEM

4.1 Launching Analysis PC

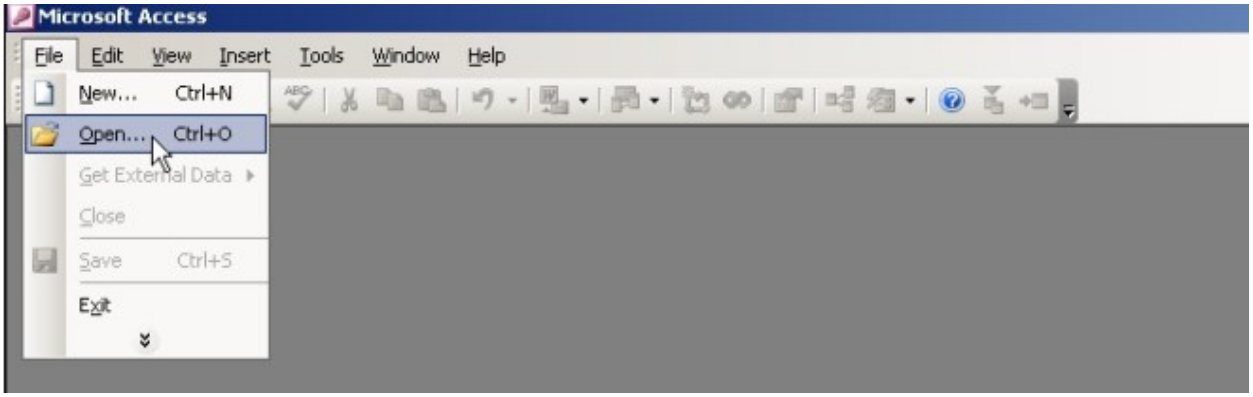
The Analysis PC application can be launched in three ways:

1. From Microsoft Access
    a. Open Microsoft Access (For example, **Start >> All Programs >> Microsoft Office >> Microsoft Office Access 2003**)
    b. Choose **File >> Open** from the Menu bar up top
    c. Choose the analysis_pc.mdb database file (default location is at C:\analysis)

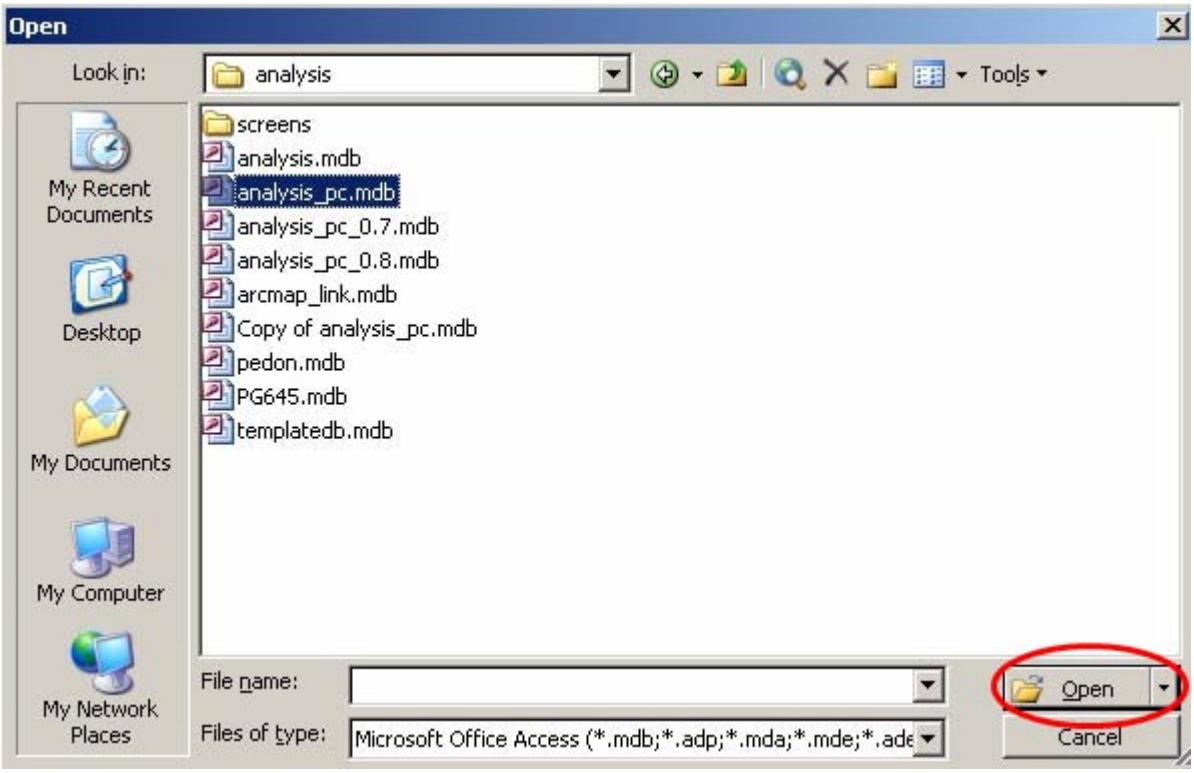
2. From Windows Explorer/My Computer
    a. Navigate Windows Explorer or My Computer to the location of the analysis_pc.mdb database file (default location is at C:\analysis)
    b. Double-click the file to launch Microsoft Access

3. Via shortcut on your Desktop or Start Menu
    a. Navigate to the analysis_pc.mdb database file as in 2.a. above
    b. Right click on the file and select “Create Shortcut”. This places a shortcut to this file in the same folder.
    c. Click and drag the shortcut to your Desktop or Start Menu.
    d. Right click on the shortcut and then select “Rename”.
    e. Type in “Analysis_PC” or similar text.
    f. Start the Analysis PC application by double-clicking the shortcut.

Currently, the default parent folder in which all files are placed is called “analysis” and resides on the C letter-designated hard drive (i.e. C:\analysis). The default Analysis PC database filename is currently “analysis_pc.mdb”.



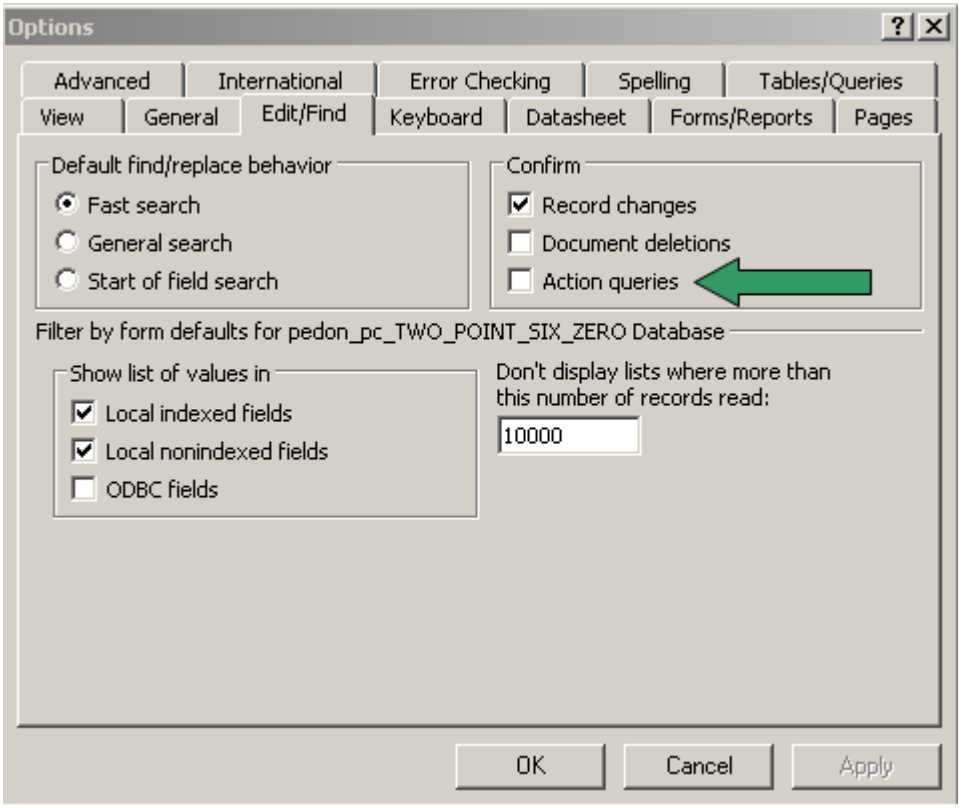
Starting the Analysis PC database application via Microsoft Access: the first step is to navigate to ***File >> Open…***



Starting the Analysis PC database application via Microsoft Access: the second step is to select C:\analysis\analysis_pc.mdb and then press the Open button.

4.2 Change Microsoft Access Options

In Microsoft Access, navigate to the **Tools** >> **Options** >> **Edit/Find** tab. Make sure the box next to **Confirm** >> **Action Queries** is empty (not checked). Many of the functions in this database use action queries to perform their commands. This step keeps Access from notifying you every time an action query runs.



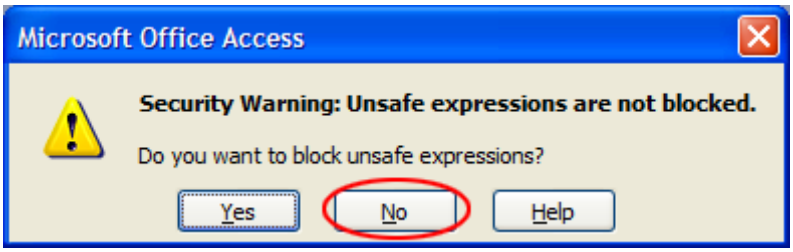
Uncheck the Action queries checkbox to disable Access notifications.

In Microsoft Access, navigate to the **Tools >> Options >> View** tab. Make sure the box next to **Show >> Hidden Objects** is checked. This step will allow you to see all database tables, forms, queries and reports.

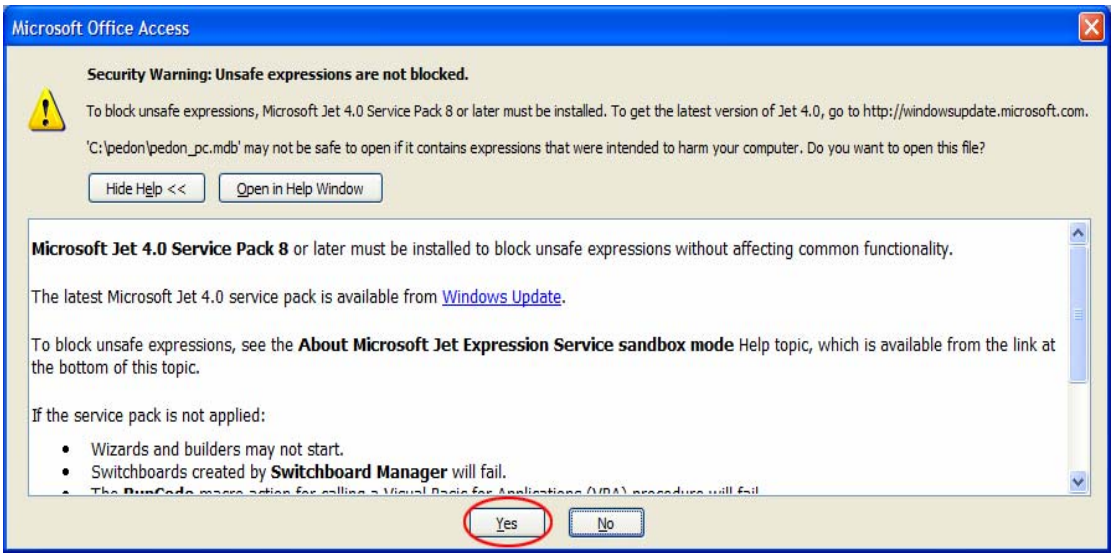
Check the Hidden objects checkbox to show all tables, forms, queries and reports.

4.3 Security Warning Messages

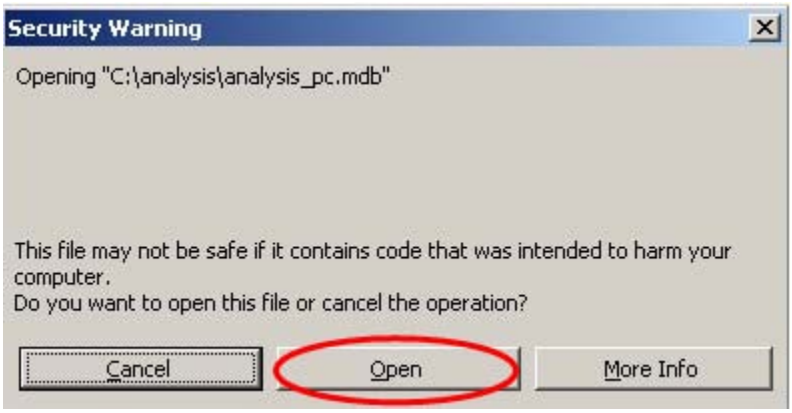
After invoking the analysis_pc.mdb file, you may receive **up to** three Security Warning Messages, depending on your security settings. The red circles in the screenshots below show what to select.



A possible security warning message is shown above (press No).

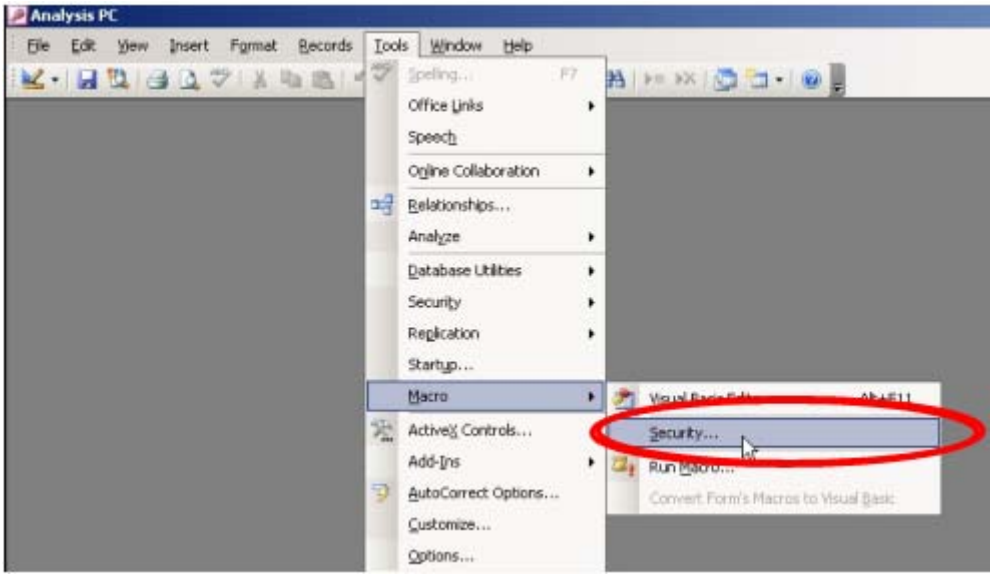


A possible security warning message is shown above (press Yes).



A possible security warning message is shown above (press Open). These security warnings are shown because of Microsoft Office macros.

The messages above refer to the security settings for Microsoft Office macros. The Analysis PC database application does not contain malicious macros. If you want to change your security settings navigate to **Tools >> Macro >> Security…**



*Navigate to **Tools >> Macro >> Security…** to change Access security settings.*

You will receive the following dialog box. Choose only Medium or Low Security Levels. Choosing "Low" is not recommended but will result in no security messages popping up when opening the program.

If you want no security messages to popup at all choose the "Low" security level.

4.4 Main Menu

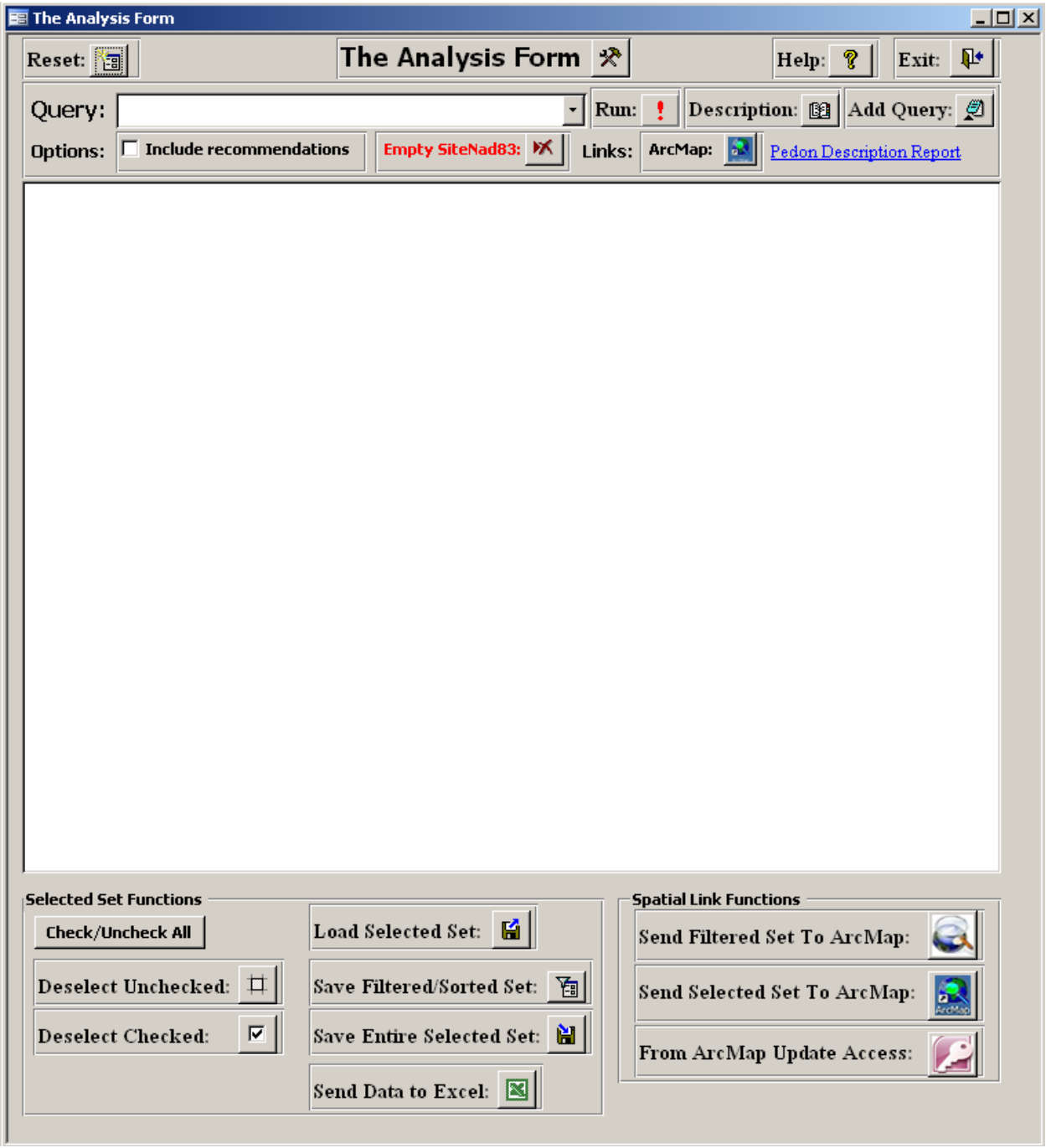
The Analysis PC Main Menu is shown above.

Upon launching Analysis PC, a Main Menu will be presented.

1. **The Analysis Form:** Opens up the Analysis Form.
2. **Statistics Form:** Choose to perform a statistical analysis on a user defined table.
3. **Textural Triangle Menu:** Choose to **Plot Points From Pedon Horizon Table**, **Plot Points From User Defined Table**, **Plot a Point** or **Fill Area**.
4. **Data View Forms Menu:** Choose to view data forms in read-only mode. The forms include three Pedon PC Data Entry Forms: **Pedon Tablet Form**, **Transect Form** and the **Site Association Form**. There are also two views which enable you to view a site, site observation, pedon and horizon at the same time, or a transect, pedon and horizon at the same time.
5. **Setup Menu:** Choose to access **Setup** or **Import Data File From NASIS**.
6. **Utilities Menu:** Choose to access **Erase Pedon Data**, **DMS/DD Conversion, Quality Assurance/Quality Control** or **Compact and Repair Database** options.
7. **Exit Analysis PC:** Choose to exit the Analysis PC application.

Online NASIS help can be accessed through the “NASIS Help” hyperlink underlined at the top right of the screen. Also note that the version of Analysis PC is displayed on the lower right of the screen.

4.5 The Analysis Form



The Analysis Form is shown above.

Plotting Points in ArcMap

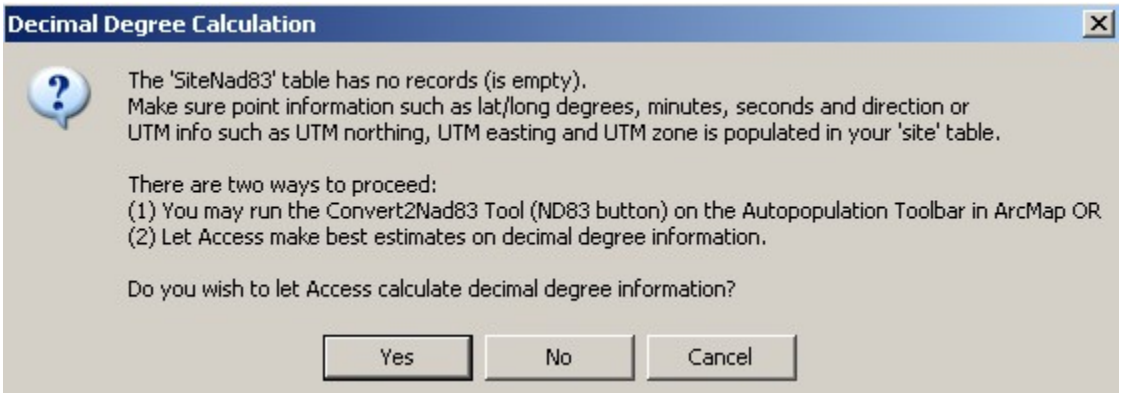
Analysis PC contains the ability to launch and use ArcMap to display Access tabular data spatially. ArcMap displays spatial data using decimal degrees. However, the NASIS site table contains UTM (Universal Transverse Mercator) and DMS (Degrees Minutes Seconds) data, but not DD (decimal degree) data. The SiteNad83 table was created as a link between the NASIS and ArcMap environments. It is a table native only to Analysis PC and contains degrees, minutes, seconds, direction and decimal degree data. The user has two choices to convert the NASIS site spatial data to decimal degrees: use Analysis PC on the Access side, or use the Convert2Nad83 Tool (ND83 button) or Convert2WGS84 (WG84 button) on the Auto-population Toolbar in ArcMap. The Convert2Nad83 Tool exists as part of the "Pedon Auto-population" Toolbar. There is also a Convert2WGS84 Tool (WG84 button), for those users in the Pacific Basin. If Analysis PC (Access) is chosen to do the conversion, the program will convert whatever spatial data exists in the site table to decimal degrees. Note that this means it will convert either site UTM or DMS data to decimal degrees, if the source data exists in the site table. **Access a*ssumes the NAD83 datum for both the source and destination data.*** The Convert2Nad83 Tool in ArcMap performs the same function but the source data can be in more projections (legacy NAD27, WGS84 or Old Hawaiian). Once the data has been converted to decimal degrees, points can be plotted and visually shown in the ArcMap environment. Therefore, the SiteNad83 table and its data are vital to the operation of The Analysis Form.

The "SiteNad83" table name is a bit of a misnomer. It is so named because the majority of conversions will be to the NAD83 projection. However, for soil survey areas in the Pacific Basin, this will not be true. Instead, conversions will be to the WGS84 projection. In this case, the WGS84 data will also be stored in the SiteNad83 table for those conversions.

The ND83 button on the Pedon Auto-population Toolbar allows conversion from NAD27, NAD83, WGS84 and Old Hawaiian to the NAD83 projection. Similarly, the WGS84 button on the Pedon Auto-population Toolbar allows conversion from NAD27, NAD83, WGS84 and Old Hawaiian to the WGS84 projection. The SRITB Toolbar will have to be installed in order to activate the Pedon Auto-population Toolbar.

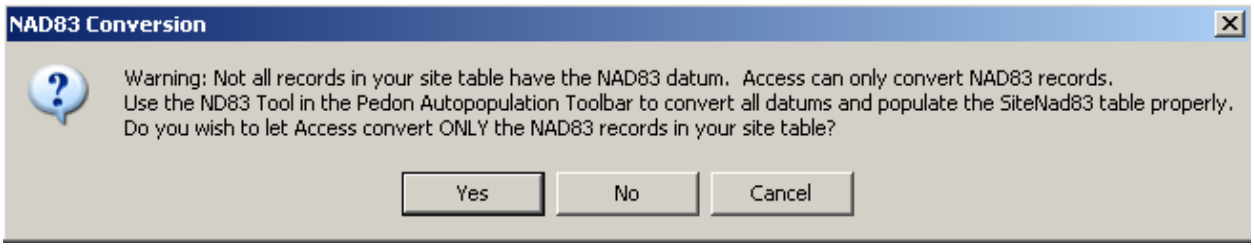
If the SiteNad83 table has no records, the Analysis Form will prompt the user to allow Access to perform the data conversion using the site table to populate the SiteNad83 table. If the user has all site data in NAD83 format, then allowing Access to perform the conversion is fine, although either method can be used. On the other hand, if all site data is not in NAD83 format, then the Convert2Nad83 Tool on the Auto-population Toolbar ***must be used*** to properly populate the SiteNad83 table. Note that the SiteNad83 table must be included in all queries that show data (plot points) in ArcMap.

The following screenshot shows two available options when the SiteNad83 table is empty: let Access perform the conversion or manually run the NAD83 Tool in ArcMap.

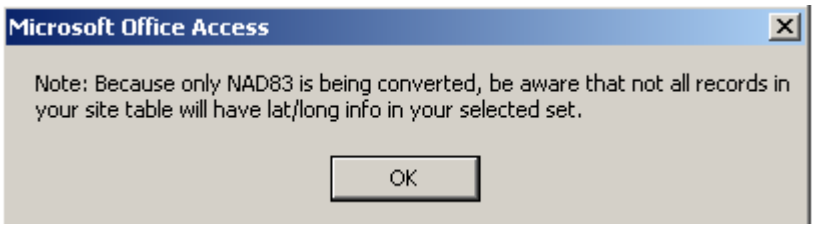


If the SiteNad83 table is empty the program will prompt the user for direction.

If you proceed to let Access calculate the decimal degree information, you may receive more informational screens. One of them occurs when the site table contains some records that do not have the NAD83 datum (for example legacy NAD27 datum). If this is the case, you can allow Access to convert only the NAD83 records and ignore the rest. If you proceed, not all site records will have lat/long decimal degree info in your selected set because the program is only converting site rows with the NAD83 datum.



Access can convert all the NAD83 records and ignore records with other projections.



Some records in your site table will not have point information because Access can only convert the NAD83 datum.

Access pops up a warning message which tells you records containing no lat/long information cannot be shown in ArcMap.

Note: If the pedon "site" table in Analysis PC is changed in any way, then the SiteNad83 table must be resynchronized. This is done by pressing the "Empty SiteNad83" button on the Analysis Form and then either allowing Access or the (NAD83 or WGS84 Tool) on the "Pedon Auto-population" Toolbar to recreate the records in the SiteNad83 table. ***Important: Only NAD83 data can be converted to decimal degrees by Microsoft Access.***

Source Projection	Destination Projection	Recommended Conversion Tool(s)
NAD27	NAD83	ND83 button
NAD83	NAD83	ND83 button or Access (Analysis Form)
WGS84	NAD83	ND83 button
Old Hawaiian	NAD83	ND83 button
NAD27	WGS84	WG84 button
NAD83	WGS84	WG84 button
WGS84	WGS84	WG84 button
Old Hawaiian	WGS84	WG84 button

The four source projections currently supported are NAD27, NAD83, WGS84 and Old Hawaiian. The only two destination projections supported are NAD83 and WGS84. For all but one case, the ND83 or WG84 button should be used to perform the conversion. The only case in which Access can be used is if the source and destination projections are both NAD83.

It is highly recommended to use the ND83 or WG84 buttons on the Pedon Auto-population Toolbar in ArcMap because it is more thorough and accurate than what Access can achieve.

The following discussion concerns using the ND83 button on the Pedon Autopopulation Toolbar in ArcMap; the WG84 button process is the same.

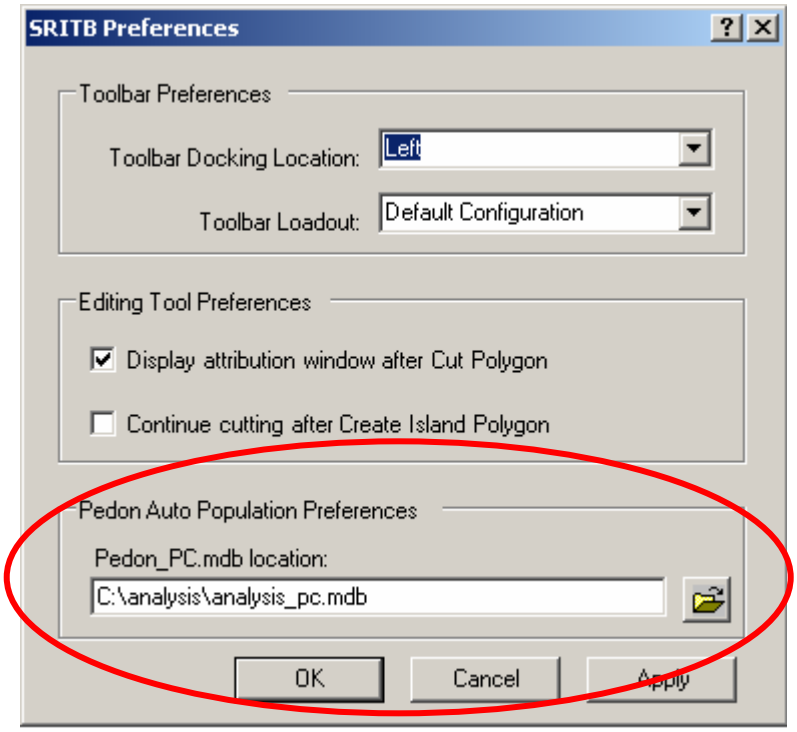
ND83 Button on the Pedon Autopopulation Toolbar

The first step in using the ND83 Tool on the Pedon Autopopulation Toolbar in ArcMap is to make sure Analysis PC is closed. While it is not vital that Access and Analysis PC are closed, it ensures ArcMap can obtain a secure lock on the site table in Analysis PC.

The second step is to check the location of the analysis_pc.mdb file in the SRITB Toolbar. The SRITB Preferences dialog is located in the SRITB Edit Manager Toolbar. You need to install the SRITB Toolbar if it is not already on your machine and then open ArcMap (we are assuming ESRI ArcMap is loaded on your machine). Please consult a system administrator to install the SRITB Toolbar, if necessary.

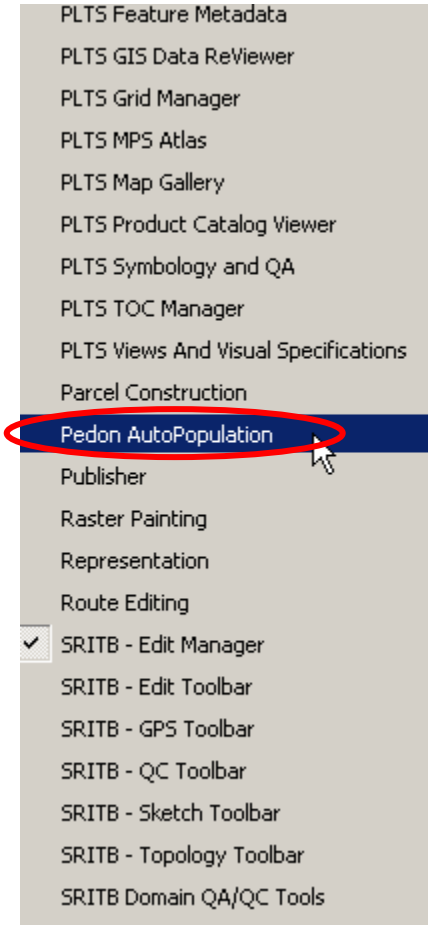
The SRITB Edit Manager Toolbar contains the Preferences button.

The location of the Analysis PC program (analysis_pc.mdb) needs to be placed in the "Pedon Auto Population Preferences" section in the SRITB Preferences dialog, under "Pedon_PC.mdb location". Ignore the fact that the heading says Pedon_PC.mdb; this tool was written before Analysis PC was created. Using the browse folder button, select the analysis_pc.mdb file and then press the "OK" button. The default location of Analysis PC is set at C:\analysis_pc.mdb. Note the location and name of this file can be changed.



Select the location of the Analysis PC database file. Ignore the fact that the text displayed is "Pedon_PC.mdb location:".

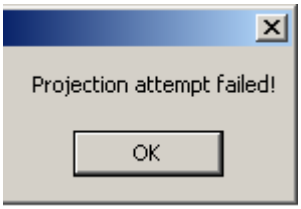
The third step is to right-click on the ArcMap menu and on the context toolbar menu select "Pedon AutoPopulation".



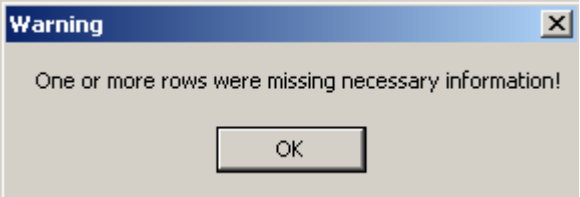
In ArcMap, right-click on the ArcMap menu up top, and select "Pedon AutoPopulation" from the toolbar listing.

The toolbar appears and in this case we are interested in the ND83 icon. Press the button to activate the tool. The WG84 icon will also be shown (this is for Pacific Basin users).

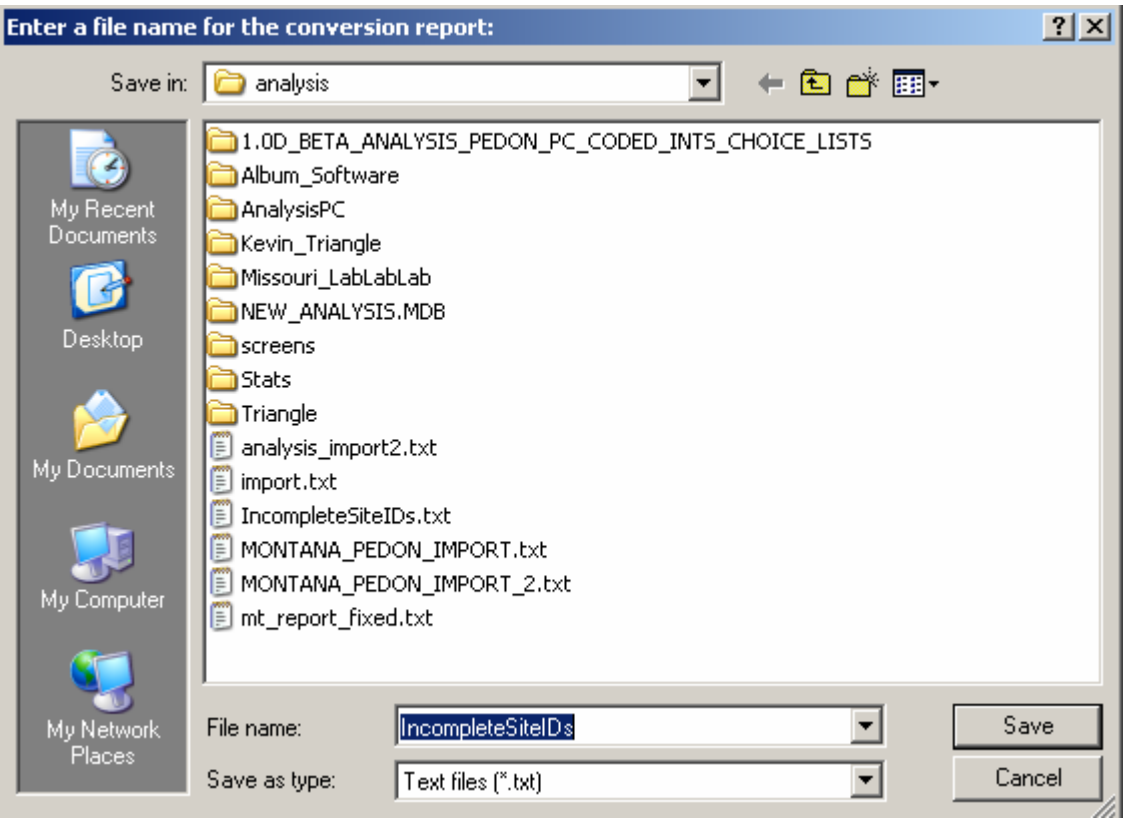
Press the ND83 button to populate the SiteNad83 table in Analysis PC based on point information (lat, long, UTM, etc) in your site table.



It is possible that the site table does not contain enough information to produce a valid result. You may receive a message similar to the one above.



If you receive this message, then a conversion report will be generated.



A conversion report is generated if one or more rows are missing necessary information. The default text file name is "IncompleteSiteIDs.txt". You may name the file whatever you wish.

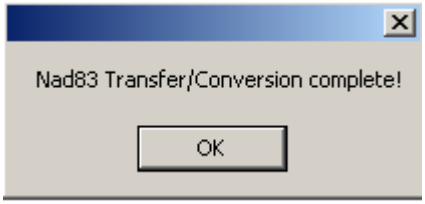
IncompleteSiteIDs.txt - Notepad

File Edit Format View Help

```
Convert-to-NAD83 tool

=========================================================
The following Rows were missing necessary information:
=========================================================
Site ID             : -247287
Datum               : 1
Latitude Degrees   :
Latitude Minutes   :
Latitude Seconds   :
Longitude Degrees   :
Longitude Minutes   :
Longitude Seconds   :
Longitude Direction:
Latitude Direction:
UTM Northing        : 5199180
UTM Easting         : 488230
UTM Zone            :
----------------------------------------
Site ID             : -245821
Datum               : 2
Latitude Degrees   :
Latitude Minutes   :
Latitude Seconds   :
Longitude Degrees   :
Longitude Minutes   :
Longitude Seconds   :
Longitude Direction:
Latitude Direction:
UTM Northing        : 5016018
UTM Easting         :
UTM Zone            : 12
----------------------------------------
Site ID             : -245817
Datum               : 2
Latitude Degrees   :
Latitude Minutes   :
Latitude Seconds   :
Longitude Degrees   :
Longitude Minutes   :
Longitude Seconds   :
Longitude Direction:
Latitude Direction:
UTM Northing        :
UTM Easting         : 331190
UTM Zone            : 12
----------------------------------------
```

Partial contents of an "IncompleteSiteIDs.txt" file are shown above. Review the contents so that you know which sites need more information.



A conversion complete message is shown above.

Note: If enough site information exists and can be converted, then the SiteNad83 table will contain as many records as the site table. However, if site information is missing or in a projection that cannot be converted, then the SiteNad83 table will contain fewer records than the site table.

Although we call the table SiteNad83, do not assume we are only storing data in the NAD83 projection.

Issues

If you receive any error messages similar to the following, the solution is to close your Microsoft Access program and then re-open Access. You may have to reboot your PC.

"Cannot open any more databases"
"Cannot open any more tables"

If you have too many Microsoft Access databases open, you may also receive a "permissions error". The solution is to close any databases you are not using (close Access windows not in use).

Analysis Form Summary

The first step in using The Analysis Form is to select a Query using the Query drop down listbox and press the Run button (exclamation point icon). The selected set will be returned in the main grid (there is only one). Check which points (records) you wish to display in ArcMap by checking the boxes in the main grid and press the "Send Selected Set To ArcMap" button. You may also perform a filter on the selected set and send that filtered selected set to ArcMap by pressing the "Send Filtered Set To ArcMap" button. To create a filter navigate to **Records >> Filter** and choose the appropriate option such as "Filter by Selection".

Pressing either of the "Send" buttons will send you to another screen in which you select fields you wish to display on the ArcMap side. You may select up to six fields, of these three can be text type fields and three can be number type fields. Text type fields include text, strings and characters such as "Azaar" and number type fields include whole numbers and floating point numbers such as 10 and 5.4, respectively. In ArcMap the six field names will be represented as "Field 1" through "Field 6".

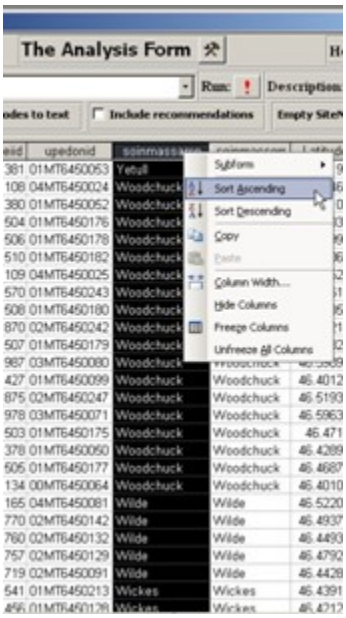
At this point, Access will launch ArcMap, if it is not already running. You need to follow the steps in the Setup section if you do not have an ArcMap project. The steps are to create points, area and boundary layers in an ArcMap project and to add the "Analysis_PC" Toolbox. The model "_Setup for Point Layer" in the "Analysis_PC" Toolbox will automate the process of adding a point layer to an ArcMap project.

Within ArcMap you may select either points or polygons and then run an ArcMap model in the "Analysis_PC" toolbox. If you select points, run the "Export Selected Points"

model, and if you select polygons, run the “Export Intersected Points” model. Both models return a set of points. After running an ArcMap model switch back to Analysis PC in Access and press the “From ArcMap Update Access” button. This button will always need to be pressed after running a model in ArcMap and switching back to the Access environment. This button will refresh the data in The Analysis Form on the Access side. In the next section we will discuss how to run a query, create a selected set, and how to sort and filter the data in your selected set.

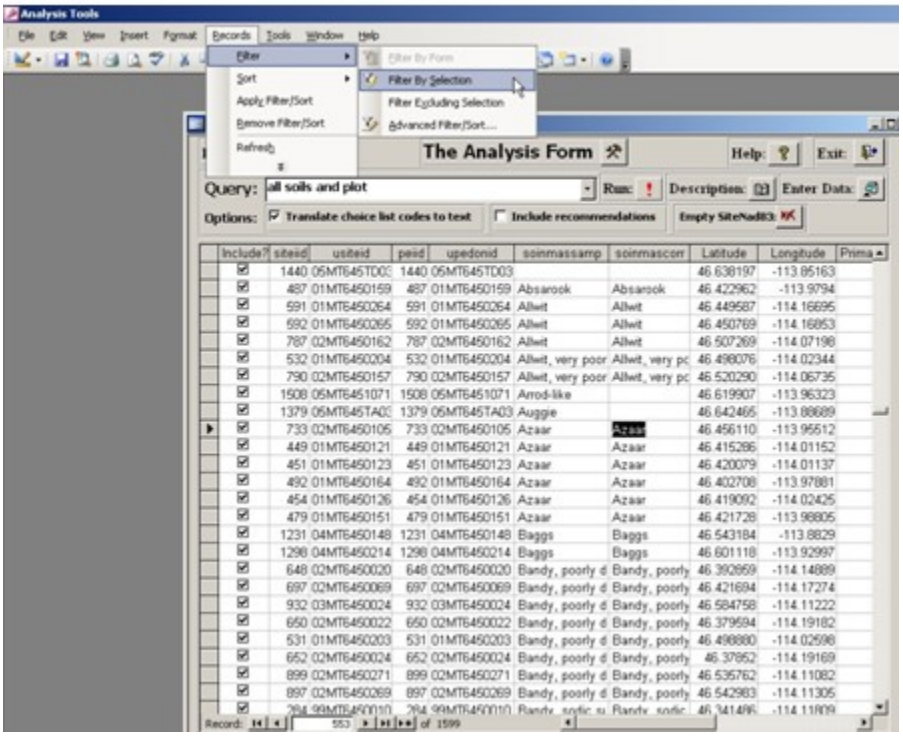
Analysis Form Details

In this form, there are built-in queries which allow users to examine and manipulate the resulting selected sets. The first step is to click on the “Query” drop down, choose a query to run and then press the exclamation point icon next to “Run”. One of the default queries is to examine all the soil types in the database, labeled as “all soils and plot”. The key fields in this query are “soil name as sampled” and “soil name as correlated”. After running the query, a selected set appears in the main grid. In our case, 1599 records were returned because that is the data in our pedon database from a soil survey area in Montana. You can perform basic Access functions by right clicking on a column name. As seen below, you can sort the column data in ascending or descending order, change the column width, hide the column or freeze the column.

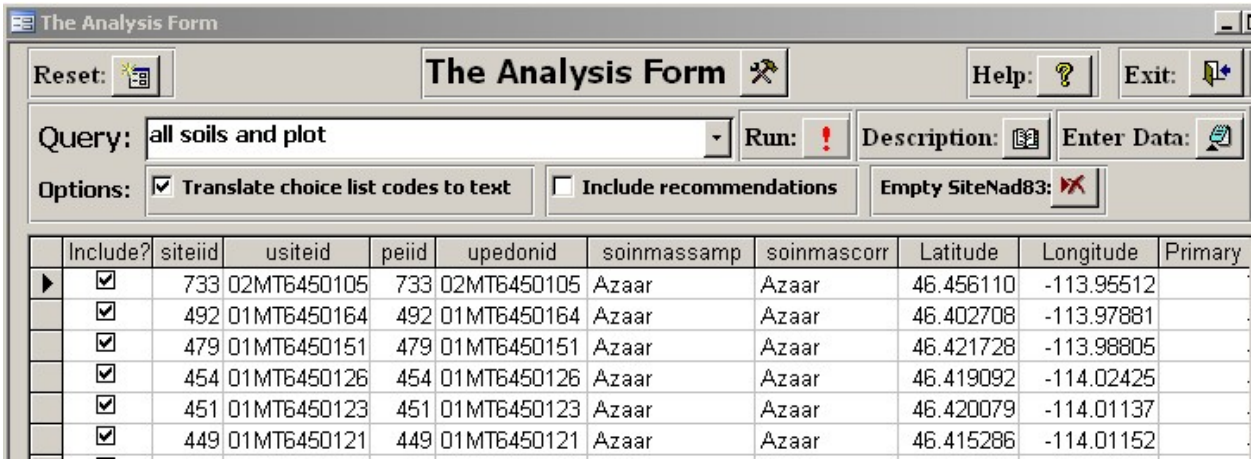


Right clicking on a column name returns a context menu of choices.

In order to filter data, navigate up top to the “Records” menu and choose “Filter”. A submenu will appear and includes “Filter By Selection”, “Filter Excluding Selection” and “Advanced Filter/Sort”. We are going to filter the selected set on the “Azaar” soils series name. To do this we highlight one “Azaar” soil name in the selected set and then choose “Filter By Selection” on the **Records >> Filter** menu. We should receive six Azaar records through this operation. The screen below displays the grid before this operation is performed. At this point 1599 records are shown.



Our original selected set contains 1599 records. We highlight one Azaar text (bolded in the screenshot), and navigate to ***Records >> Filter >> Filter By Selection****. We only want the "Azaar" soil records to be returned.*



Include?	siteiid	usiteid	peiid	upedonid	soinmassamp	soinmascorr	Latitude	Longitude	Primary
☑	733	02MT6450105	733	02MT6450105	Azaar	Azaar	46.456110	-113.95512	
☑	492	01MT6450164	492	01MT6450164	Azaar	Azaar	46.402708	-113.97881	
☑	479	01MT6450151	479	01MT6450151	Azaar	Azaar	46.421728	-113.98805	
☑	454	01MT6450126	454	01MT6450126	Azaar	Azaar	46.419092	-114.02425	
☑	451	01MT6450123	451	01MT6450123	Azaar	Azaar	46.420079	-114.01137	
☑	449	01MT6450121	449	01MT6450121	Azaar	Azaar	46.415286	-114.01152	

Our filtered set contains 6 Azaar records, as expected.

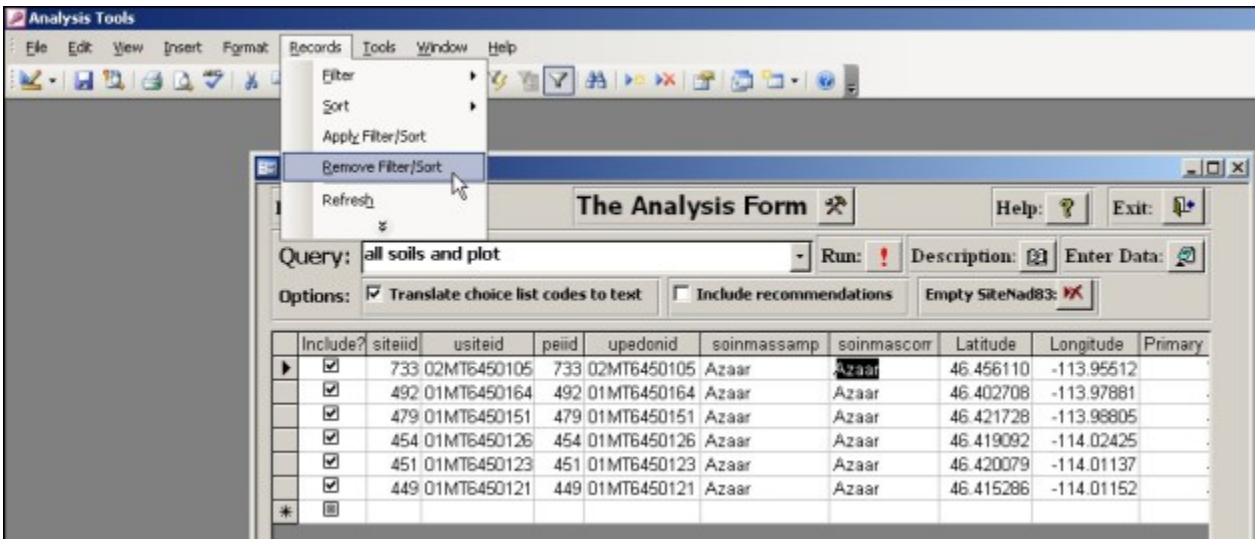
Notice the record navigator indicates this is a filtered set of records through the "(Filtered)" text next to the number of records.

The record navigator confirms the number of filtered records.

To go back to the original selected set, we need to remove the current filter by navigating to **Records >> Remove Filter/Sort** as shown in the screenshot below. ***We are not deleting the filter on "Azaar", but going back to the original selected set before the filter on "Azaar" was applied.***

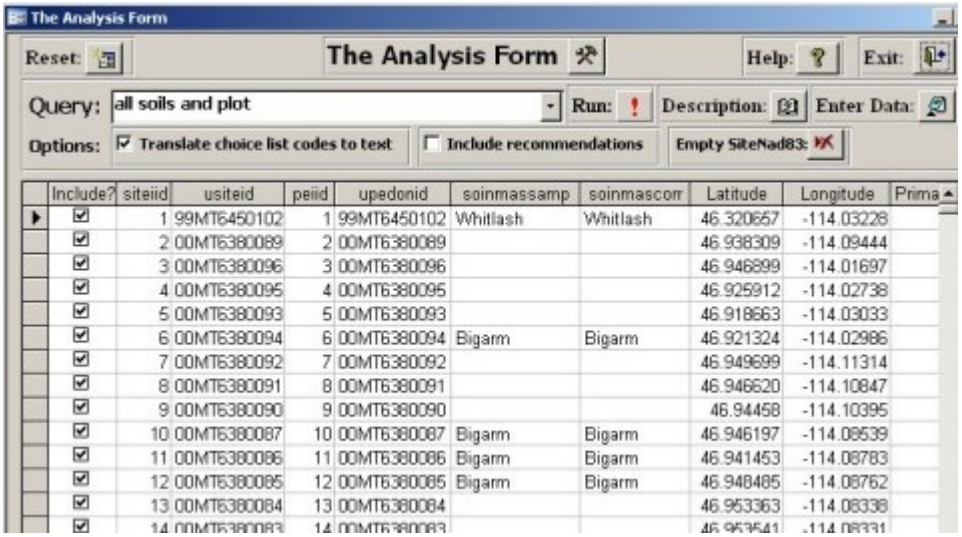
At this point we have two sets of data: the original selected set and the filtered set of data.

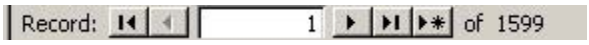
Choosing to remove a filter will allow the user to go back to the original selected set as shown in the screenshot below.



*In order to go back to our original selected set, select **Records >> Remove Filter/Sort**. Note that we are **not** deleting this filtered set. You may think of this as a "Go Back" operation.*

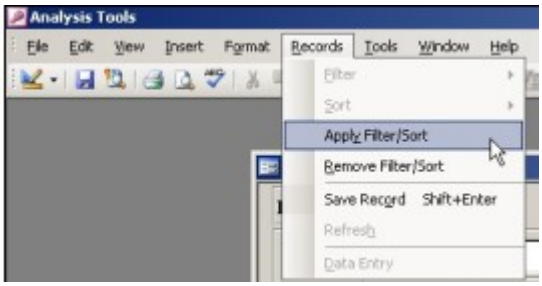
After the operation is performed, we receive our original selected set as shown below.





Our original selected set still exists (1599 records).

In order to switch back to our filtered "Azaar" query, we can do the reverse of the "Remove Filter" operation which is "Apply Filter". In order to do this, navigate to **Records >> Apply Filter/Sort**.

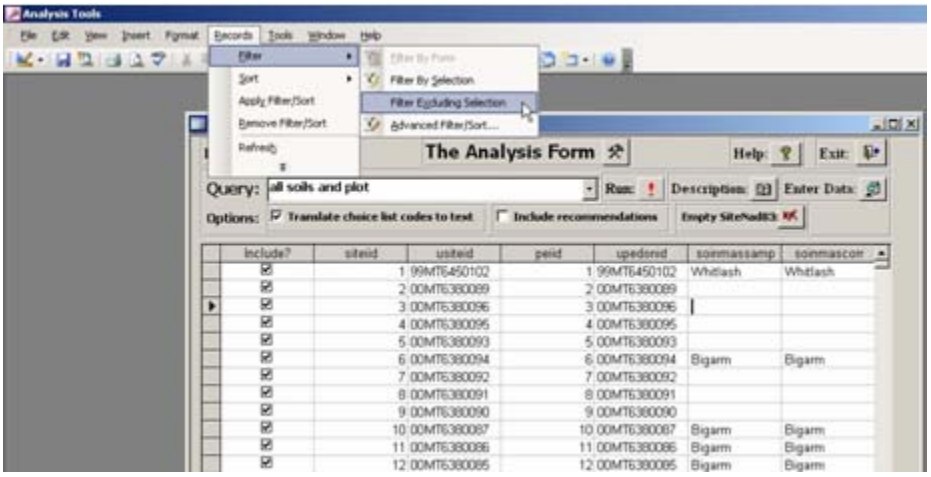


*In order to switch back to our filtered set, select **Records >> Apply Filter/Sort**. You may think of this as a "Go Forward" operation.*

Include?	siteiid	usiteid	peiid	upedonid	soinmassamp	soinmascorr	Lati
☑	733	02MT6450105	733	02MT6450105	Azaar	Azaar	46.4
☑	492	01MT6450164	492	01MT6450164	Azaar	Azaar	46.402
☑	479	01MT6450151	479	01MT6450151	Azaar	Azaar	46.421
☑	454	01MT6450126	454	01MT6450126	Azaar	Azaar	46.419
☑	451	01MT6450123	451	01MT6450123	Azaar	Azaar	46.420
☑	449	01MT6450121	449	01MT6450121	Azaar	Azaar	46.415

Our filtered set still exists (6 Azaar records).

Another filter operation which is the opposite of the "Filter By Selection" option is the "Filter Excluding Selection" option. Once again, highlight the text you want to use in this operation. We chose NULL or the empty field for the "soil name as sampled" field because we want to remove all the empty soil names. In order to perform this operation, highlight a NULL text field and navigate to **Records >> Filter >> Filter Excluding Selection** as shown in the screenshot below. The result of this operation should be a selected set containing all soils that have a name. We know ahead of time that we have 544 NULL records in the original 1599 records. This means we should receive 1055 records after this filter is performed.



We are removing all the NULL soils in the original selected set.
This is, in fact, what is returned as shown in the screenshot below.

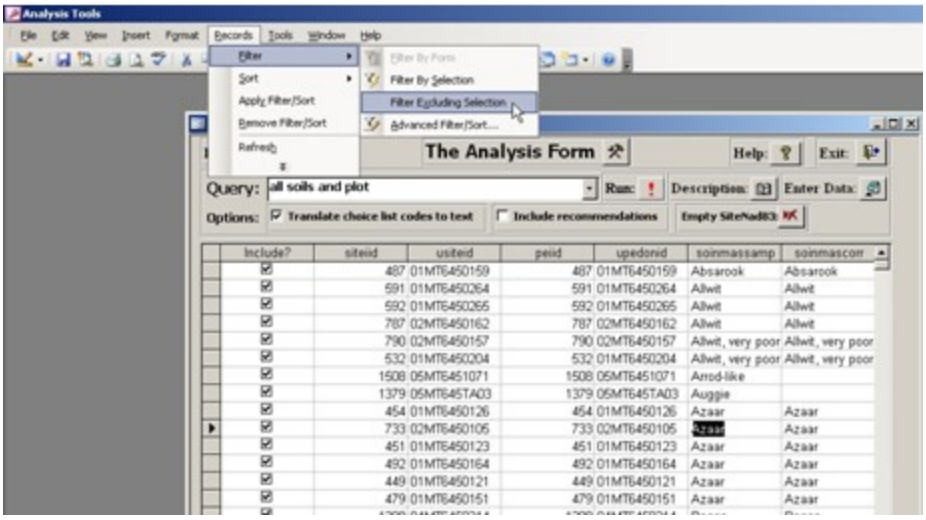
	Include?	siteiid	usiteid	peiid	upedonid	soinmassamp	soinmascorr	L
▶	☑	1	99MT6450102	1	99MT6450102	Whitlash	Whitlash	46.
	☑	6	00MT6380094	6	00MT6380094	Bigarm	Bigarm	46.9
	☑	10	00MT6380087	10	00MT6380087	Bigarm	Bigarm	46.9
	☑	11	00MT6380086	11	00MT6380086	Bigarm	Bigarm	46.9
	☑	12	00MT6380085	12	00MT6380085	Bigarm	Bigarm	46.9
	☑	15	00MT6380082	15	00MT6380082	Bigarm	Bigarm	46.9
	☑	19	00MT6380078	19	00MT6380078	Biglake	Biglake	46.9
	☑	23	00MT6380074	23	00MT6380074	Grassvalley	Grassvalley	46.9
	☑	24	00MT6380073	24	00MT6380073	Bigarm	Bigarm	46.9
	☑	26	00MT6380071	26	00MT6380071	Bigarm	Bigarm	46.9
	☑	33	00MT6380046	33	00MT6380046	Bigarm	Bigarm	46.9
	☑	40	00MT6380038	40	00MT6380038	Bigarm	Bigarm	46.9
	☑	41	00MT6380039	41	00MT6380039	Bigarm	Bigarm	46.9
	☑	44	00MT6380030	44	00MT6380030	Biglake	Biglake	46.9
	☑	50	00MT6380108	50	00MT6380108	Bigarm	Bigarm	46.9
	☑	59	00MT6380105	59	00MT6380105	Bigarm	Bigarm	46.7
	☑	60	00MT6380103	60	00MT6380103	Bigarm	Bigarm	46.7
	☑	62	00MT6380101	62	00MT6380101	Bigarm	Bigarm	46.
	☑	63	00MT6380100	63	00MT6380100	Biglake	Biglake	46.8
	☑	65	00MT6380098	65	00MT6380098	Biglake	Biglake	46.8
	☑	66	00MT6380062	66	00MT6380062	Missoula	Missoula	46.8
	☑	110	00MT6380020	110	00MT6380020	Bigarm	Bigarm	46.7
	☑	119	99MT6450103	119	99MT6450103	Rock outcrop	Rock outcrop	46.3
	☑	120	00MT6450078	120	00MT6450078	Burnt Fork	Burnt Fork	46.3
	☑	121	00MT6450077	121	00MT6450077	Subwell	Subwell	46.3
	☑	122	00MT6450076	122	00MT6450076	Burnt Fork	Burnt Fork	46.4

No empty soil names exist in our filtered set.

Once again, notice the “(Filtered)” text appended to the number of records.

The number of filtered records is confirmed.

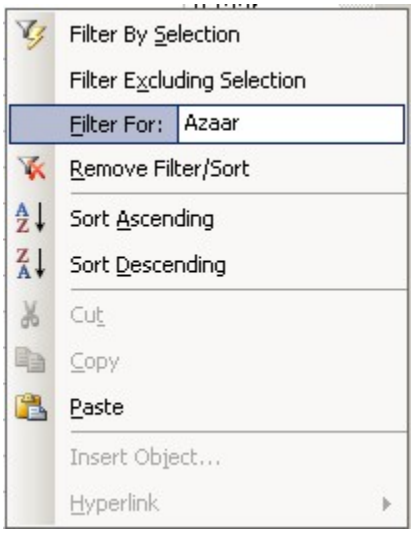
We now have a set of records with no NULL soil names, but can we further filter this set? The answer is yes. An example is to now exclude all “Azaar” records. To do this, perform the same operation as before: select and highlight the “Azaar” text and then navigate to **Records >> Filter >> Filter Excluding Selection** as shown in the screenshot below. We should receive 1049 records because we started with 1055 records and are excluding 6 Azaar records (1055 - 6 = 1049).



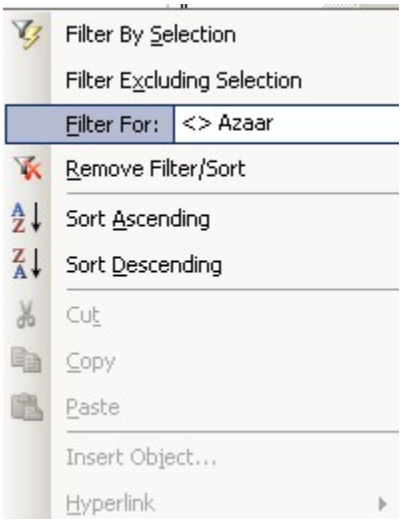
We are further filtering the set by excluding the “Azaar” soils.

The “(Filtered)” text indicates this is a filtered set.

There are some shortcuts available using the right mouse button (the context menu). Simply highlight a value in one of the fields, for example “Azaar” in the soinmassamp field, and a context menu appears. At this point you can enter values in the “Filter For:” textbox that perform an inclusion or exclusion of a particular value. The two screenshots below display filters for only the “Azaar” soils and another for excluding the “Azaar” soils. Also notice the “Filter By Selection”, “Filter Excluding Selection” and “Remove Filter/Sort” operations are also available.

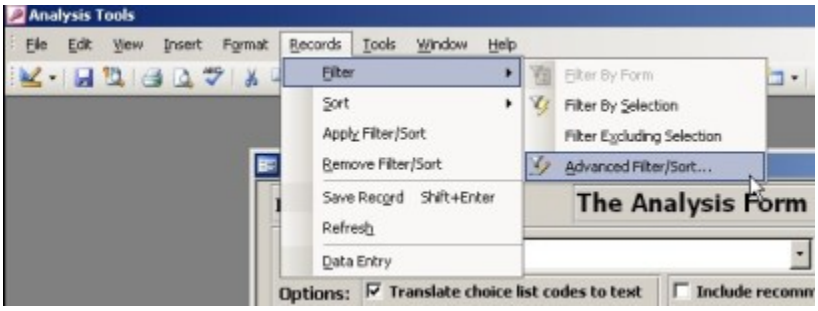


This filter will show only Azaar soils.



This filter will show all soils except Azaar.

At first, filtering step by step like this seems a bit tedious to those who wish to just filter one time because they know exactly what they want to see. For those type of users, there is one more option available by navigating to **Records >> Filter >> Advanced Filter/ Sort** as shown in the screenshot below.

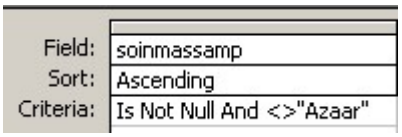


*For advanced users, navigate to **Records >> Filter >> Advanced Filter/Sort**.*

Selecting this option displays an advanced screen that allows the user to specify exactly what they want to filter on. The table you see displayed (in this case it is t_Analysis_Selected_Set") is our selected set in the main grid. Notice the "soil name as sampled" field (soinmassamp) is listed.

The t_Analysis_Selected_Set table (the selected set in the main grid on The Analysis Form) is displayed along with its field names in the upper pane.

In our case, we have already performed two filters: a filter excluding NULLs, and subsequently another filter excluding the “Azaar” soil types. This is exactly what is shown in the advanced filter Criteria syntax (Is Not NULL And <> “Azaar”) as shown in the screenshot below. Access has automatically figured out the SQL syntax and displayed the current filter situation. We have a filter on the “soil name as sampled” field, we are displaying the text in ascending order and we are filtering the selected set such that NULL records and “Azaar” soil records are omitted.



Notice Access has already filled in the “Criteria” field.

What does this “Criteria” text mean exactly? It is part of the “Where” clause in a SQL statement. In fact the above is represented in SQL as:

```
SELECT * FROM FROM t_Analysis_Selected_Set
WHERE soinmassamp Is Not Null And soinmassamp <> "Azaar"
ORDER BY soinmassamp Ascending
```

Some options available on this form through the context menu (right click) are “Apply Filter/Sort”, “Clear Grid”, “Load from Query” and “Save As Query” as shown in the screenshot below.

Right click on the window to show a context menu of options.

The SQL syntax can be shown by selecting the "Save As Query" option from the context menu, going to the list of database queries, and right clicking on the query name and selecting "Design View".

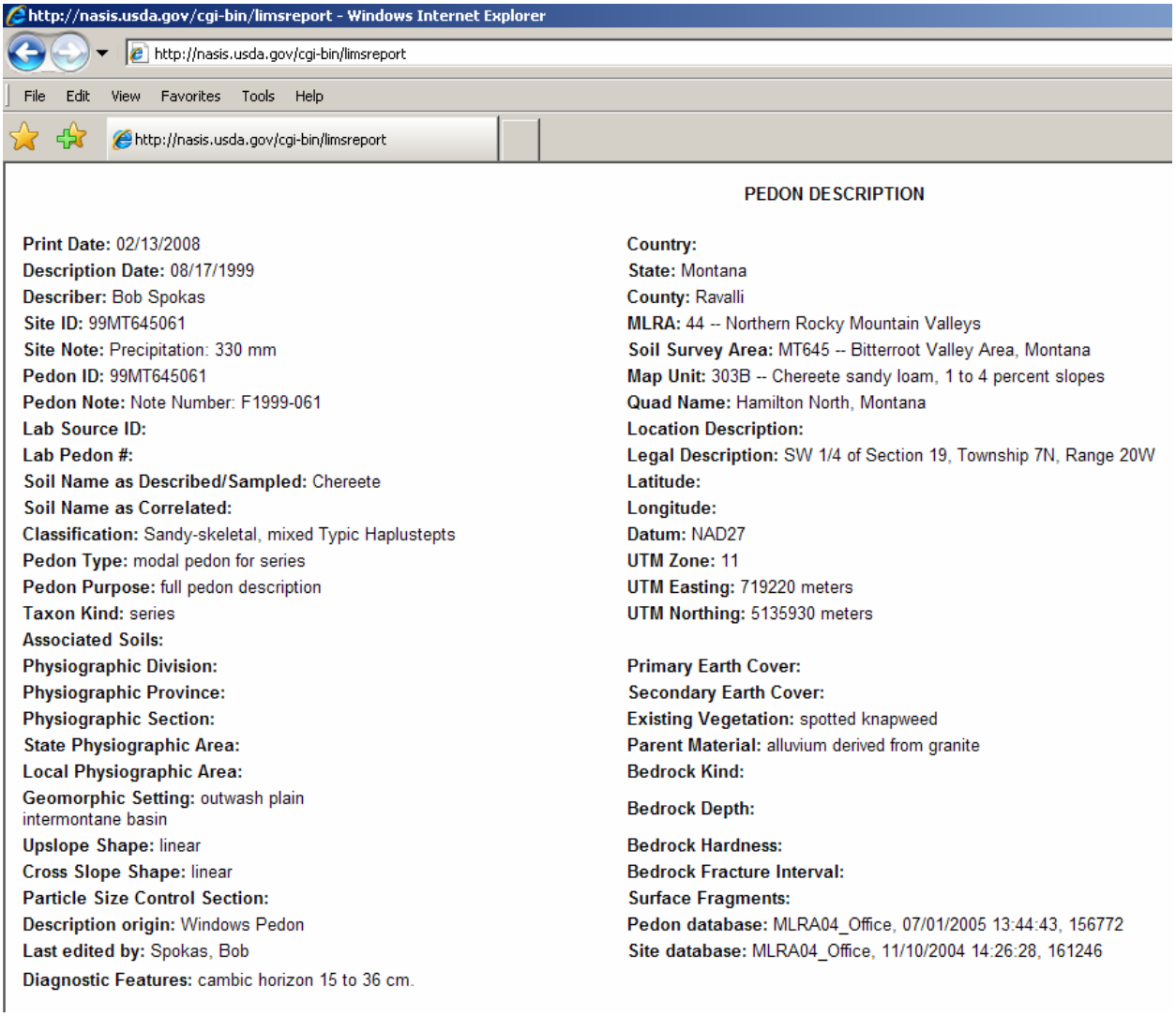
Note this is a feature for advanced users who are familiar with SQL syntax, the pedon database and the Access environment.

Links to a Pedon Description Report and ArcMap

Links to ArcMap and a web-based pedon description report are shown above.

You may view a pedon's description in a selected set given its User Pedon ID. This pedon must already exist in NASIS. Press the "Pedon Description Report" hyperlink and your web browser will be launched to the site: http://nasis.usda.gov/cgi-bin/limsreport?report_name=Pedon%20Description%20html%20(userpedid). Type in (or copy and paste) a User Pedon ID and a corresponding pedon description report will be returned.

A web-based pedon description report utility is shown above.

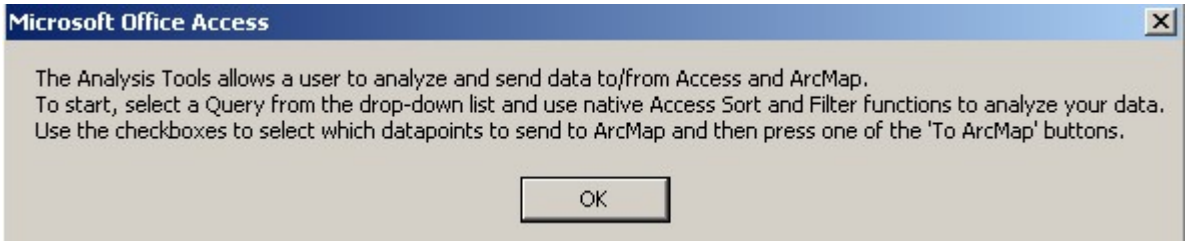


A portion of the pedon description report for User Pedon ID "99MT645061" is shown above.

Analysis Form Features

At this point, the buttons and features on The Analysis Form will be discussed. The first button is the one that displays the form's instructions. It is accessed by pressing the tools button next to the name of the form.

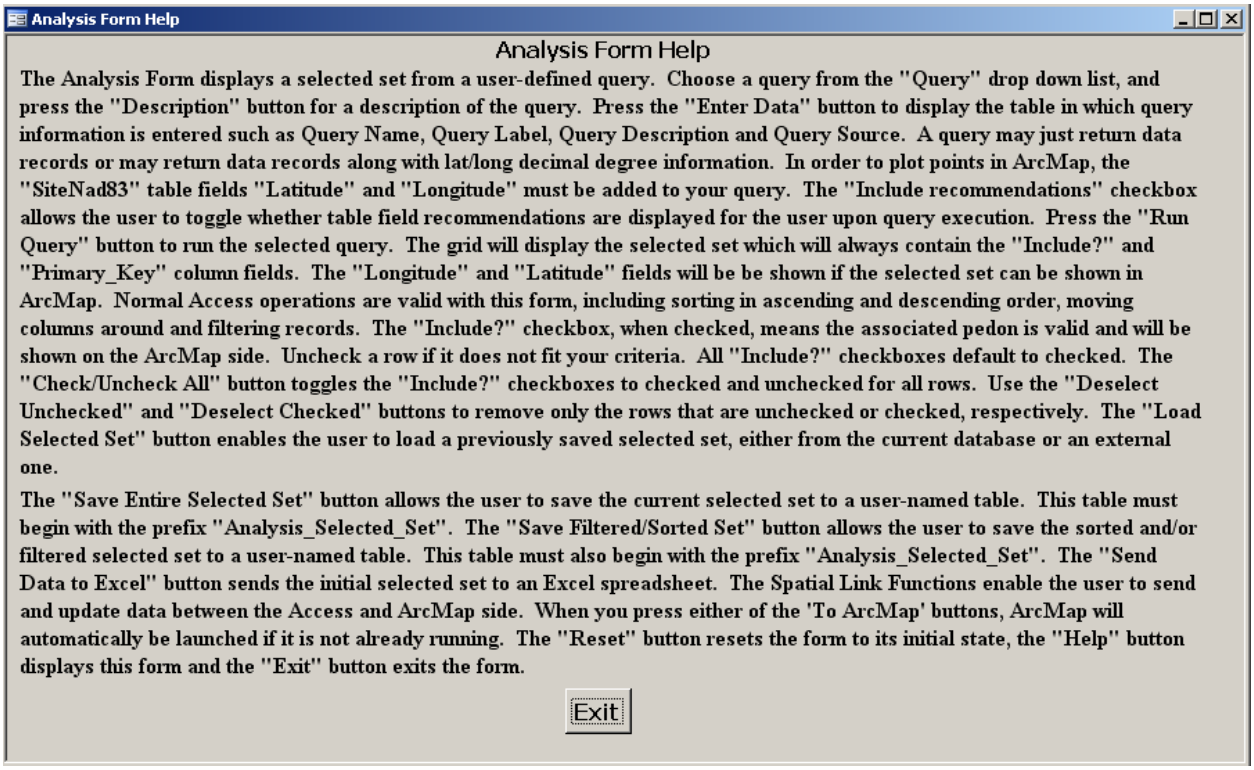
Press the Tools button next to "The Analysis Form" label to display basic instructions.



Brief Instructions are provided as seen above.

A similar button is the Help button which is accessed through the question mark icon.

Press the question mark button next to the "Help" label for help.



The Analysis Form help screen is shown above.

The Exit button or "X" box may be clicked in order to exit The Analysis Form.

There are two ways to exit the form.

The Reset button resets the form to its initial state and clears the contents of the Query listbox and selected set grid.

To reset the form to its initial state press the Reset button.

The Query listbox contains all the query labels representing the built-in queries and is how you select a query to run.

This is where you select a query to run.

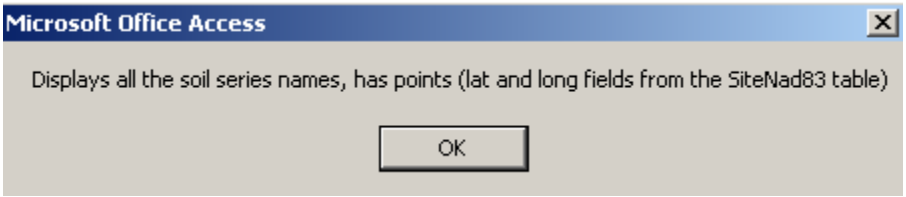
The Run button is a red exclamation point icon which is pressed after a query is chosen.

Press the Run button to execute a query and create a selected set.

Pressing the Description icon (a book) will display the description field for this query.

To show what a query does, press the Description button.

In this case, the query label is “all soils and plot” and the description is “Displays all the soil series names, has points (lat and long fields from the SiteNad83 Table)”. This is the description given by the creator of the query and can be as brief or as long as you wish (it is a Memo field).



A Query description is shown above.

The table used to define the contents of the Query drop down list is called “t_Analysis_Query” and its fields are shown below.

t_Analysis_Query : Table

Field Name	Data Type
Query_ID	Number
Query_Label	Text
Query_Name	Text
Query_Description	Memo
Seq	Number
Query_Source	Text
Has_Points	Yes/No

The “t_Analysis_Query” table fields are shown above.

The “ID” field is the table’s primary key, the “Label” field is what a user sees in the Query drop down list box, the “Name” field is the actual query name in the database, the “Description” field is the user-defined query description, the “Source” field represents the creator of the query and the “Has Points?” field is a Boolean value representing whether or not a query contains latitude/longitude (point) information.

Analysis Query Data Entry

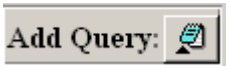
Analysis Query Data Entry

Analysis Query Table (Label Required):

Sequ	Label	Name	Description	Source	Has Points?
1	all soils	q_analysis_all_soils_no_points	Displays all the soil series names, no point	NGDC	☐
2	all soils and plot	q_analysis_all_soils_points	Displays all the soil series names, has poir	NGDC	☑
3	mapunit elements and plot	q_analysis_muelements_points	Query for mapunit elements, has points (lat	NGDC	☑

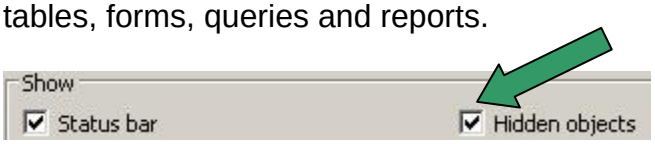
Some records in the “t_Analysis_Query” table are shown above.

To add, remove or edit an entry in the Query drop down list, you must add, remove or edit a record in the t_Analysis_Query” table. This can be done through the basic Access interface or through the “Add Query” button (the notebook icon). Note that the Label and Name are required fields in this table because you need a Label for the Query drop down list and you need a Name for the actual query name in the Analysis PC database.



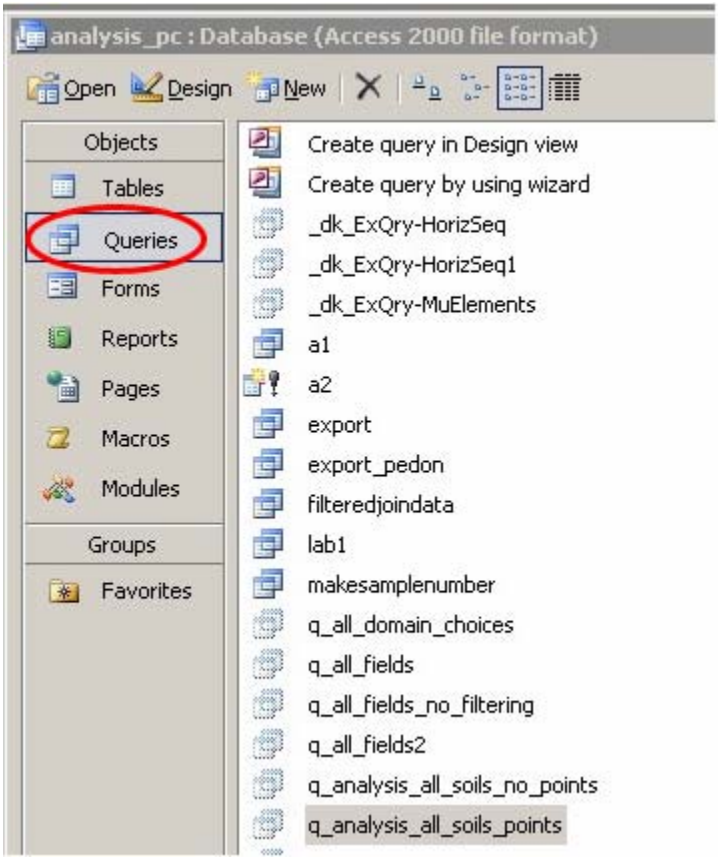
Press the Add Query button to edit records in the “t_Analysis_Query” table.

This next part will show you one of the existing queries in the database. In Microsoft Access, navigate to the **Tools >> Options >> View** tab. Make sure the box next to **Show >> Hidden Objects** is checked. This step will allow you to see all database tables, forms, queries and reports.



Check the Hidden objects checkbox to show all tables, forms, queries and reports.

Navigate to the “analysis_pc: Database (Access 2000 file format)” window which lists all the objects in the database such as tables, queries, forms and reports. Select the “Queries” Objects. Right click on the “q_analysis_all_soils_points” query and select ‘Design View”.

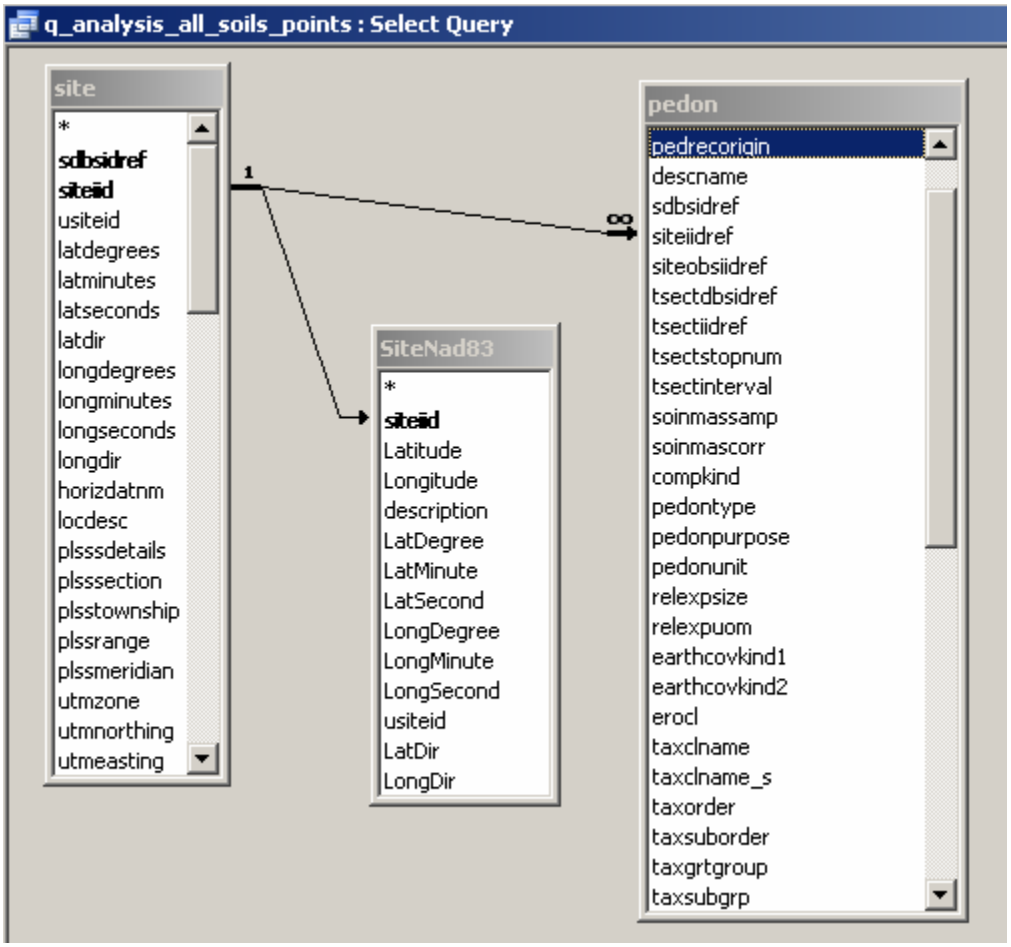


Right click on the "q_analysis_all_soils_points" query to reveal a context menu.

The query's SQL text is revealed through "Design View".

Notice that we include the SiteNad83 table and the fields Latitude and Longitude because we intend to plot points in ArcMap.

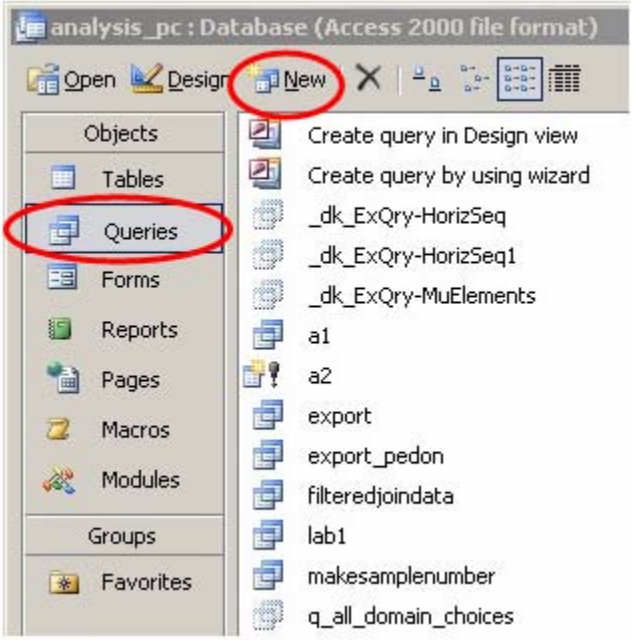
Right click again and select "Query Design". Notice we are joining the tables "site", "pedon" and "SiteNad83".



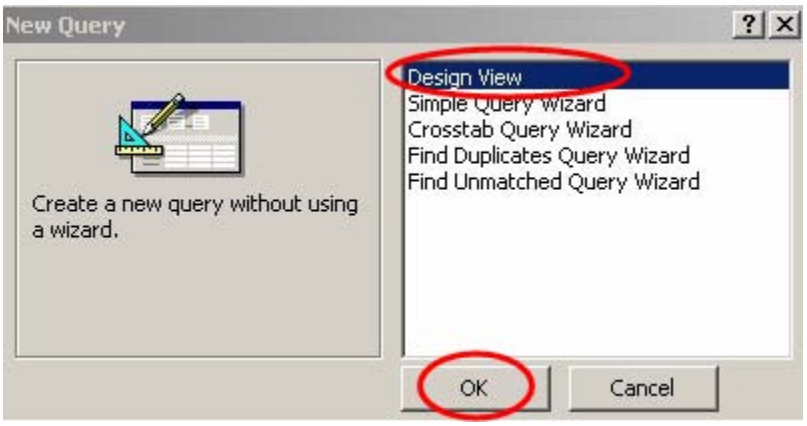
In "Query Design" the tables "site", "pedon" and "SiteNad83" are joined.

The first step in adding one of your own queries is to create the query using the basic Access interface.

Navigate to the main database window “analysis_pc: Database (Access 2000 file format)”, select the “Queries” Object, press “New”, select “Design View” and then press the “OK” button.

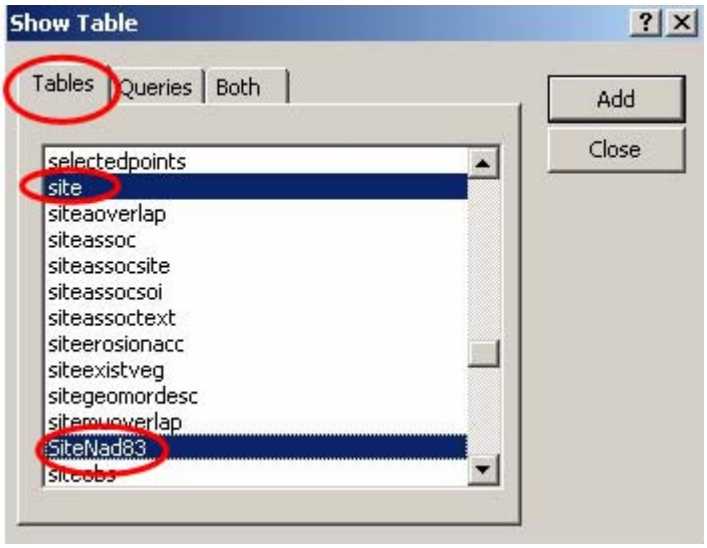


*Go to the main database window and select **Queries >> New**.*



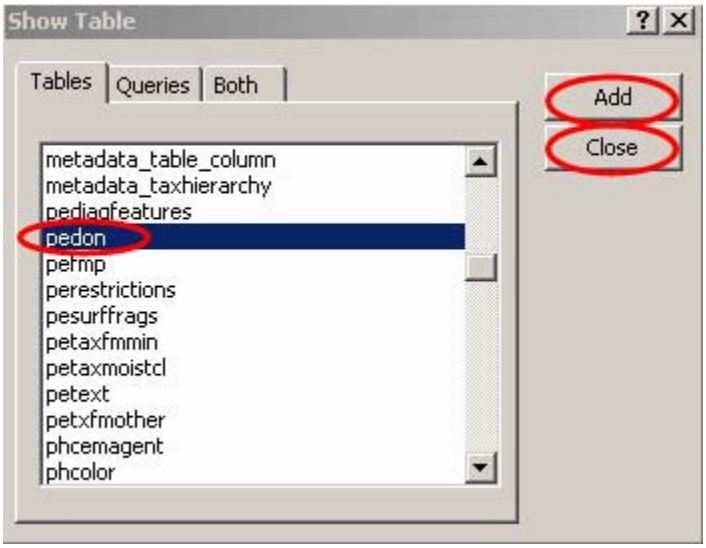
*Select **Design View >> OK**.*

The next step is to select the tables from which you will select data. If you plan to show points in ArcMap you need to select the “SiteNad83” table. You may select from tables, queries or both as shown in the tabs below.

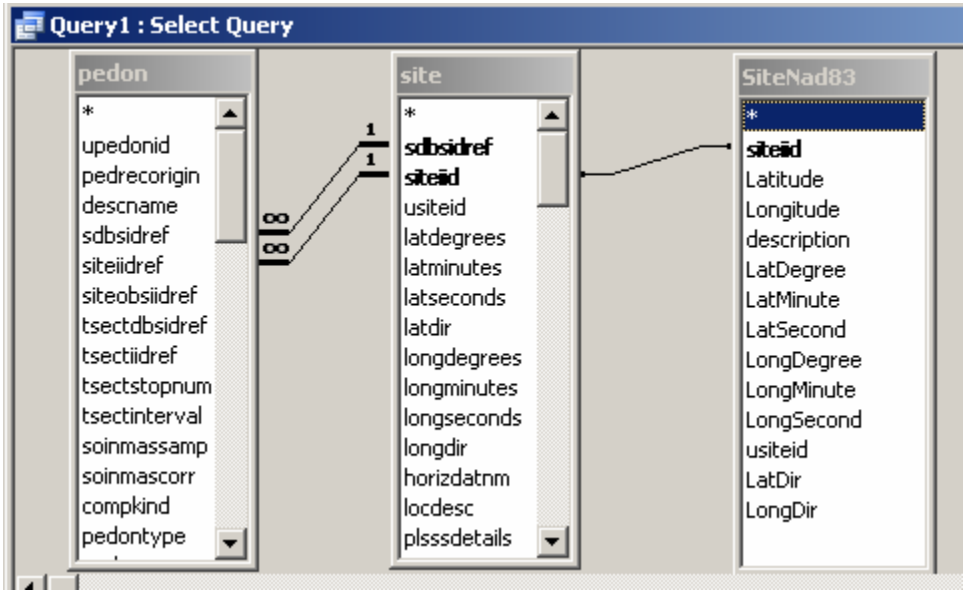


Select the SiteNad83 table if you intend to show points in ArcMap.

Our goal here is to show how the “all soils and plot” query was created. In this case we have selected the site table and the SiteNad83 table, but we still need to scroll up in the list to select the pedon table (the tables are sorted in alphabetical order). Press and hold the Ctrl key down and press the left mouse button to highlight and select more than one table at a time. Once the pedon table is selected, the “Add” button and then the “Close” button are pressed to display a visualization of the tables.



Once you are done selecting tables and/or queries, press the Add button and then the Close button.

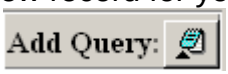


The new query is given a generic name: Query1 (Query and then an available integer); if Query1 already exists then this would be given the name Query2.

As you can see Access has already created the table connections so the only thing left is to select the fields you wish to see in your selected set. In this case, we want to see the "Rec_ID" fields for the site and pedon tables, the "User Site ID" in the site table, the "User Pedon ID", the "Soil Name As Sampled" and "Soil Name As Correlated" fields in the pedon table, and the "Latitude" and "Longitude" fields in the SiteNad83 table. In order to select these fields simply double click the field in the table and Access will automatically add those fields to the listing below.

Field:	upedonid	peiid	soinmassamp	soinmascorr	siteiid	usiteid	Latitude	Longitude
Table:	pedon	pedon	pedon	pedon	site	site	SiteNad83	SiteNad83
Sort:								
Show:	☑	☑	☑	☑	☑	☑	☑	☑
Criteria:								

Double click a field in a table in the upper pane and it will appear in this grid in the lower pane.

Save the query, giving it a descriptive name. This is the name to be placed in the "Name" field in the "t_Analysis_Query" table. The next step is to open the "t_Analysis_Query" table and create a new record for your query or open The Analysis Form and press the "Add Query" button 

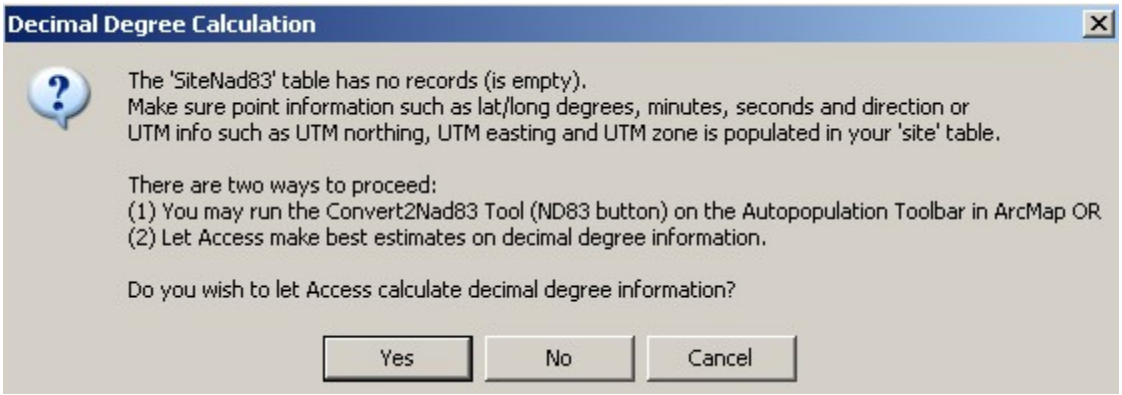
Rec ID	Label	Name	Description	Seq	Source	Has Points?
2	all soils and plot	q_analysis_all_soils_points	All soils, has points	2	Sal Magnotta	☑

Add information as needed for a new query in the "t_Analysis_Query" table.

The next section to discuss is the "Options" section. This section contains some pre-run options for the user to choose.

Pre-run options.

The "Include recommendations" checkbox allows the user to toggle whether table field recommendations are displayed for the user upon query execution. The “Empty SiteNad83” button allows the user to delete all the records in the SiteNad83 table. The deletion of SiteNad83 records may be needed in order to resynchronize the table due to changes in the database, for example adding more site records or filling in more point information in the site table. If this button is pressed accidentally, the program will prompt the user to recalculate point information and fill the SiteNad83 table when a query is run as shown in the screenshot below.



If the SiteNad83 table is empty the program will prompt the user for direction.

This dialog box will appear in the Analysis Form when it is found that the “SiteNad83” table is empty (no records exist). There are many causes for this to occur. The user may have pressed the “Empty SiteNad83” button or intentionally deleted all records in the “SiteNad83” table via the standard Access interface. It is also possible the current site table does not contain point information in the UTM and DMS fields such as UTM northing, UTM easting and UTM zone, and Latitude Degrees, Latitude Minutes, Latitude Seconds and Latitude Direction. The user may have to populate these fields in the site table in order to proceed by using the NASIS import function in Setup.

The “Include?” field in the selected set grid on The Analysis Form represents whether or not the record will be displayed on the ArcMap side. When the box is checked, the point will be displayed in ArcMap and when it is unchecked the point will not be shown.

	Include?	siteiid	usiteid
▶	☑	1	99MT6450102
	☑	2	00MT6380089
	☑	3	00MT6380096
	☑	4	00MT6380095

The Include checkbox is checked to show a point on the ArcMap side.

Simply check/uncheck the box according to your analysis.

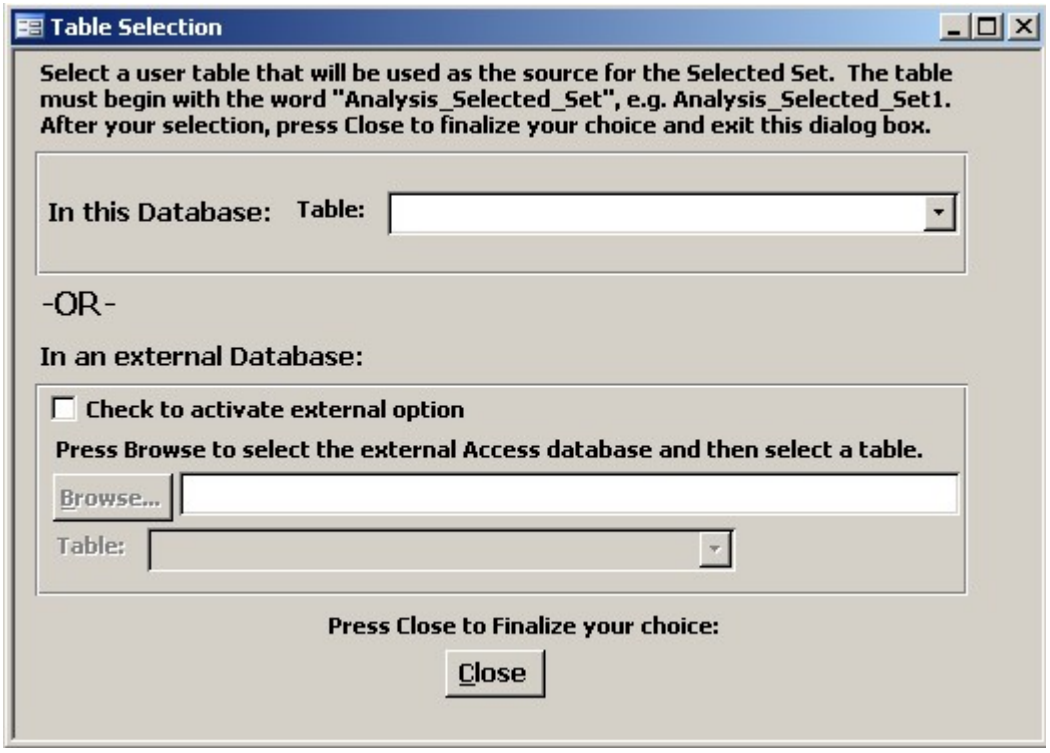
A global way to check or uncheck all the boxes for all the records in the selected set is the “Check/Uncheck All” button. Also all unchecked records may be removed by pressing the “Deselect Unchecked” button and all checked records may be removed by pressing the ‘Deselect Checked” button.

Selected Set Functions are shown above.

Press the “Load Selected Set” button to load a previously saved selected set (either a filtered or unfiltered selected set).

The Load Selected Set button allows the user to load a selected set into the main grid.

When loading, you may choose a table in the current Analysis PC database or in an external Access database.



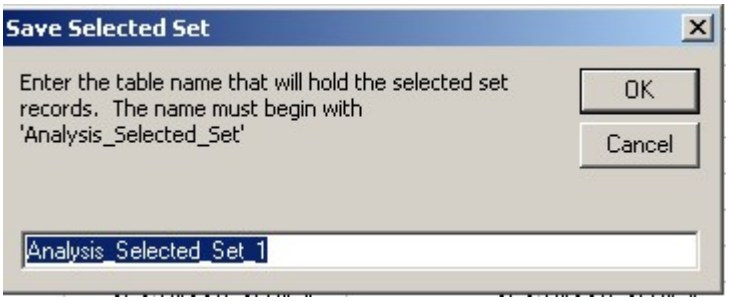
The Table Selection dialog box allows the user to load a table in the current database or an external one.

The Analysis Form gives the user the opportunity to save the entire unfiltered/unsorted selected set or the filtered/sorted selected set. For example, the query “all soils and plot” returned 1599 records for the particular pedon database we were using. We filtered out all the NULL (empty soils) values and received 1055 records for the filtered set. If we wanted to save the 1599 records we would have pressed the “Save Entire Selected Set” button and given the saved name a meaningful one such as “Analysis_Selected_Set_all_soils”. If we also wanted to save the 1055 records produced by the filter we would have pressed the “Save Filtered/Sorted Set” button and given the saved name a meaningful one such as “Analysis_Selected_Set_all_soils_no_nulls”. Note that the table name must begin with the text “Analysis_Selected_Set”.

The two save options are shown below.

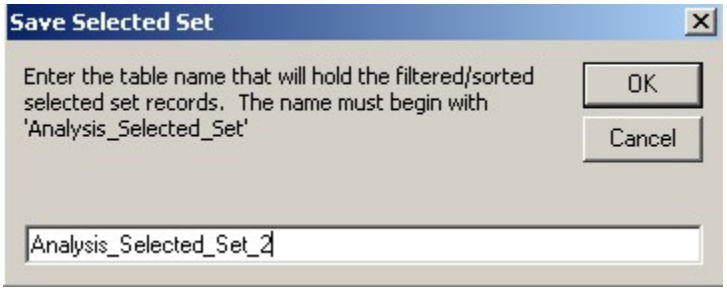
You can save the original (entire) selected set or a filtered one.

If the “Save Entire Selected Set” button is pressed the following dialog box displays.



The Save Entire Selected Set prompt is shown above.

If the “Save Filtered/Sorted Set” button is pressed the following dialog box displays.



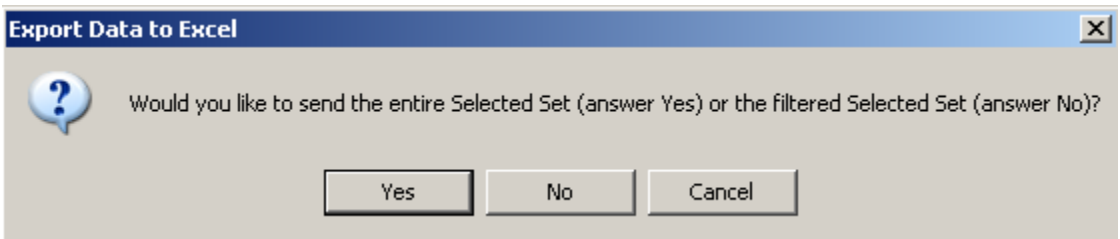
The Save Filtered/Sorted Set prompt is shown above.

Both selected sets are saved to a user-defined table beginning with the prefix "Analysis_Selected_Set".

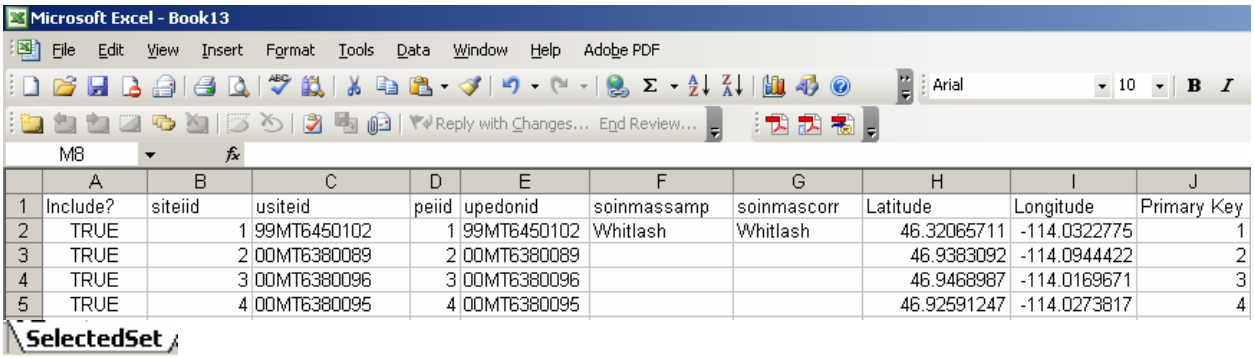
The purpose of saving a selected/filtered set is to be able to load the selected set at a later point in time. ***In Analysis PC, the saved selected set can be loaded into the Analysis Form, the Statistics Form, or the Textural Triangle Form.***

Analysis PC is also "Excel enabled", allowing a user to send Access data over to an Excel spreadsheet for further analysis in that environment.

The Excel button can send the entire (original unfiltered) selected set over to Excel, or a filtered selected set.



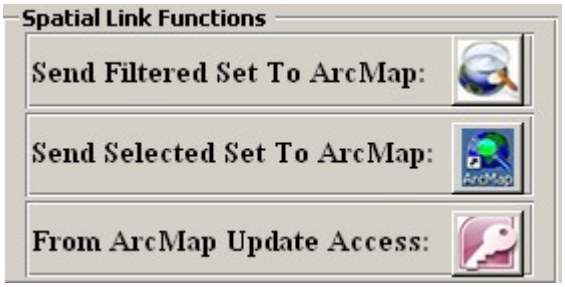
The Excel button can send the entire (original unfiltered) selected set over to Excel, or a filtered selected set. Press the "Yes" button to send the entire set over, the "No" button to send the filtered set over or the "Cancel" button to cancel the operation.



	A	B	C	D	E	F	G	H	I	J
1	Include?	siteiid	usiteid	peiid	upedonid	soinmassamp	soinmascorr	Latitude	Longitude	Primary Key
2	TRUE	1	99MT6450102	1	99MT6450102	Whitlash	Whitlash	46.32065711	-114.0322775	1
3	TRUE	2	00MT6380089	2	00MT6380089			46.9383092	-114.0944422	2
4	TRUE	3	00MT6380096	3	00MT6380096			46.9468987	-114.0169671	3
5	TRUE	4	00MT6380095	4	00MT6380095			46.92591247	-114.0273817	4

The selected set was sent over to Excel in the worksheet named "Selected Set".

There are three spatial functions available to the user: the ability to send the entire selected set to ArcMap, the ability to send the filtered set to ArcMap and the ability to update Access once an ArcMap Toolbox Model has been executed.

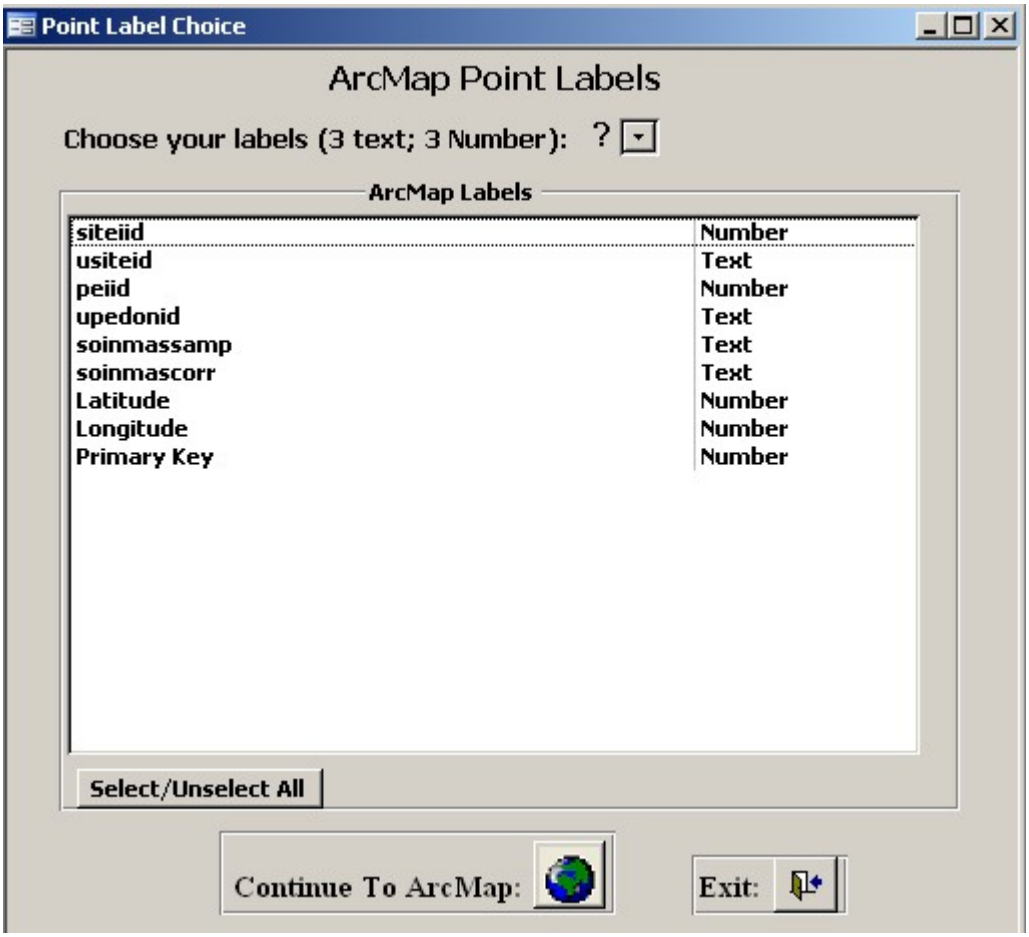


The Spatial Link Functions are shown above.

For example, suppose the entire selected set consists of the 1599 records obtained from running the “all soils and plot” query and the filtered set consists of the 6 “Azaar” soil records. In this case, you could send all 1599 records to ArcMap via the “Send Selected Set To ArcMap” or you could send the 6 “Azaar” soil records via the “Send Filtered Set To ArcMap”. Note that you do not have to send all records over for display on the ArcMap side. Check an “Include?” checkbox to send over that record (point) to ArcMap, and uncheck the checkbox to exclude that record (point) in ArcMap.

You can send the original selected set or the filtered one.

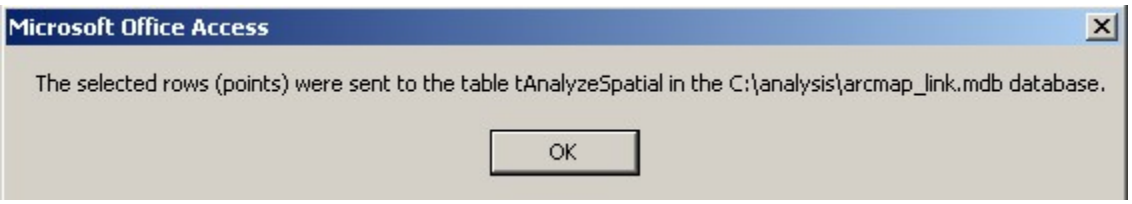
Pressing either of the “Send” buttons will send you to another screen in which you select fields you wish to display on the ArcMap side. You may select up to six fields, of these three can be text type fields and three can be number type fields. Text type fields include text, strings and characters such as “Azaar” and number type fields include whole numbers and floating point numbers such as 10 and 5.4, respectively. In ArcMap the six field names will be represented as “Field 1” through “Field 6”. In this example we will send all six filtered records (Azaar soils) so we press “Send Filtered Set To ArcMap” and the following screen appears.



The Point Label Choice Form: select the labels to be seen on the ArcMap side.

In the form above, we selected five fields: siteiid (number), usiteid (text), peiid (number), soinmassamp (text) and soinmascorr (text), and then pressed the “Continue to ArcMap” button (globe icon). We could have selected one more numerical field since a maximum of six fields may be sent over.

The next dialog box displays and confirms that the rows we selected were sent to the spatial link database (arcmap_link.mdb) table “tAnalyzeSpatial”. Recall that the table “tAnalyzeSpatial” is where points are stored and is the point layer in the ArcMap project.



This confirmation box states the points were sent to the spatial link database.

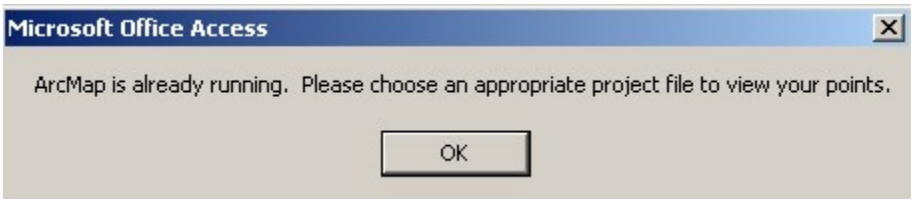
After pressing the “OK” button we receive a note indicating the fields we have chosen, their data type (number or text) and to which ArcMap field they are mapped (Field 1

through Field 6). The dialog box shows the mapping of the fields to the labels we have chosen.

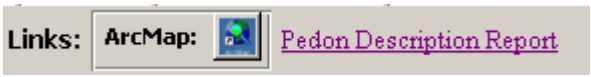
A summary of what is being sent over is displayed.

You may want to write these field mappings down for future reference when working with ArcMap. At this point, Access will launch ArcMap if it is not already running. If it is already open then a confirmation dialog box will appear. If you do not have ArcMap installed on your computer or have specified its path incorrectly in the Setup Form, you will be notified through a dialog box. The default location of ArcMap is "C:\Program Files\ARCGIS\bin\ArcMap.exe". If this is incorrect for your particular configuration, please change this in the Setup Form (**Main Menu >> Setup Menu >> Setup**).

After pressing the "OK" button, we receive the message that ArcMap is already running (for this example) and to choose an appropriate project file. Access does not check what project is running in ArcMap. In our case we already have the necessary project running so we simply switch to the ArcMap environment.



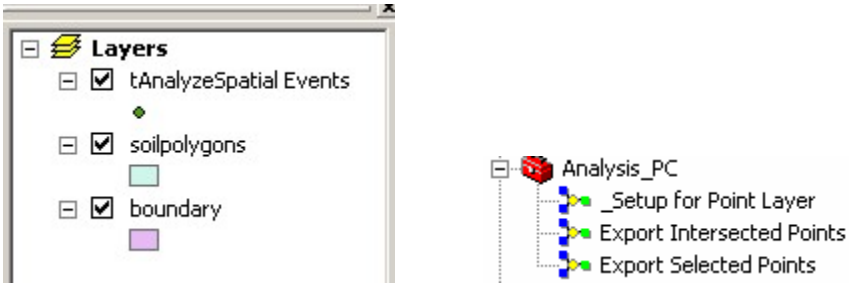
The program will detect if ArcMap is running or not.



A link to ArcMap is shown above.

If you wish to launch ArcMap without sending data, there is a link to it under the "Links" section. Press the ArcMap button and ArcMap will be launched, if it isn't already running. This should be used if you want to open ArcMap without sending any Access data.

In the following examples, we already have the layers set up properly and have also loaded the ArcToolbox "Analysis_PC.tbx".

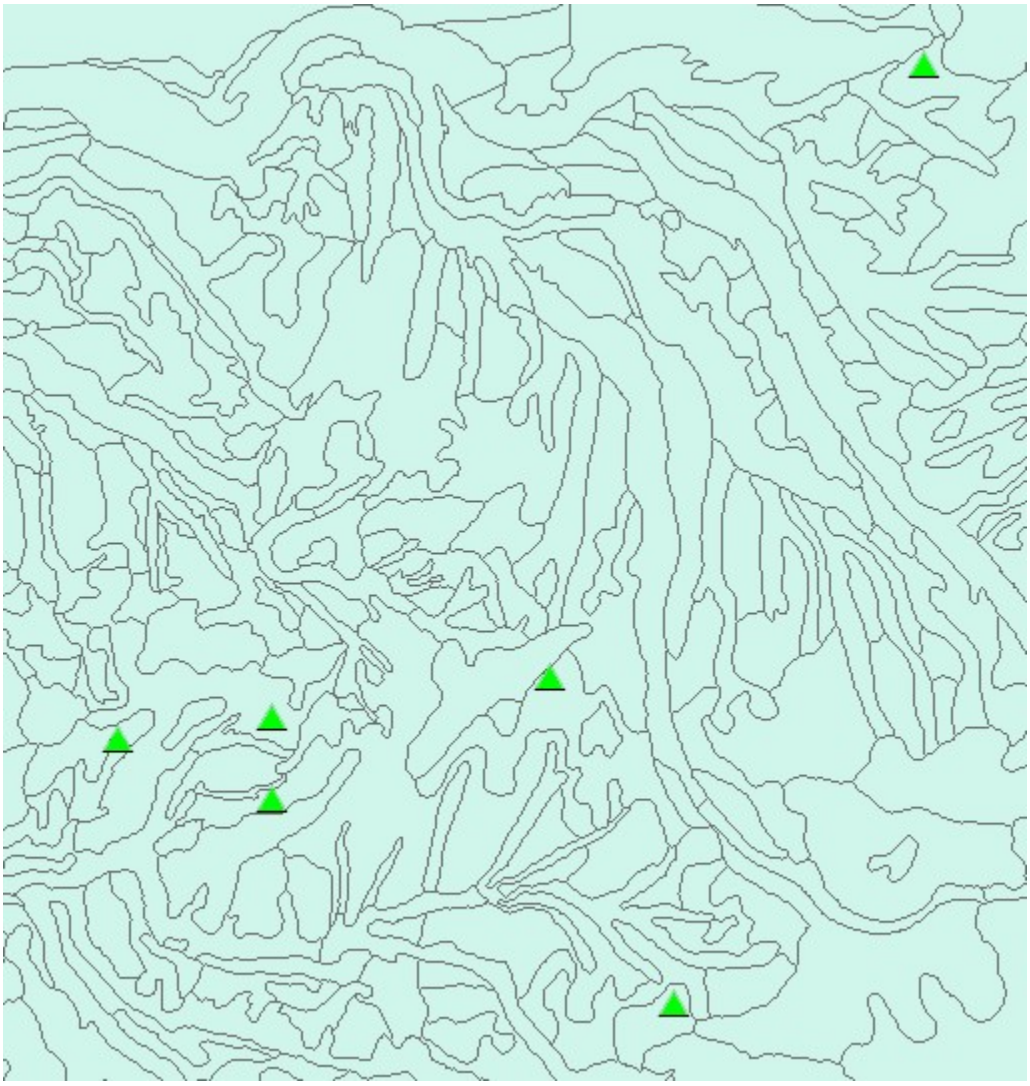


The three layers and the toolbox are already loaded.

Once we are in ArcMap, the first step is to refresh the map to reflect the points we have just sent over. Do this through the "Refresh the active view" icon (two arrows). It is located at the bottom of the map: Next, we need to resize and arrange the map to view the six points we sent over. We do so using the zoom in and out buttons, the pan button, the full extent button and the last extent button.

The zoom in, zoom out, pan, full extent and last extent buttons are shown above.

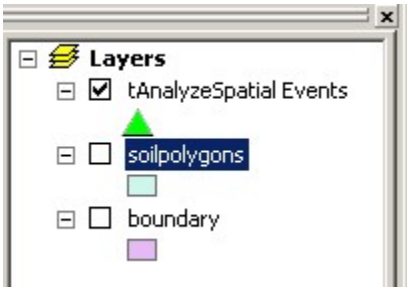
Our map now looks like this:



The map displays six points, five of which are close to each other.

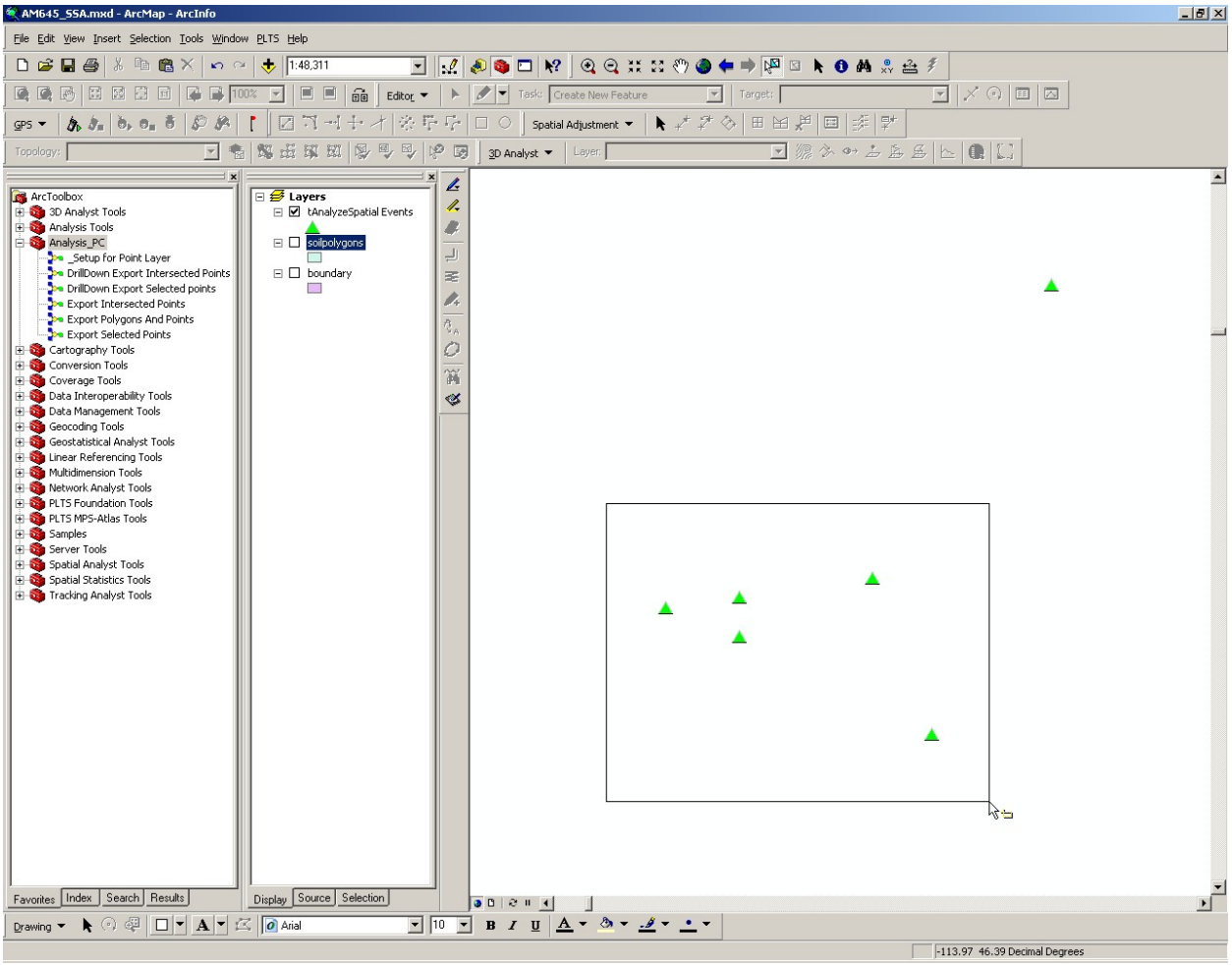
Notice five of the points (shown by green triangles) are closely set to one another but one is in the far north-east corner. Perhaps through some analysis it is found that this outlier is not actually part of the “Azaar” soil types. We can select the five points and exclude the other one using the “Select Features” button:

An easy to way to select the points (features) is to temporarily hide the other two layers and only show the points layer (hide the soilpolygons and boundary layers). We do this by unchecking the boxes next to the layers we want to hide.



To select points only show the tAnalyzeSpatialEvents layer (hide the other two).

Now that the points are the only thing visible, we simply select the five points using the "Select Features" button. Hold and drag the cursor to make a bounding rectangle as shown below.

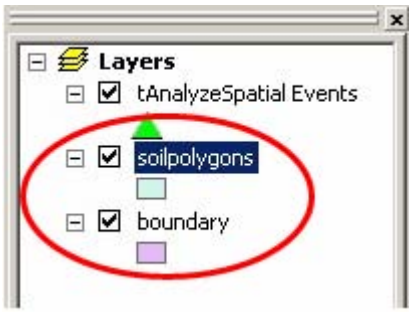


Hold the left mouse button down and drag the cursor to create a bounding rectangle.

After releasing the mouse button you will see that we have indeed selected the five points (notice the colors have changed from green to a light blue in the screen below).

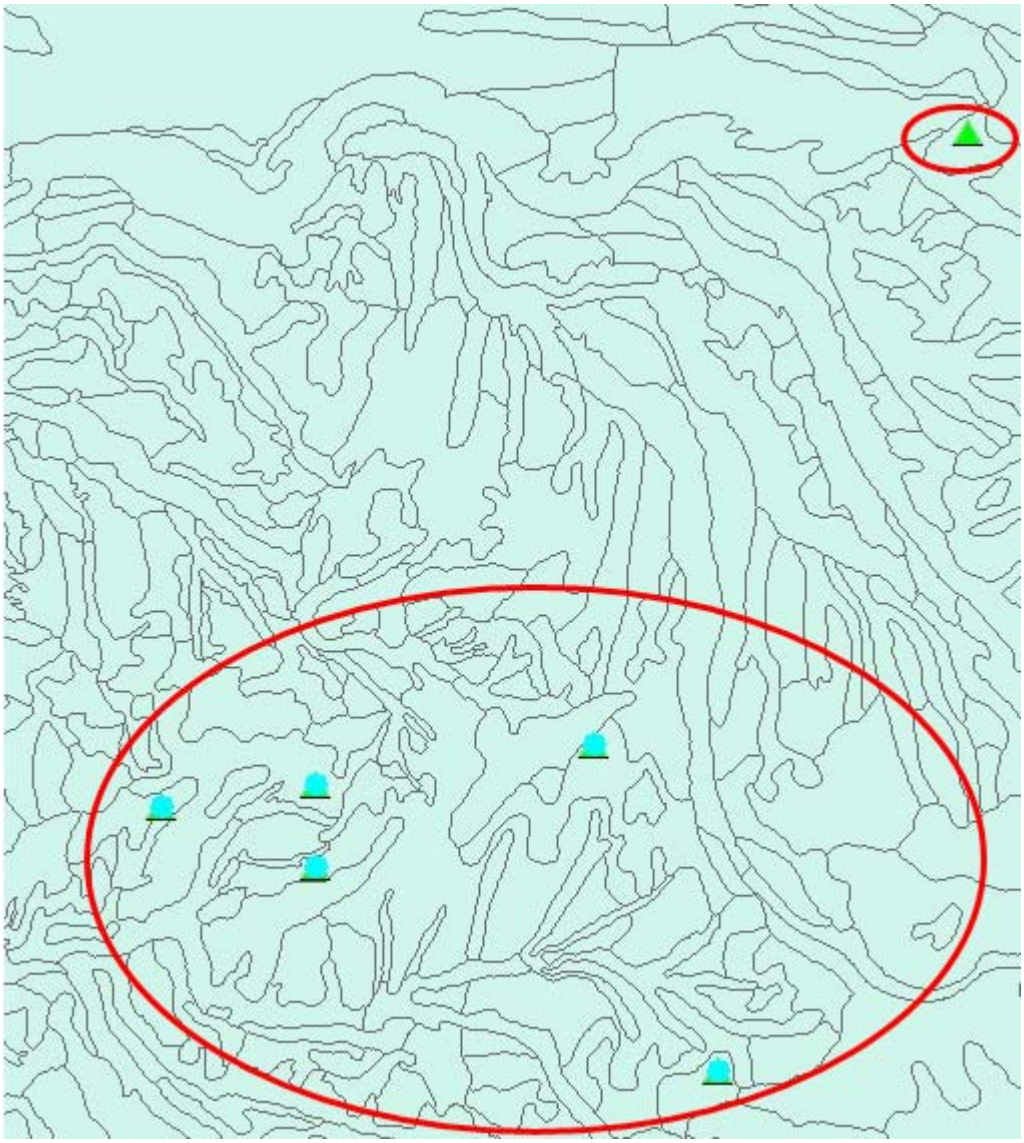
The five points have been selected as shown above.

Next, we can re-check the boxes to show the layers that were hidden.



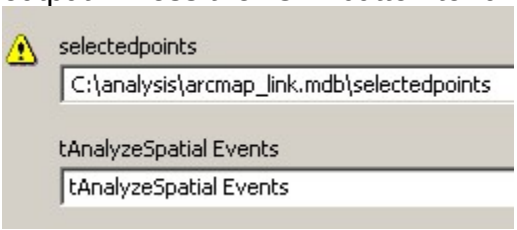
Show the two layers we previously hid.

The following map is displayed. Notice the selected points versus the unselected point in the northeastern corner of the map (the green triangle).



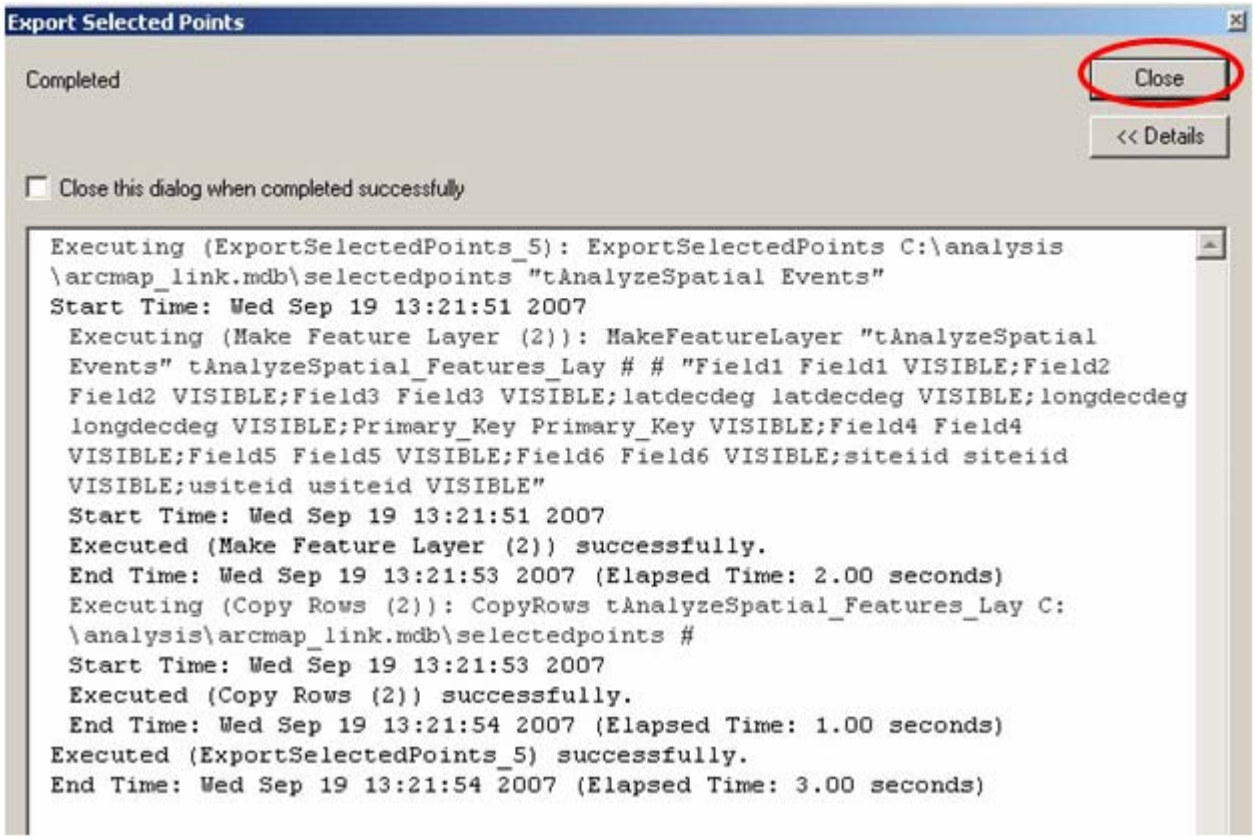
The blue triangles are selected points and the green triangle is the unselected point.

Next we need to run the ArcMap model "Export Selected Points" (simply double-click the name to run it). A run dialog box appears displaying where the model will write the output. Press the "OK" button to run the model.



Run the model "Export Selected Points" to export the five selected points.

The following screen appears and indicates the model ran successfully.



Successful completion of model execution is shown above (press the Close button).

Since the points were written to the spatial link database we now need to switch back to Access and press the "From ArcMap Update Access" button to refresh the Analysis Form grid. You will always do this after running a model in ArcMap.

Once we are back in The Analysis Form, we want to refresh the selected set grid.

Access indicates the operation was successful.

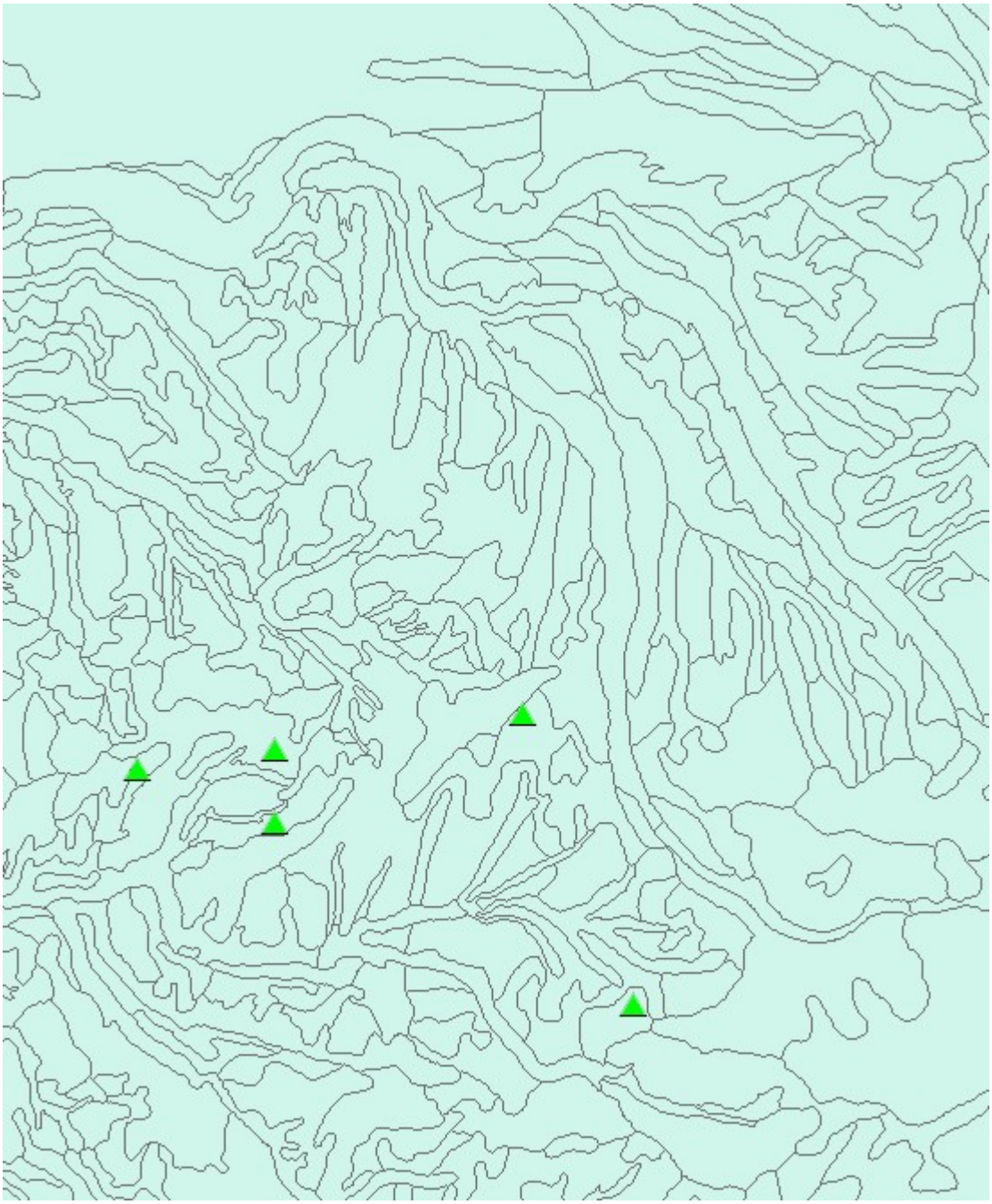
Successful refresh on the Access side.

Notice the original six selected records now have one record unchecked. The record with the unchecked box is the point in the northeastern corner of the map we did not select in ArcMap.

	Include?	siteiid	usiteid	peiid	upedonid	soinmassamp	soinmascorr
▶	☐	733	02MT6450105	733	02MT6450105	Azaar	Azaar
	☑	492	01MT6450164	492	01MT6450164	Azaar	Azaar
	☑	479	01MT6450151	479	01MT6450151	Azaar	Azaar
	☑	454	01MT6450126	454	01MT6450126	Azaar	Azaar
	☑	451	01MT6450123	451	01MT6450123	Azaar	Azaar
	☑	449	01MT6450121	449	01MT6450121	Azaar	Azaar

The unchecked record is the point in the northeastern corner of the map. Note we have not deleted the point from the selected set; we have only excluded it from the selected set by unchecking the checkbox.

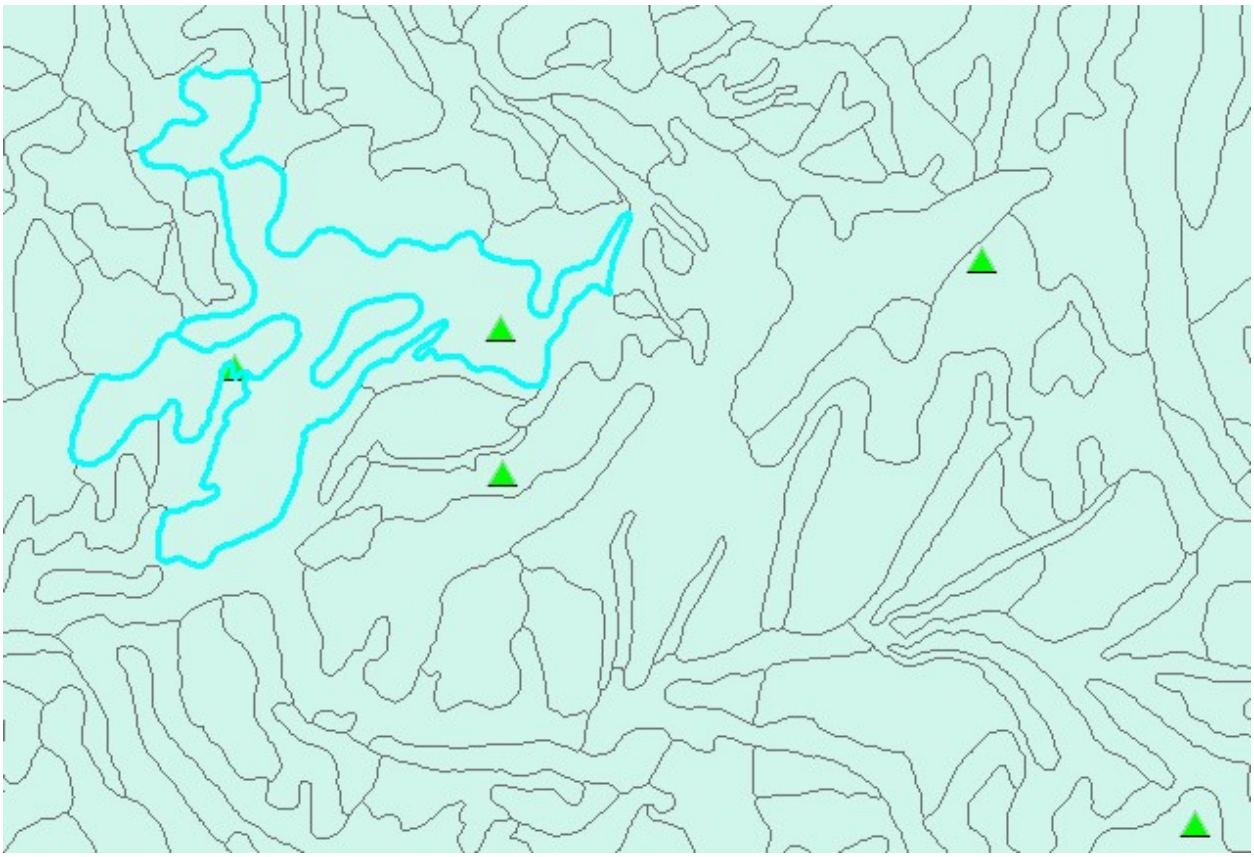
Interaction can continue in this manner between Access and ArcMap. At this point we can resend these five checked points to ArcMap and see what happens to the map. We do so and the map is updated on the ArcMap side to show only the five points selected.



The ArcMap side is refreshed to show the five points. The northeast corner point is gone.

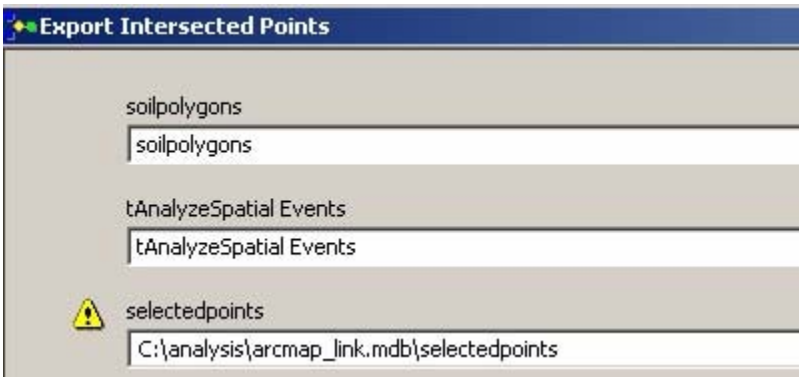
We can save the current filtered selected set in Access (six Azaar records with one unchecked) by pressing the “Save Filtered/Sorted Set” button. We can also save all 1599 records through the “Save Entire Selected Set” button. Perhaps this is a breaking point in our work and we will return to this at a later time. At that later time, we would open The Analysis Form, press the “Load Selected Set” button and choose the saved selected set table to load into the main grid.

Since we are in ArcMap at this time, let's run another model on our remaining five points. Suppose we want to select one or more soil polygons and send the points contained within those polygons to Access. This time we are working with the "soilpolygons" layer.



We select one soil polygon (the "soilpolygons" layer).

We select one polygon using the "Select Features" button .and notice that two points are contained within its boundaries. We then run the model "Export Intersected Points".



Run the "Export Intersected Points" model to send the points within the selected polygon.

After the model successfully runs, we switch back to Access and press the “From ArcMap Update Access” button and receive the following result.

	Include?	siteiid	usiteid	peiid	upedonid	soinmassamp	soinmascorr
▶	☐	733	02MT6450105	733	02MT6450105	Azaar	Azaar
	☐	492	01MT6450164	492	01MT6450164	Azaar	Azaar
	☐	479	01MT6450151	479	01MT6450151	Azaar	Azaar
	☑	454	01MT6450126	454	01MT6450126	Azaar	Azaar
	☑	451	01MT6450123	451	01MT6450123	Azaar	Azaar
	☐	449	01MT6450121	449	01MT6450121	Azaar	Azaar

Two records are checked and represent the two points inside the selected soil polygon.

As expected, two points have been selected and are the points within the polygon we selected in ArcMap. Note we have not deleted any points from the selected set; we have only excluded them from the selected set by unchecking their checkboxes.

A Note on The Analysis_PC Models

For the previous examples, we ran two models: “Export Selected Points” and “Export Intersected Points”. These models are to be used for The Analysis Form. The model “_Setup for Point Layer” is used to initially set up the tAnalyzeSpatial Events point layer for your ArcMap (mxd) project. This model defaults to the NAD83 projection, so would need to be changed for other projections such as WGS84.

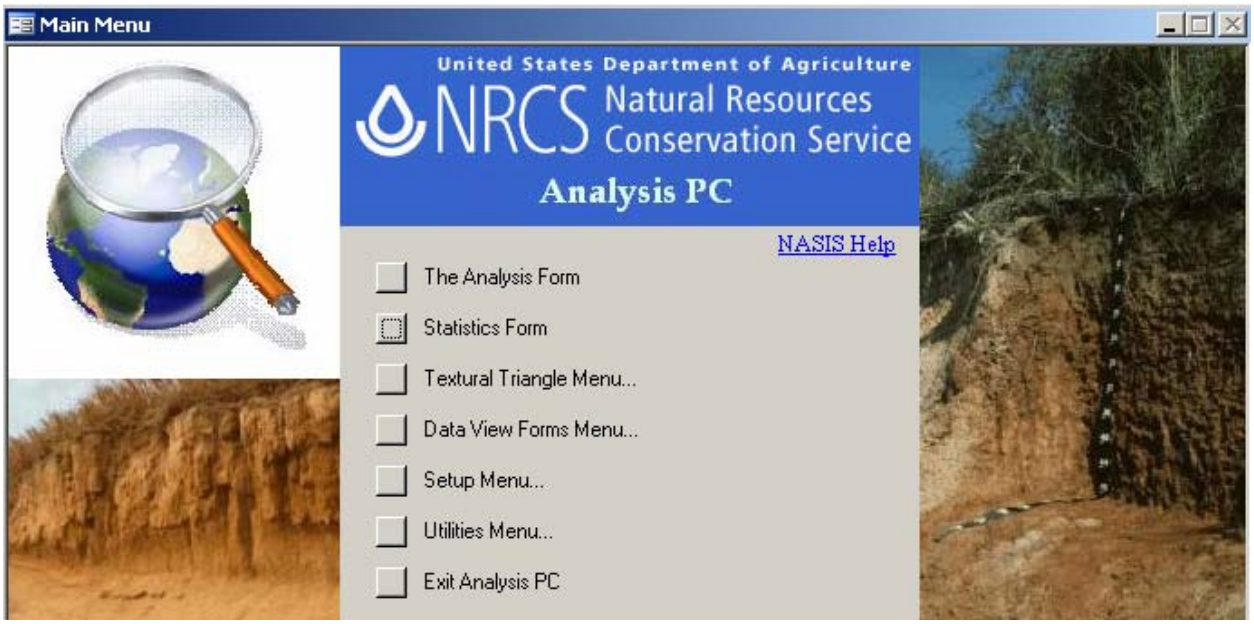
Notice the default projection is NAD83. To change it, press the rightmost button.

To change the projection, press the button to the right of the “GCS_North_American_1983” text and in the dialog box which follows press the “Select…” button.

From here you may select a different projection.

4.6 Statistics

To access the Statistics Form navigate to **Main Menu >> Statistics Form …**



The "Statistics Form" in Access allows analysis on a user selected table.

Upon clicking the Statistics Form option from the Main Menu, the user will receive a statistics form from which the following statistical functions can be performed on a user-defined table in any Access database (local or external): count, sum, first, last, min, max, range, mode, median, average, standard deviation, variance and standard error.

Statistics in Microsoft Access

SQL aggregate functions are the most commonly used functions in Access. These functions perform either mathematical calculations or value evaluations against a given expression. Typically, these functions are used in a query environment where the Expression argument refers to a field in a table where you are evaluating all the row values of that field.

First(Expression). First returns the value of the first record in the designated field or grouping. This function works with all data types.

Last(Expression). Last returns the value of the last record in the designated field or grouping. This function works with all data types.

Sum(Expression). Sum calculates the total value of all the records in the designated field or grouping. This function only works with the following data types: Number, Currency, Date/Time and AutoNumber.

Min(Expression). Min returns the value of the record with the lowest value in the designated field or grouping. This function only works with the following data types: Number, Text, Currency, Date/Time and AutoNumber.

Max(Expression). Max returns the value of the record with the highest value in the designated field or grouping. This function only works with the following data types: Number, Text, Currency, Date/Time and AutoNumber.

Avg(Expression). Avg calculates the Average or Mean of all the records in the designated field or grouping. This function only works with the following data types: Number, Currency, Date/Time and AutoNumber.

Count(Expression). Count counts the number of entries within the designated field or grouping. This function works with all data types.

Var(Expression). Var (variance) calculates the amount by which all the values within the designated field or grouping vary from the average value of the group. This function only works with the following data types: Number, Currency, Date/Time and AutoNumber.

StDev(Expression). StDev (standard deviation) calculates the standard deviation across all records within the designated field or grouping. This function only works with the following data types: Number, Currency, Date/Time and AutoNumber.

Special functions

There are four other statistical functions not built into Access, but which can be calculated using a combination of built-in functions.

The statistical range is the difference between the lowest and highest valued numbers in a set of numbers. The standard error of a method is the estimated standard deviation of the error in that method; it is the standard deviation of the difference between the measured or estimated values and the true values. Mathematically, standard error is the standard deviation divided by the square root of the size of the sample. In SQL this is represented as StDev(Expression)/Sqr(Count(*))

The statistical mode is the most frequent value in a sample. Calculating the mode in Access requires some SQL expertise and can be represented as:

```
SELECT TOP 1 [table].[field] AS Mode
FROM [table]
GROUP BY [table].[field]
ORDER BY Count(*) DESC;
```

Note: [table] is the name of the table and [field] is the name of the field within the table

The statistical median is the number separating the higher half of a sample from the lower half. Calculating the median in Access requires some SQL expertise and can be represented as:

```
SELECT x.[field] AS median
FROM [table] AS x, [table] AS y
GROUP BY x.[field]
HAVING Sum(IIf(y.[field]<=x.[field],1,0))>=(Count(*)+1)/2 And
Sum(IIf(y.[field]>=x.[field],1,0))>=(Count(*)/2)+1;
```

Note: [table] is the name of the table and [field] is the name of the field within the table

Examples

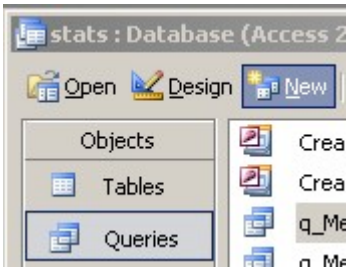
The first step is to know what table to which we want to perform statistical analysis. The following table is a made-up table called “t_lab” and contains a record ID, a lab number, and the percentage of sand, silt and clay. It contains 13 records.

t_lab : Table

Rec_ID	LabNumber	Sand	Silt	Clay
1	1	55	40	5
2	2	30	30	40
3	3	40	40	20
4	4	50	40	10
5	5	35	45	20
6	6	100	0	0
7	7	0	100	0
8	8	0	0	100
9	9	0	0	0
10	10	10	10	80
11	11	80	10	10
12	12	10	80	10
13	13	35	35	30

This table will be used for analysis.

In order to display statistics a query must be created and then executed, so the next step is to create a new query through the main database window. Select “Queries” and then the “New” button to create a new query.



The main database window can be used to create a new query.

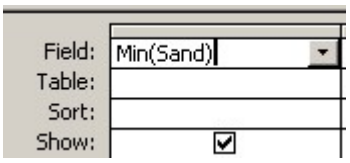
In the New query dialog select “Design View”, select the table to add and then press the “Add” button.

The New Query dialog allows the user to choose how to create the query.

The “t_lab” table will be shown in the upper pane and displays the fields contained within it. We are going to create a query based on the “t_lab” table so that portion is already done.

The t_lab table in Design View is shown above.

In the lower pane, let’s enter some basic built-in Access statistical functions such as Min, Max and Avg. Type in “Min(Sand)” in the first block where it says “Field:”.



The lower pane is where you create the query; in this case we started with the Min function (Minimum).

You can continue in this manner and enter “Max(Sand)” and “Avg(Sand)” in subsequent blocks. Notice our text changed when we left one block and entered another to enter more text. The text “Min(Sand)”, for example, changed to “Expr1:Min([Sand])”. What happened was Access assigned a column name to the Min(Sand) function and named it

"Expr1" (which is an abbreviation for "Expression One"). Access also added brackets around the fieldname as in "[Sand]".

Field:	Expr1: Min([Sand])	Expr2: Max([Sand])	Expr3: Avg([Sand])

After adding the Min, Max and Avg functions we are ready to run the query.

Access has taken care of the column names so when we run this query, the field heading up top will display "Expr1", "Expr2" and "Expr3". At this point you may save the query and run it, or use the right mouse button and select "DataSheet View", which also runs the query. After the query is run the following screen appears.

Query1 : Select Query

Expr1	Expr2	Expr3
0	100	34.2307692308

The query was run using the right mouse button and selecting "DataSheet View".

As you can see the name of the query is the default name "Query1" because we did not save the query yet – we only ran it. Also, note the headings: "Expr1" for Min, "Expr2" for Max and "Expr3" for Avg.

There should be a way to name these columns because it is too hard to remember which Expression maps to a stat function. The way to do this is to get back into design view (right mouse button), and type in the column name in place of the "Exprx" notation. In this case, we will use Min_Sand, Max_Sand, and Avg_Sand for Expr1, Expr2 and Expr3, respectively.

Field:	Min_Sand: Min([Sand])	Max_Sand: Max([Sand])	Avg_Sand: Avg([Sand])

We replaced the Exprx syntax with more appropriate column names.

Now when we run the query, we get column names that make more sense, and represent the statistical function we are executing.

Min_Sand	Max_Sand	Avg_Sand
0	100	34.2307692307692

The Minimum, Maximum and Average functions were performed on the t_lab table and the Sand field. We changed the column names to represent this fact.

Any built in Access function can be used in this way. Let's continue in this manner and use as many functions as we can on the data.

Field:	Min_Sand: Min([Sand])	Max_Sand: Max([Sand])	Avg_Sand: Avg([Sand])	Sum_Sand: Sum([Sand])	Count_Sand: Count([Sand])	StDev_Sand: StDev([Sand])	Var_Sand: Var([Sand])
Table:							
Sort:							
Show:	☑	☑	☑	☑	☑	☑	☑

Var_Sand: Var([Sand])	First_Sand: First([Sand])	Last_Sand: Last([Sand])	Standard_Error_Sand: StDev([Sand])/Sqr(Count(*))
☑	☑	☑	☑

The statistical functions we used were: First, Last, Sum, Min, Max, Avg, Count, Var, StDev and Standard Error.

When we run this query we receive the following results.

Count_Sand	First_Sand	Last_Sand	Sum_Sand	Min_Sand	Max_Sand	Avg_Sand	Var_Sand	StDev_Sand	Standard_Error_Sand
13	55	35	445	0	100	34.2307692307692	986.858974358974	31.4143116168248	8.71276240906661

The results of running the statistical query are shown above.

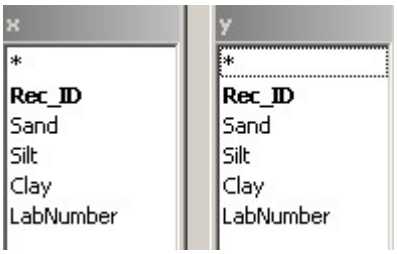
The SQL syntax that represents the query we just ran is as follows:

SELECT Min([Sand]) AS Min_Sand, Max([Sand]) AS Max_Sand, Avg([Sand]) AS Avg_Sand, Sum([Sand]) AS Sum_Sand, Count([Sand]) AS Count_Sand, StDev([Sand]) AS StDev_Sand, Var([Sand]) AS Var_Sand, First([Sand]) AS First_Sand, Last([Sand]) AS Last_Sand, StDev([Sand])/Sqr(Count(*)) AS Standard_Error_Sand FROM t_lab;

We are still missing the median and mode functions. The median function performed upon the “Sand” field can be represented in SQL as follows:

```
SELECT x.Sand AS median
FROM t_lab AS x, t_lab AS y
GROUP BY x.Sand
HAVING (((Sum(IIf([y].[Sand]<=[x].[Sand],1,0)))>=(Count(*)+1)/2) AND
((Sum(IIf([y].[Sand]>=[x].[Sand],1,0)))>=(Count(*)/2)+1));
```

The table used is t_lab, we perform a self-join on it, and rename the table as X and Y.



The t_lab table is used twice in a self-join.

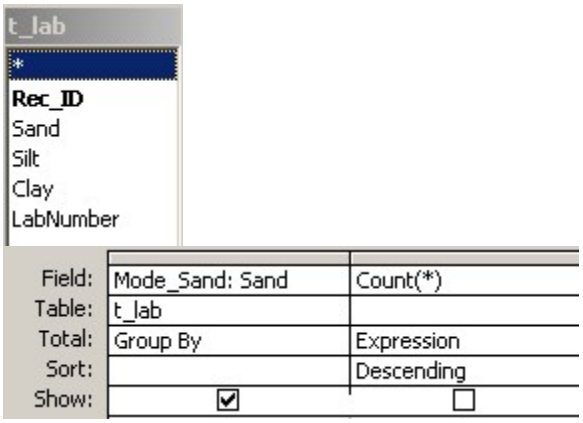
Field:	median: Sand	Sum(IIf([y].[Sand]<=[x].[Sand],1,0))	Sum(IIf([y].[Sand]>=[x].[Sand],1,0))
Table:	x		
Total:	Group By	Expression	Expression
Sort:			
Show:	☑	☐	☐
Criteria:		>=(Count(*)+1)/2	>=(Count(*)/2)+1

The design view displays how to represent the SQL text in a visual way.

The result is the median value displayed for Sand.

The mode function performed upon the “Sand” field can be represented in SQL as follows:

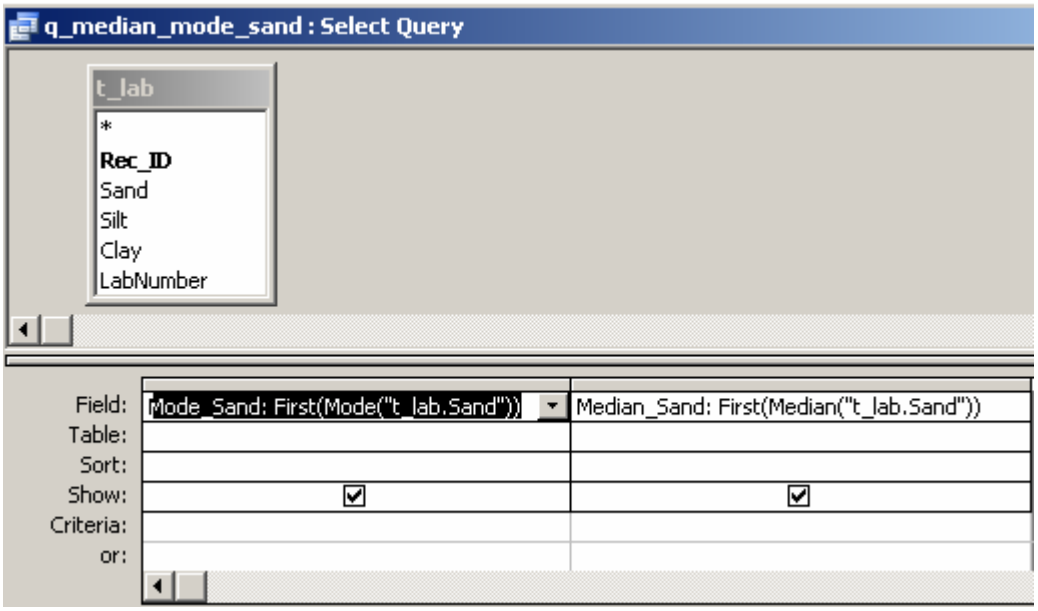
```
SELECT TOP 1 t_lab.Sand AS Mode_Sand
FROM t_lab
GROUP BY t_lab.Sand
ORDER BY Count(*) DESC;
```



The mode function uses a single t_lab table and uses the “TOP” function, and “Group By” and “Order By” SQL clauses to perform the operation.

The result is the mode value displayed for Sand.

Another much easier way to calculate Median and Mode without complex SQL writing is to use the Median and Mode functions built into Analysis PC. The user simply has to call Median and Mode like the First, Last and Avg built-in Access statistical functions. Both Median and Mode functions require a string parameter of the table name followed by a period and then the field name, as in “**t_lab.sand**”. To view an example of this process, open the query called “q_median_mode_sand” in Design View.



The query "q_median_mode_sand" displays how to call the median and mode functions in a user defined query.

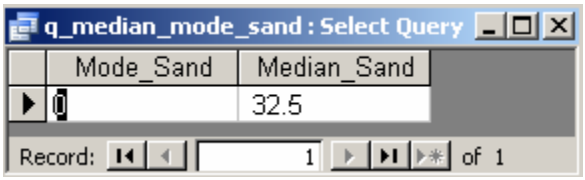
The process in calling the median and mode functions are the same as calling the built-in Access functions with a few additional requirements. The first is to call the function "First" before Median or Mode and the second is to include the table name followed by a period and then the field name as the parameter, all enclosed in quotes as it is a string data type. An example is **Mode_Sand: First(Mode("t_lab.Sand"))**.

t_lab : Table

Rec_ID	LabNumber	Sand	Silt	Clay
1	1	55	40	5
2	2	30	30	40
3	3	40	40	20
4	4	50	40	10
5	5	35	45	20
6	6	100	0	0
7	7	0	100	0
8	8	0	0	100
9	9	0	0	0
10	10	10	10	80
11	11	80	10	10
12	12	10	80	10
Number)	0	0	0	0

Record: 1 of 12

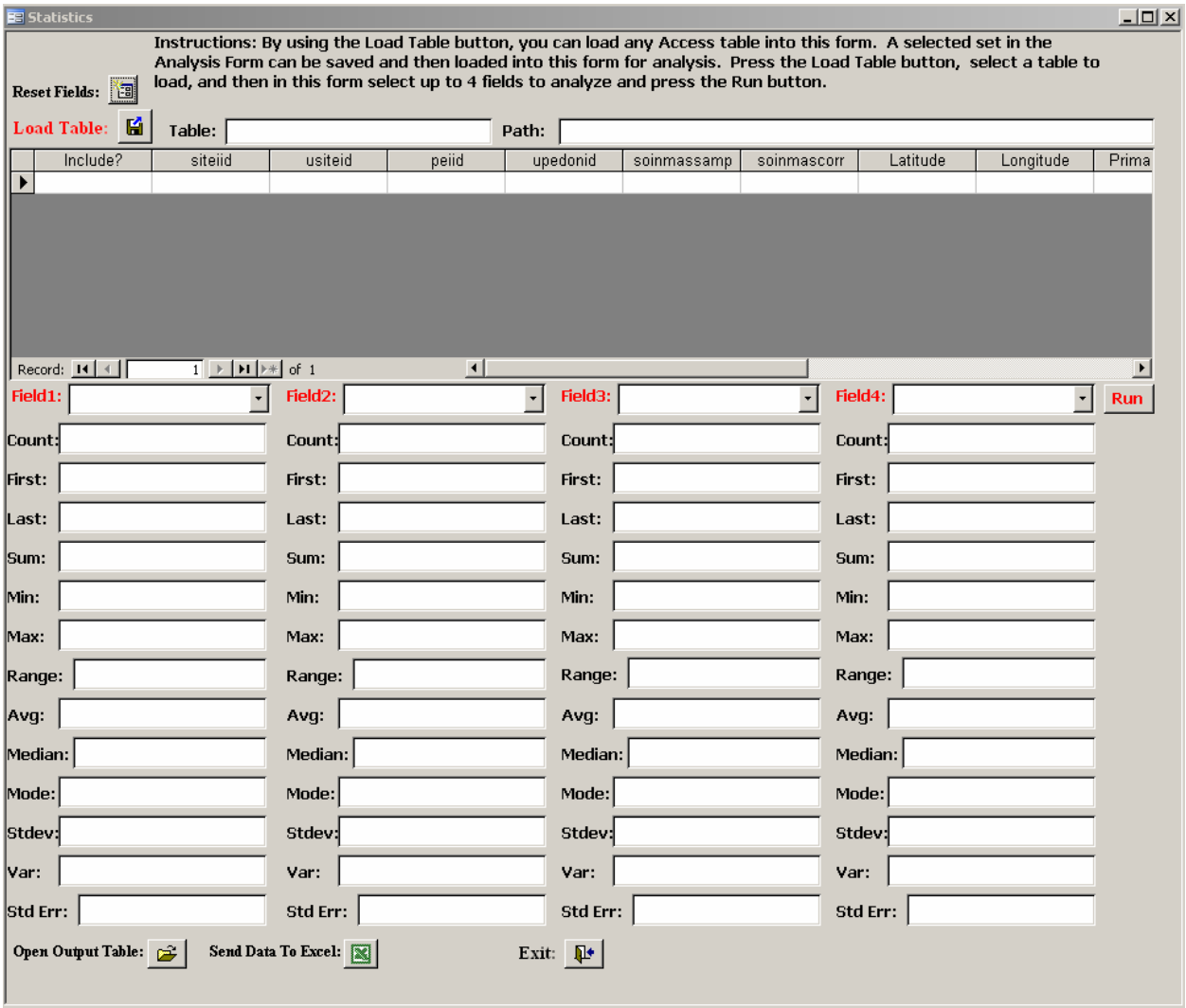
The query was run against this t_lab table.



The result of the "q_median_mode_sand" query is shown above.

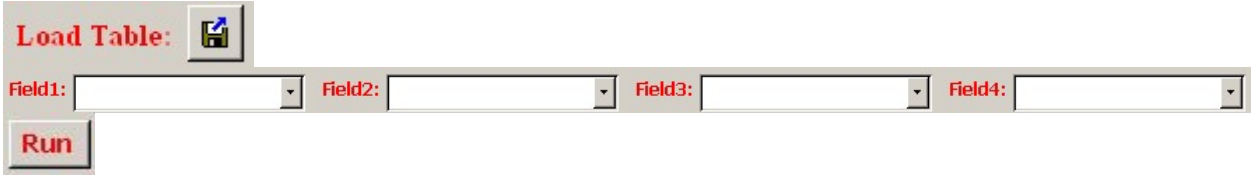
Statistical Analysis on a User Defined Table

Statistical Analysis can automatically be performed using the Statistics Form.



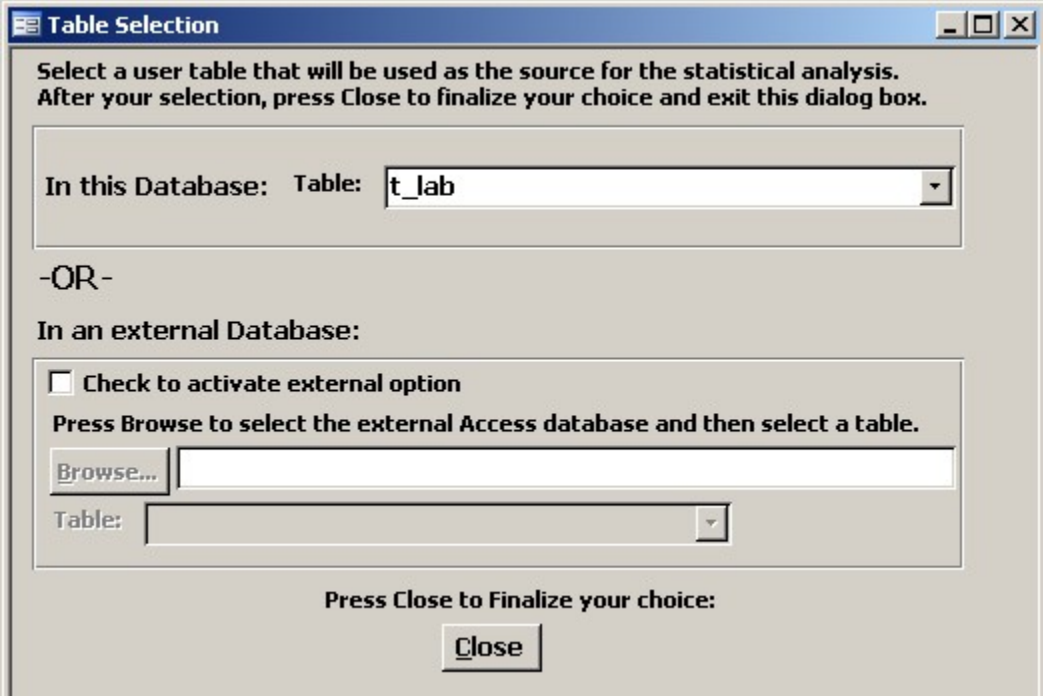
The Statistics Form allows the user to select any Access database table to which statistical functions are performed. Up to four fields may be chosen to simultaneously perform this operation.

There are three simple steps to perform a statistical analysis on an Access table. The first is to select a table, the second is to select up to 4 fields in that table and the third is to press the "Run" button to perform statistical analysis on the chosen field(s).



There are three easy steps to perform analysis: choose a table, one or more fields and then press the Run button.

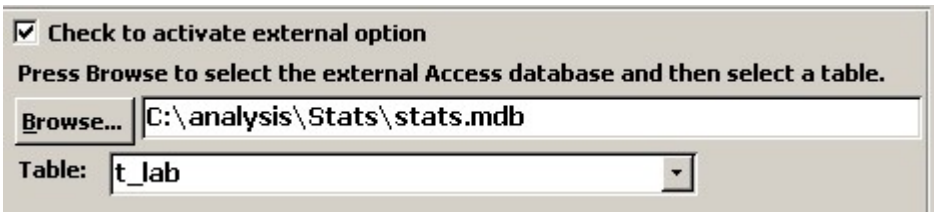
The first step is to press the "Load Table" button to access the form which allows you to choose any Access table.



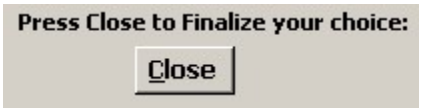
The Table Selection form allows the user to choose any Access database table. The table can be in the current Analysis PC database or an external database in another folder or drive.

Select a user table that will be used as the source for the statistical analysis. You may choose a table in the current database (Analysis PC), or in an external Access database. To select a table in the current database simply choose a table from the upper "Table" drop down list. To select a table in an external database, press the checkbox "Check to activate external option" and then press the "Browse" button to select an external database. Once that is done, select a table from the lower "Table" drop-down list. For either option, remember to press the "Close" button to finalize your choice.

Pressing the Browse button will activate an Open File Dialog box. Choose the appropriate Access database file (a file with the mdb file extension).



In this example, we selected the "t_lab" table in the external Access database "stats.mdb" located at "C:\analysis\Stats\".



Remember to press the "Close" button to finalize your choice.

After the Close button is pressed on the Table Selection form, we are returned to the Statistics form. Notice both the Table name and complete Path textboxes have been filled because we chose a table from an external database. If a local table had been chosen, only the table name would be shown.

	Rec_ID	Sand	Silt	Clay	LabNumber
▶	1	55	40	5	1
	2	30	30	40	2
	3	40	40	20	3
	4	50	40	10	4
	5	35	45	20	5
	6	100	0	0	6
	7	0	100	0	7
	8	0	0	100	8
	9	0	0	0	9
	10	10	10	80	10
	11	80	10	10	11
	12	10	80	10	12
*	Number)	0	0	0	0

The "t_lab" table has been loaded into the Statistics form in the main grid. This table contains the columns Rec_ID, Sand, Silt, Clay and LabNumber.

Another option is to save a selected set in the Analysis Form and then load it in the Statistics Form.

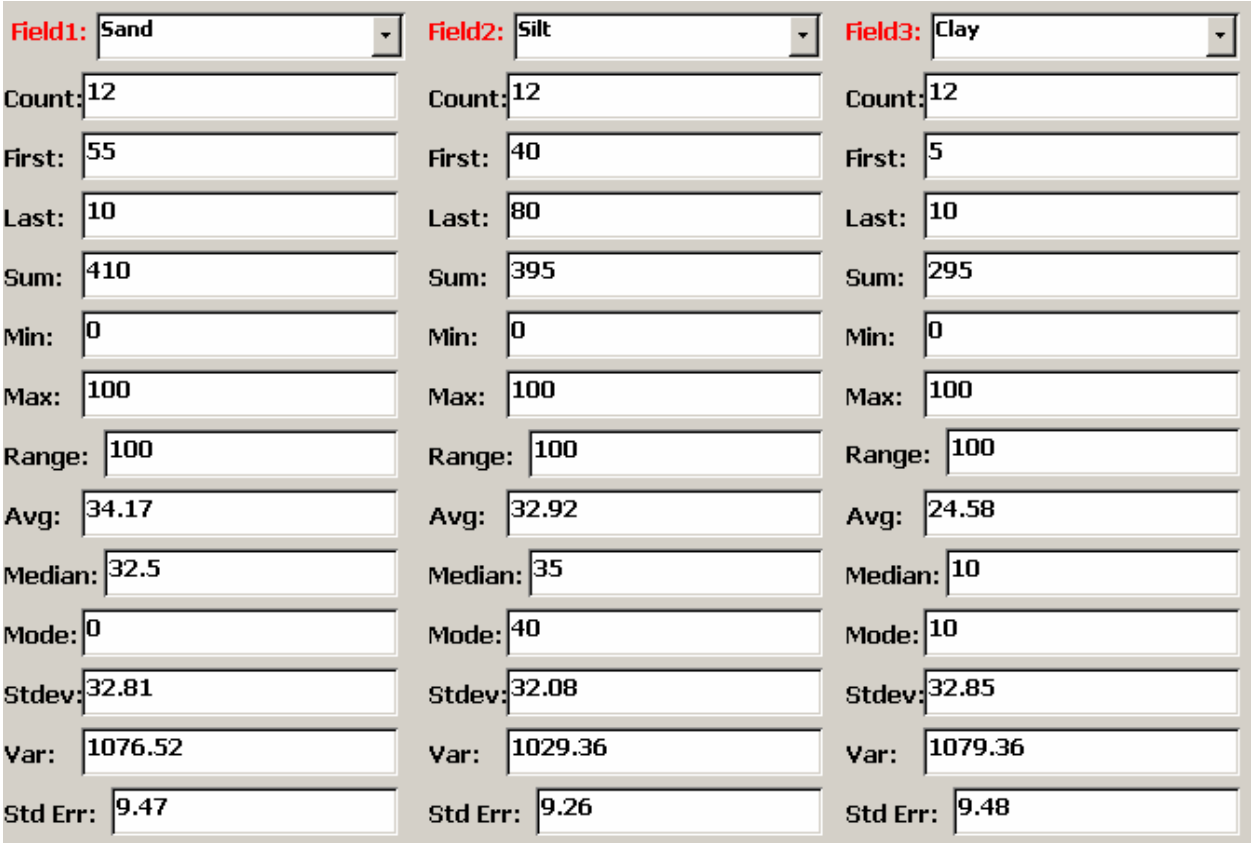
After the database table has been chosen, the next step is to select one or more fields from the loaded table (the table shown in the main grid). This is done by using the "Field1" through "Field4" drop down list boxes.

Select up to four fields from the table loaded into the grid.

In this case, we have selected the "Sand", "Silt" and "Clay" fields from the "t_lab" table. After the table and fields have been selected, press the "Run" button located on the right side of the form, next to the "Field4" list box.

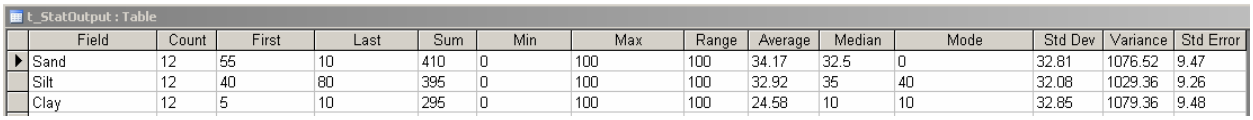
Press the Run button to perform statistical analysis on all the fields chosen.

The statistical functions performed are Count, First, Last, Sum, Min, Max, Range, Avg, Median, Mode, Stdev, Var and Std Err. For an explanation of these functions, please review the section labeled "**Statistics in Microsoft Access"** above.



Notice all 13 statistical functions were performed for all the fields selected.

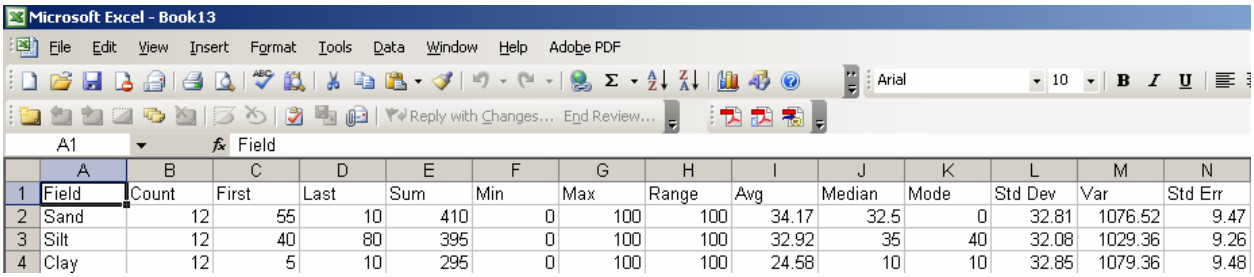
The output may be viewed in an Access table or sent to Excel.



t_StatOutput : Table

Field	Count	First	Last	Sum	Min	Max	Range	Average	Median	Mode	Std Dev	Variance	Std Error
Sand	12	55	10	410	0	100	100	34.17	32.5	0	32.81	1076.52	9.47
Silt	12	40	80	395	0	100	100	32.92	35	40	32.08	1029.36	9.26
Clay	12	5	10	295	0	100	100	24.58	10	10	32.85	1079.36	9.48

After pressing the "Open Output Table" button, the Access table "t_StatOutput" will be displayed. This table holds the current statistical results.



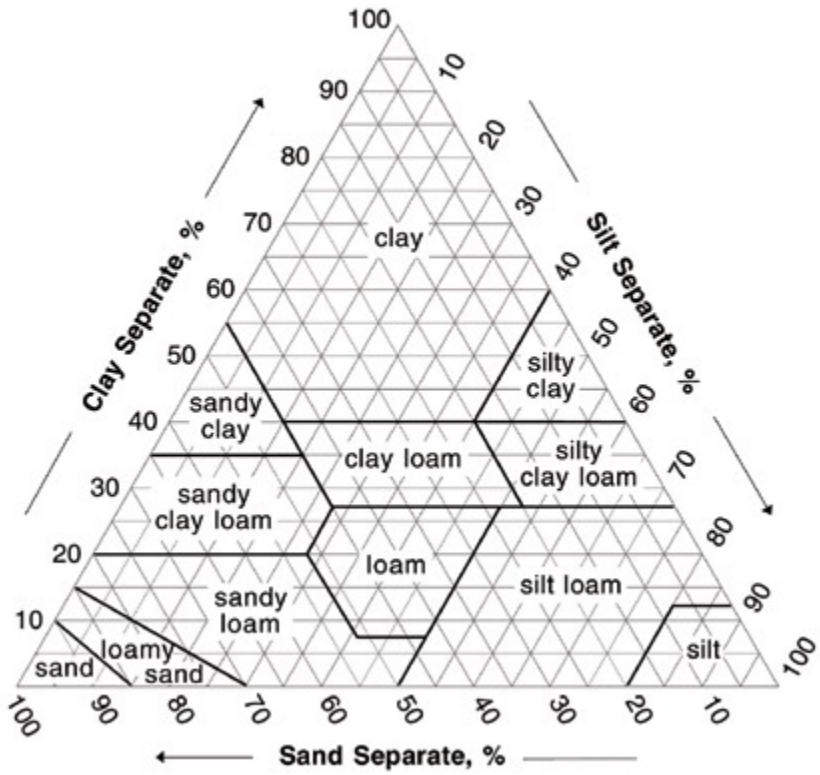
Microsoft Excel - Book13

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Field	Count	First	Last	Sum	Min	Max	Range	Avg	Median	Mode	Std Dev	Var	Std Err
2	Sand	12	55	10	410	0	100	100	34.17	32.5	0	32.81	1076.52	9.47
3	Silt	12	40	80	395	0	100	100	32.92	35	40	32.08	1029.36	9.26
4	Clay	12	5	10	295	0	100	100	24.58	10	10	32.85	1079.36	9.48

After pressing the "Send Data To Excel" button, an Excel spreadsheet appears with all the data from the current run.

4.7 Textural Triangle Menu

Soil texture is a soil property used to describe the relative proportion of different grain sizes of mineral particles in a soil. Particles are grouped according to their size into soil separates (clay, silt and sand). The soil texture class corresponds to a particular range of separate fractions and is represented by the soil texture triangle.

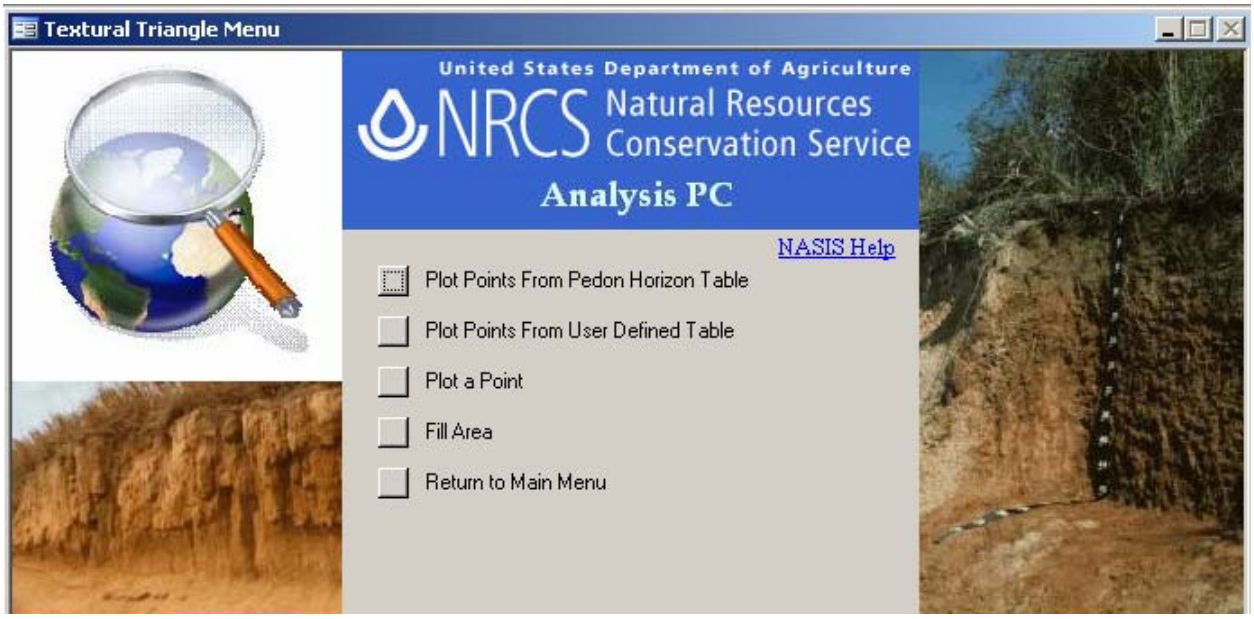


The Soil Textural Triangle has three vertices representing the percentage of clay, silt and sand in a soil.

There are 12 major texture classes: Sand, Silt, Clay, Loam, Loamy Sand, Sandy Loam, Sandy Clay Loam, Sandy Clay, Silt Loam, Clay Loam, Silty Clay Loam and Silty Clay. A soil separate is a specific range of particle sizes. The large sizes are coarse and the smaller are fine.

Name of soil separate	*Diameter limits (mm) (USDA classification)*
Clay	less than 0.002
Silt	0.002 - 0.05
Very fine sand	0.05 - 0.10
Fine sand	0.10 - 0.25
Medium sand	0.25 - 0.50
Coarse sand	0.50 - 1.00
Very coarse sand	1.00 - 2.00

To access the Textural Triangle Menu, navigate to the **Main Menu >> Textural Triangle Menu…**



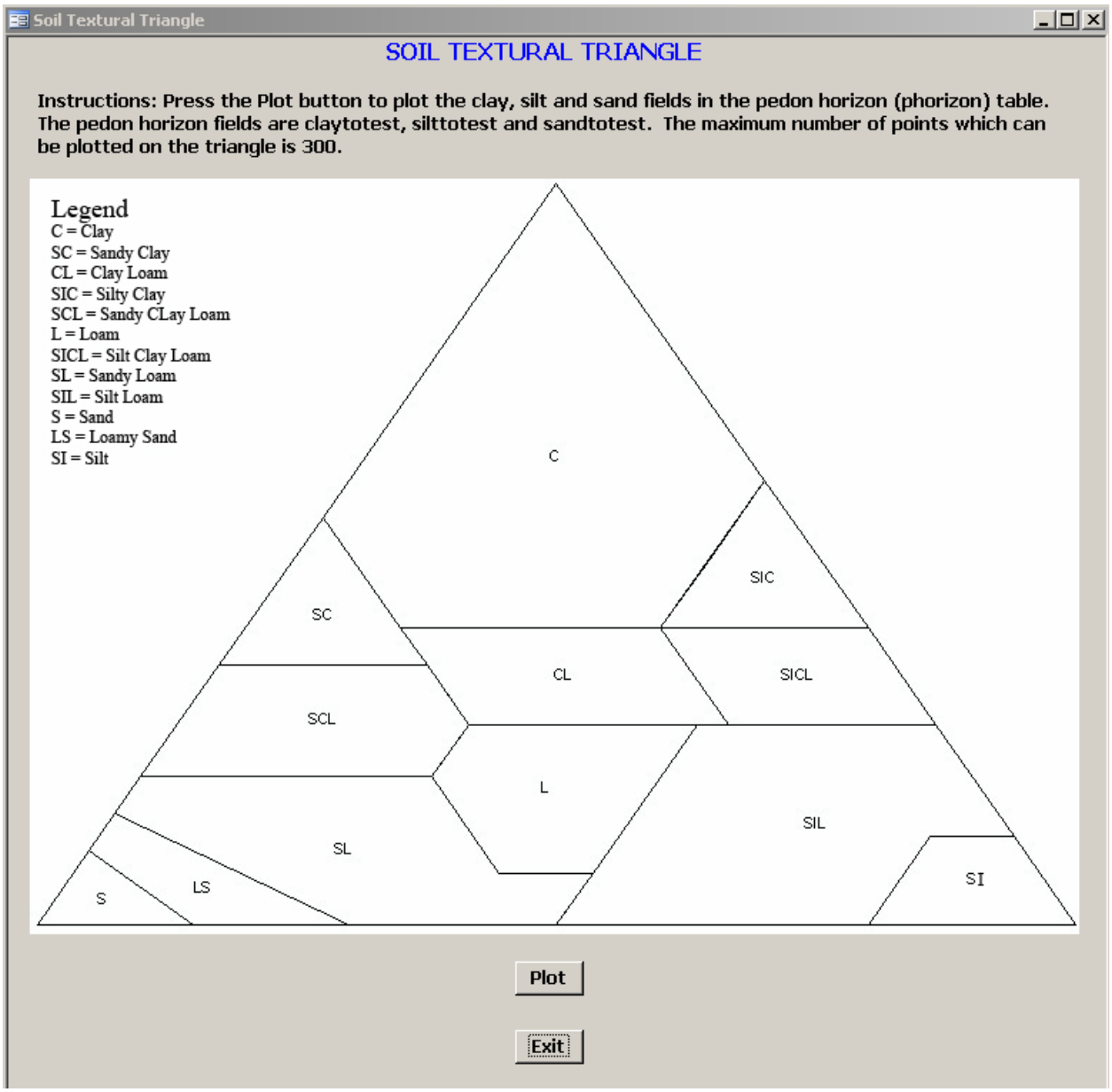
The Textural Triangle Menu allows the user to plot one or more points on a textural triangle based on the pedon horizon table or a user defined table. The user can also plot a single point or graphically display a texture class after entering the three soil separate percentages (clay, silt and sand).

Upon clicking the Textural Triangle Menu option from the Main Menu, the user will receive a Textural Triangle menu from which user options can be chosen.

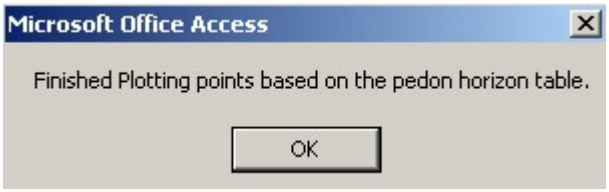
1. Plot Points From Pedon Horizon Table: Choose to plot points on a soil textural triangle based on three fields in the pedon horizon (phorizon) table. These fields are claytotest (Est Clay %), silttotest (Est Silt %) and sandtotest (Est Sand %).
2. Plot Points From User Defined Table: Choose to plot points on a soil textural triangle based on three fields in a user-defined table.
3. Plot a Point: Choose to plot one point on a soil textural triangle and display the texture class after entering the three soil separate percentages (clay, silt and sand).
4. Fill Area: Choose to fill one texture class area on a soil textural triangle and display the texture class after entering the three soil separate percentages (clay, silt and sand).

Plot Points From Pedon Horizon Table

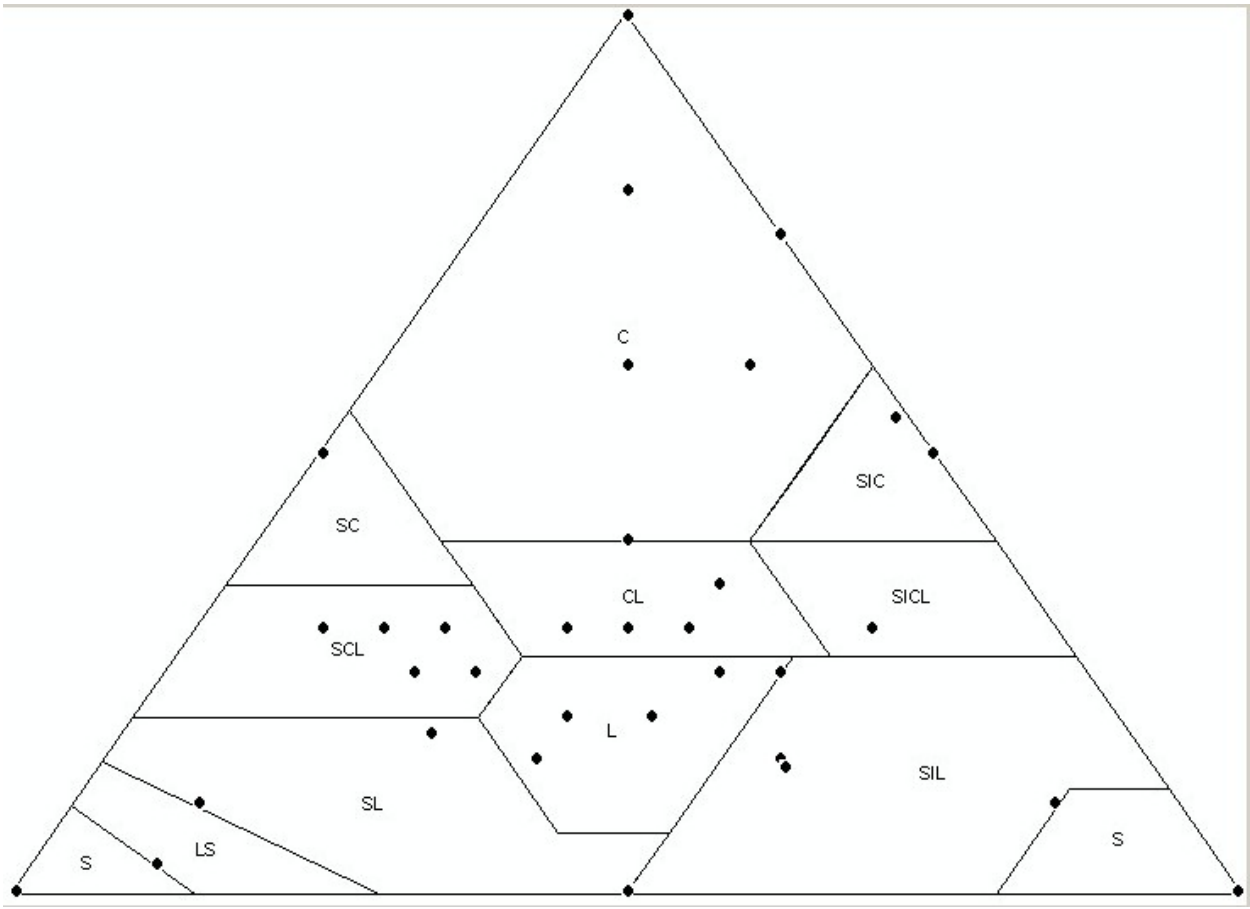
The Plot Points From Pedon Horizon Table form allows a user to plot points based on the percentage of clay, silt and sand found in the pedon horizon table (phorizon) in the pedon database. The program will extrapolate the third value if you only enter two values. For example, if you only have the sand and clay entered, the program will add those two values and subtract the total from 100 to derive the value for silt. Note the maximum number of points which can be shown is 300.



Press the "Plot" button to plot points based on the clay, silt and sand fields in the "phorizon" (Pedon Horizon) table.



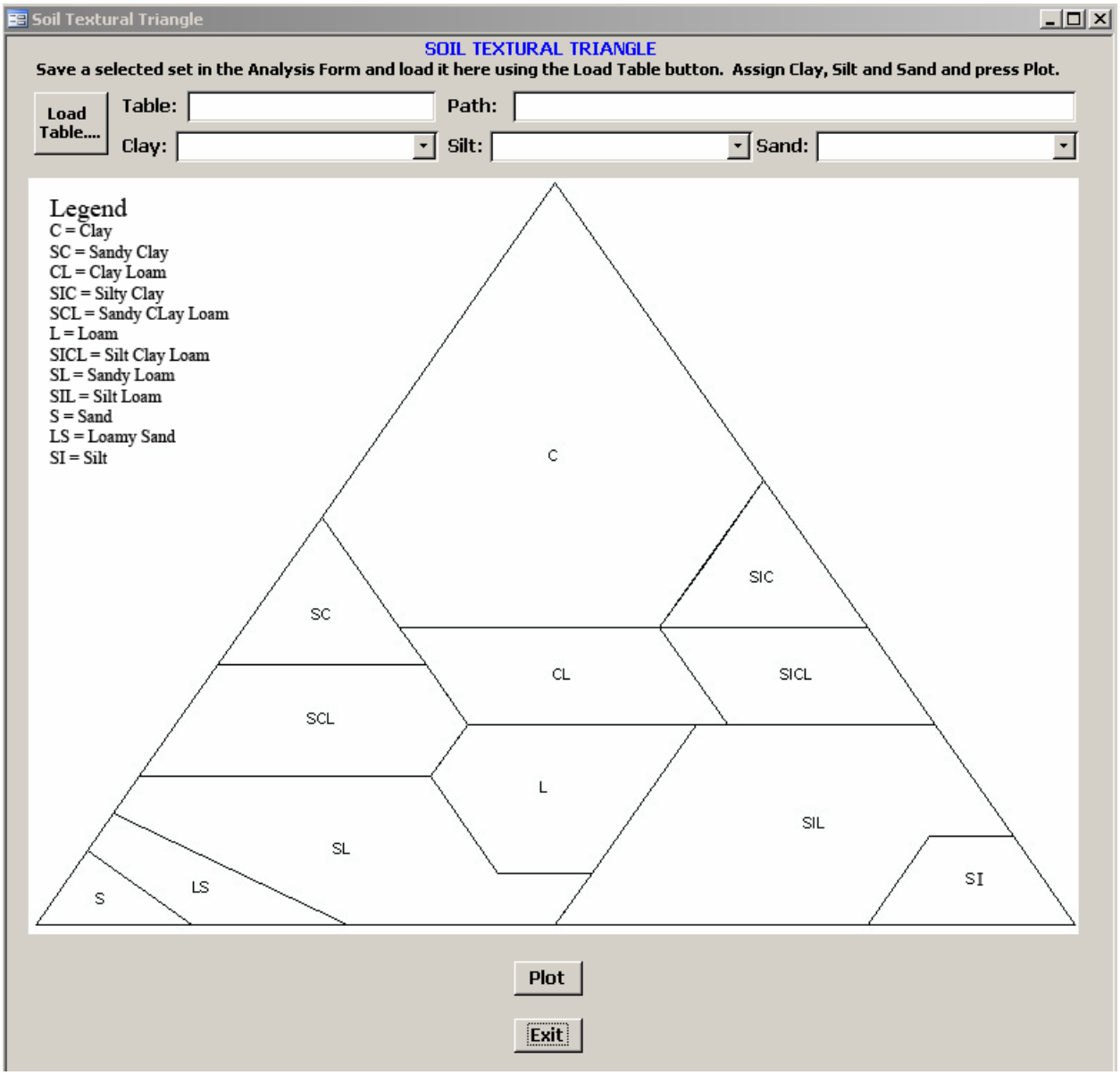
A confirmation box pops up indicating the operation has completed.



The points are shown; each one represents the three fields in one record in the pedon horizon table (sandtotest, silttotest and claytotest). The data was entered so that all classes were used.

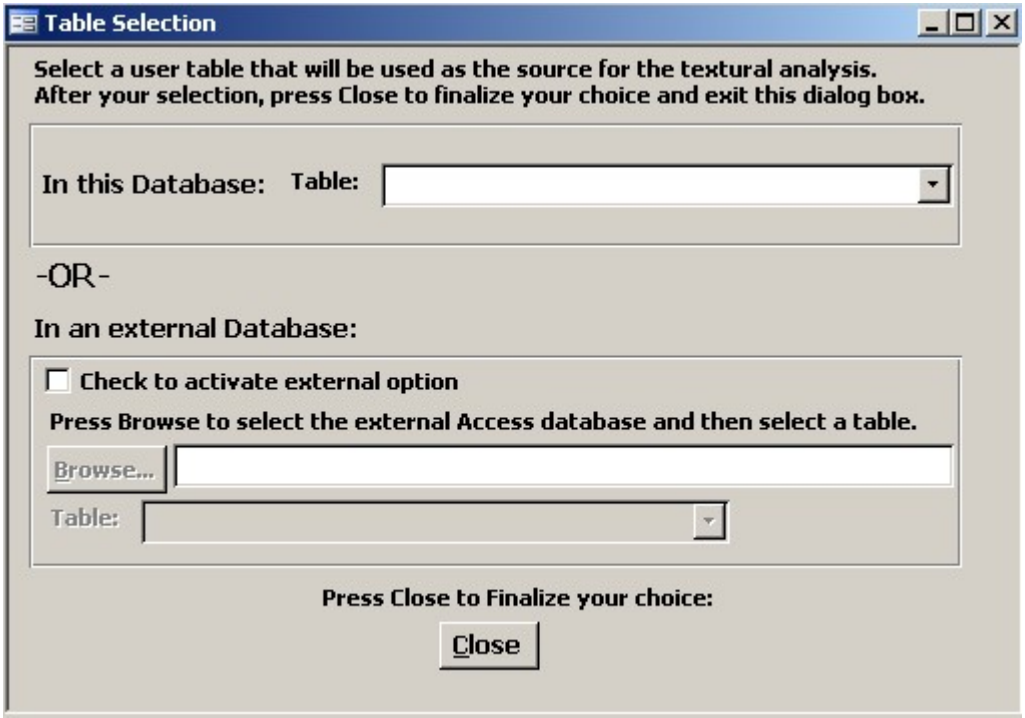
Plot Points From User Defined Table

The Plot Points From User Defined Table form allows a user to plot points based on the percentage of clay, silt and sand found in an appropriate table in any Access database. The program will extrapolate the third value if you only enter two values. For example, if you only have the sand and clay entered, the program will add those two values and subtract the total from 100 to derive the value for silt. Note the maximum number of points which can be shown is 300.



This form allows you to plot points taken from any Access database table. An option is to save a selected set in the Analysis Form and then load it here.

The first step is to press the “Load Table” button to access the form which allows you to choose any Access table.

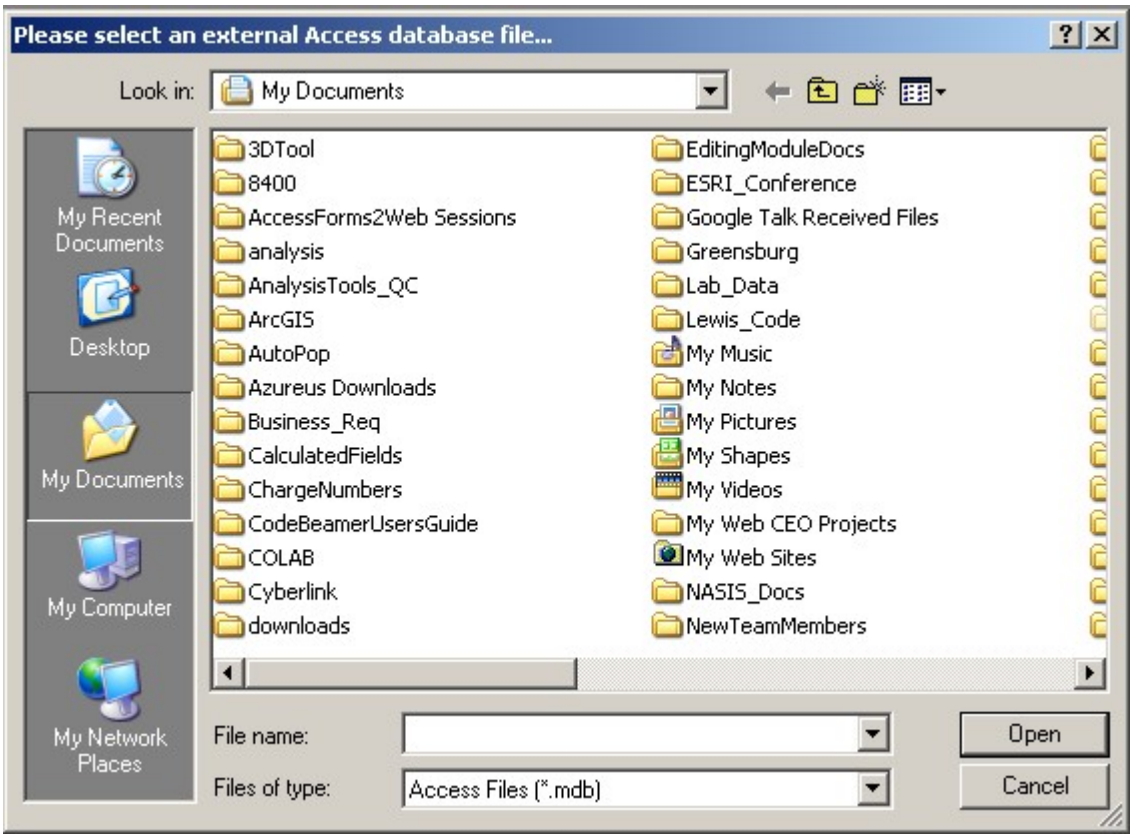


The Table Selection form allows the user to choose any Access database table. The table can be in the current Analysis PC database or an external database in another folder or drive.

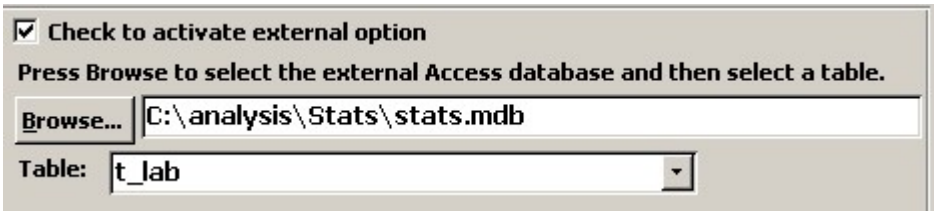
Select a user table that will be used as the source for the textural analysis. You may choose a table in the current database (Analysis PC), or in an external Access database. To select a table in the current database simply choose a table from the upper “Table” drop down list. To select a table in an external database, press the checkbox “Check to activate external option” and then press the “Browse” button to select an external database. Once that is done, select a table from the lower “Table” drop-down list. For either option, remember to press the “Close” button to finalize your choice.

	Rec_ID	Sand	Silt	Clay	LabNumber
▶	1	55	40	5	1
	2	30	30	40	2
	3	40	40	20	3
	4	50	40	10	4
	5	35	45	20	5
	6	100	0	0	6
	7	0	100	0	7
	8	0	0	100	8
	9	0	0	0	9
	10	10	10	80	10
	11	80	10	10	11
	12	10	80	10	12
*	Number)	0	0	0	0

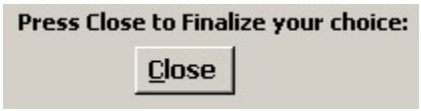
This is the table we intend to use for this example.



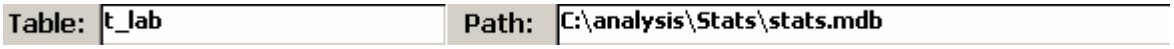
Pressing the Browse button will activate an Open File Dialog box. Choose the appropriate Access database file (a file with the mdb file extension).



In this example, we selected the "t_lab" table in the external Access database "stats.mdb" located at "C:\analysis\Stats\".



Remember to press the "Close" button to finalize your choice.

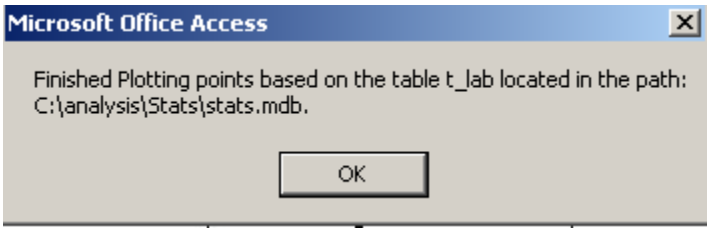


After the Close button is pressed on the Table Selection form, we are returned to the Texture form. Notice both the Table name and complete Path textboxes have been filled because we chose a table from an external database. If a local table had been chosen, only the table name would be shown.

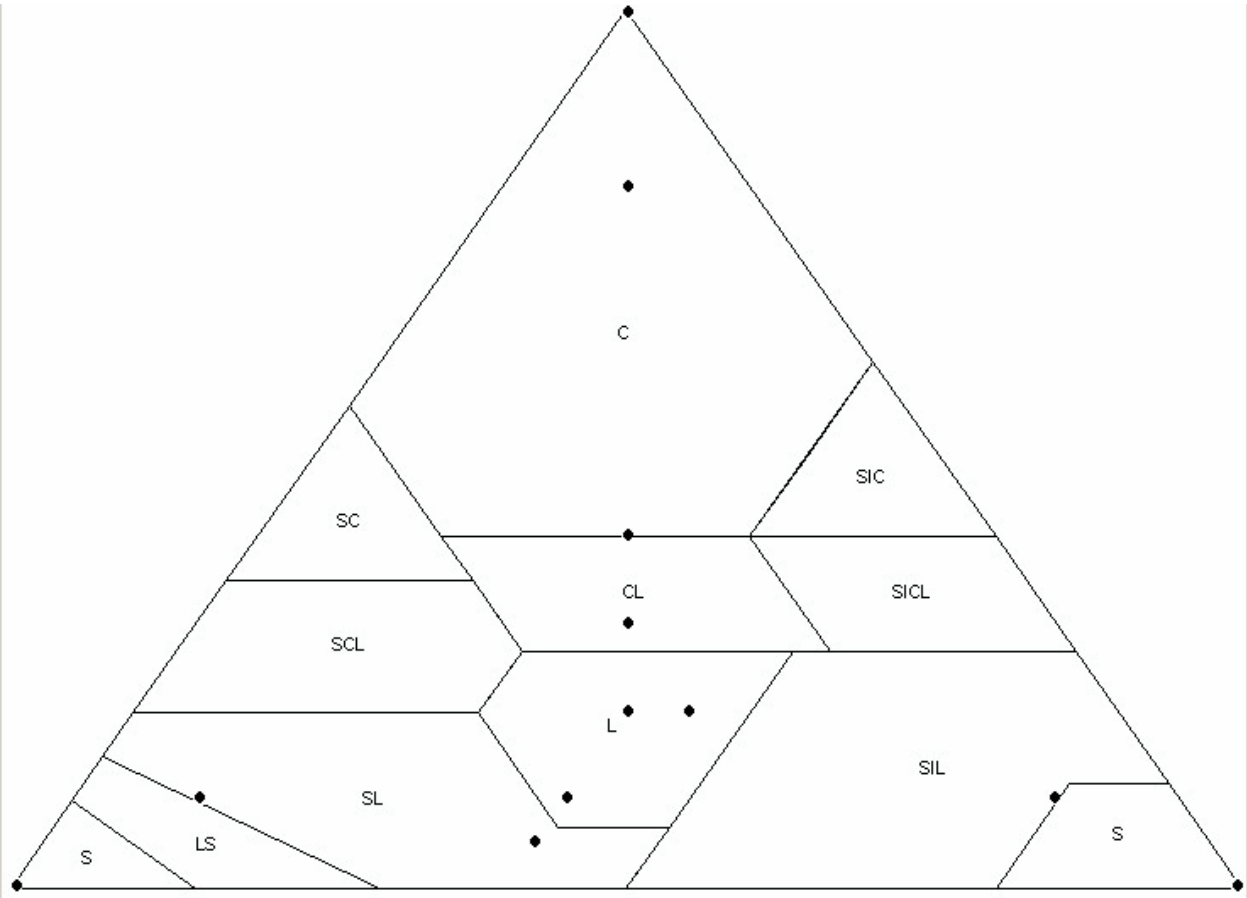
After the table has been selected, the next step is to choose three fields to represent the Clay, Silt and Sand separates.

Select three fields in the selected table to represent the clay, silt and sand separates.

Press the "Plot" button to plot the points based on the table and fields chosen.



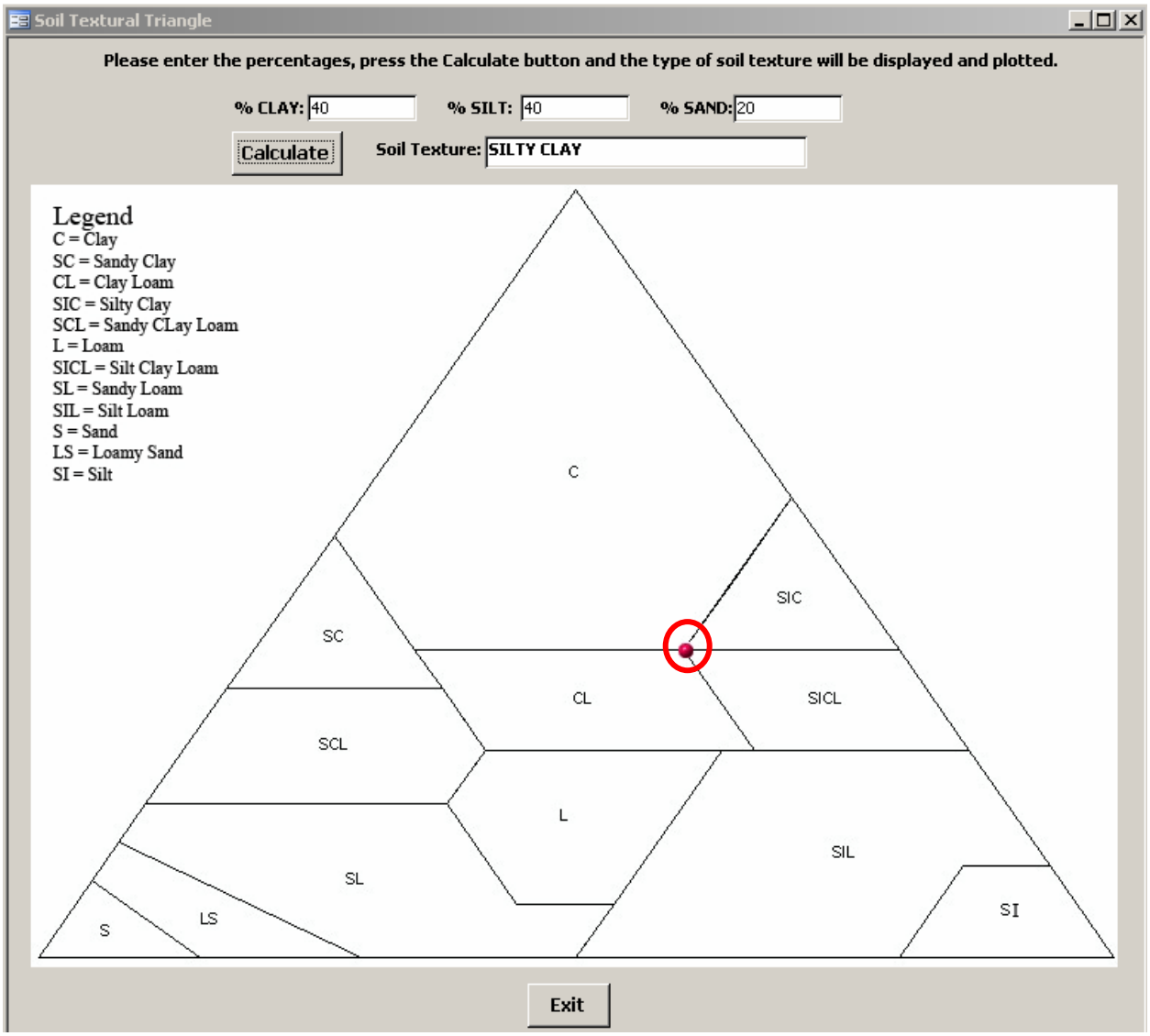
A confirmation box pops up indicating the operation has completed.



The points are shown; each one represents the three fields in one record in the user defined table.

Plot a Point

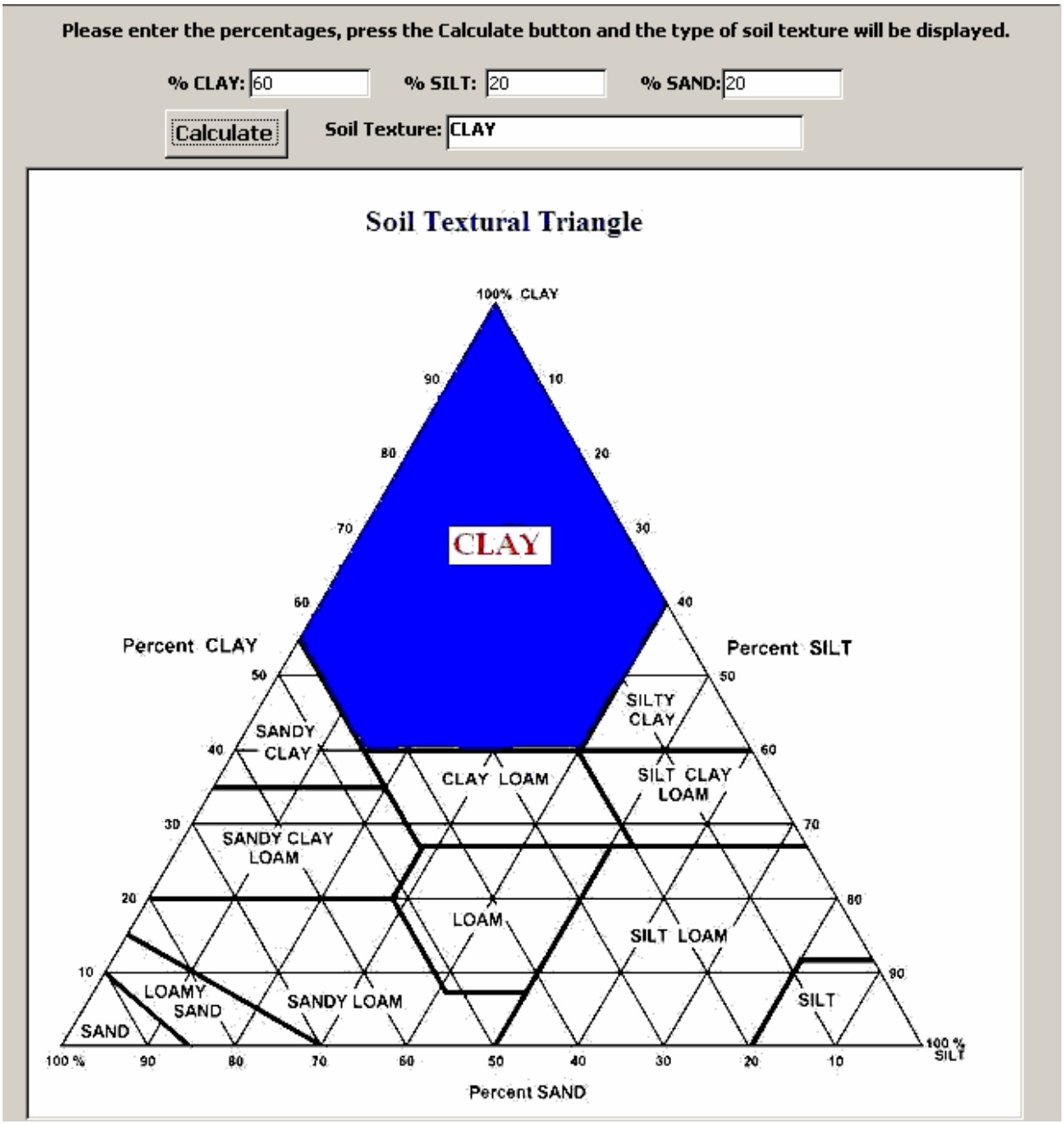
The “plot a point” option allows the user to manually enter the percentage of clay, silt and sand, and have the program display the soil texture name and plot the point on the soil textural triangle. If you enter one or two values that add up to 100 then the other value(s) will default to zero.



The values 40, 40 and 20 were entered for clay, silt and sand, respectively resulting in the “SILTY CLAY” soil texture and a point plotted at the intersection of 4 types of texture classes (Clay, Clay Loam, Silty Clay and Silt Clay Loam).

Fill Area

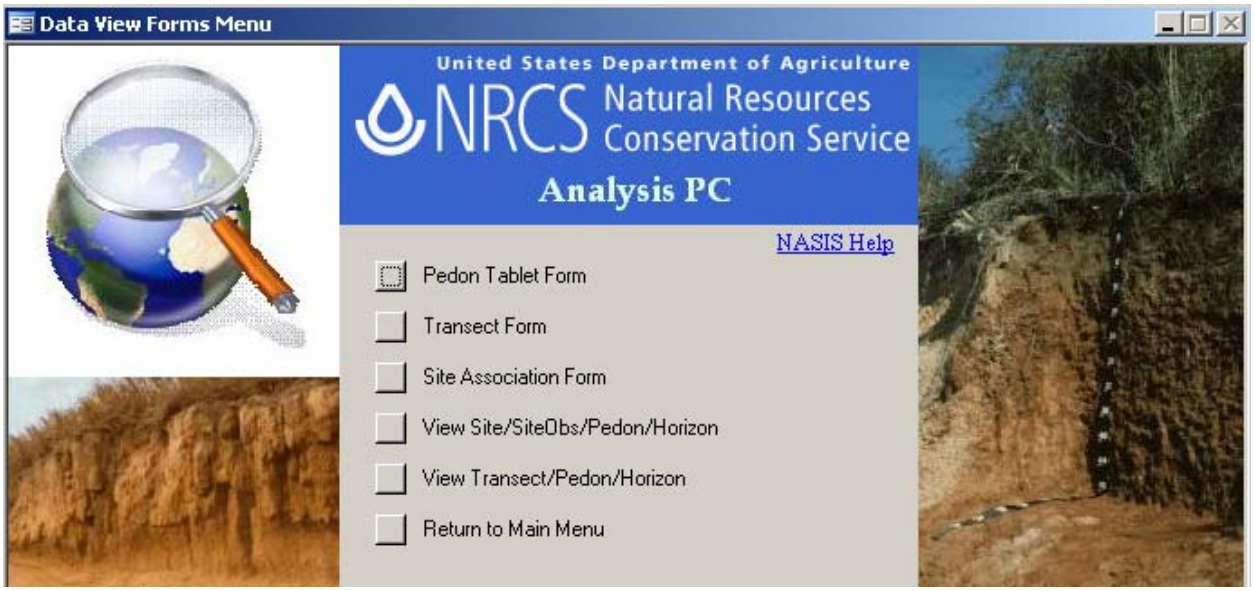
The “fill area” option allows the user to manually enter the percentage of clay, silt and sand and have the program display the soil texture name and area highlighted on the triangle. If you enter one or two values that add up to 100 then the other value(s) will default to zero.



The values 60, 20 and 20 were entered for clay, silt and sand, respectively, resulting in the “CLAY” soil texture and the entire clay texture area highlighted in the textural triangle.

4.8 Data View Forms Menu

To access the Data View Forms Menu, navigate to the **Main Menu >> Data View Forms Menu…**



The Data View Forms Menu allows the user to choose various read-only forms from which to view data.

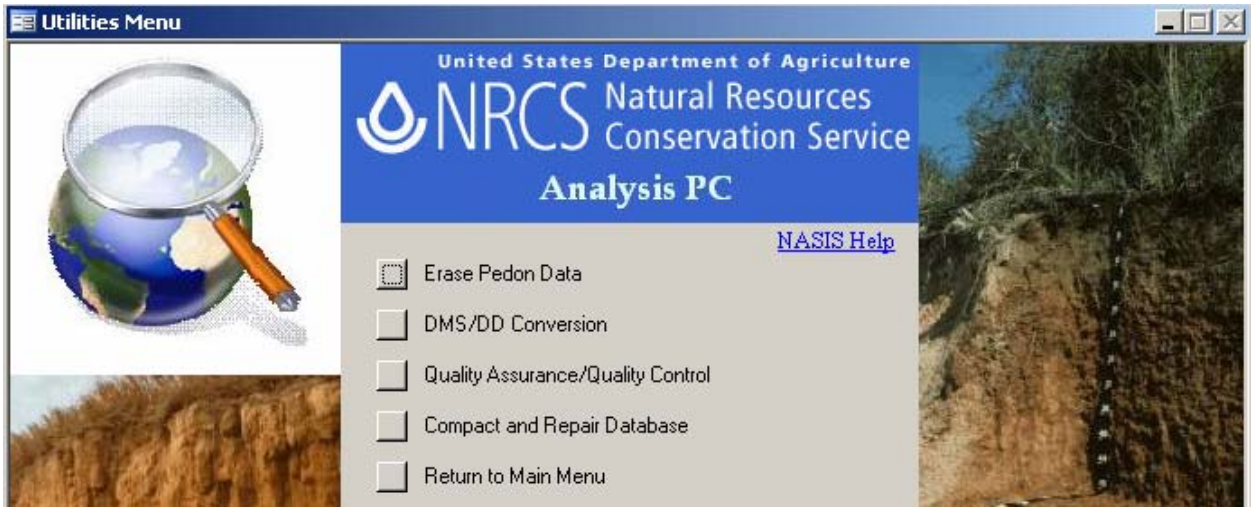
Upon clicking the Data View Forms Menu option from the Main Menu, the user will receive a Data View Forms Menu from which user options can be chosen.

1. Pedon Tablet Form: Choose to view site, site observation, pedon and horizon information in a read-only form. This form is similar to the Pedon Tablet Form in Pedon PC.
2. Transect Form: Choose to view transect, transect text and pedon information in a read-only form. This form is similar to the Transect Form in Pedon PC.
3. Site Association Form: Choose to view the site, site association, site associate site, site association soils and site associate text information in a read-only-form. This form is similar to the Site Association Form in Pedon PC.
4. View Site/SiteObs/Pedon/Horizon: Choose to view site, site observation, pedon and pedon horizon tables at the same time in one datasheet grid.
5. View Transect/Pedon/Horizon: Choose to view transect, pedon and pedon horizon tables at the same time in one datasheet grid.

For help on these forms please refer to the Pedon PC User's Guide.

4.9 Utilities

To access the Data View Forms Menu, navigate to the **Main Menu >> Utilities Menu…**



The Utilities Menu allows the user to perform administrative functions, QA/QC, and conversions between degrees/minutes/seconds and decimal degrees.

Erase Pedon Data

The "Erase Pedon Data" option allows the user to delete all data in the pedon database. Example pedon tables include site, site observation, pedon, pedon horizon and transect. Remember the pedon database is embedded in Analysis PC (analysis_pc.mdb) and is **not** contained in an external file such as pedon.mdb. When the "Erase Pedon Data" button is first pressed, Analysis PC will ask the user for confirmation. This function also deletes data in the SiteNad83 table.

Note: If you accidentally delete all your pedon data, don't panic. Simply run the NASIS import data function in Setup. Make sure to save the import text file so it is available, otherwise you may have to perform the NASIS export function.

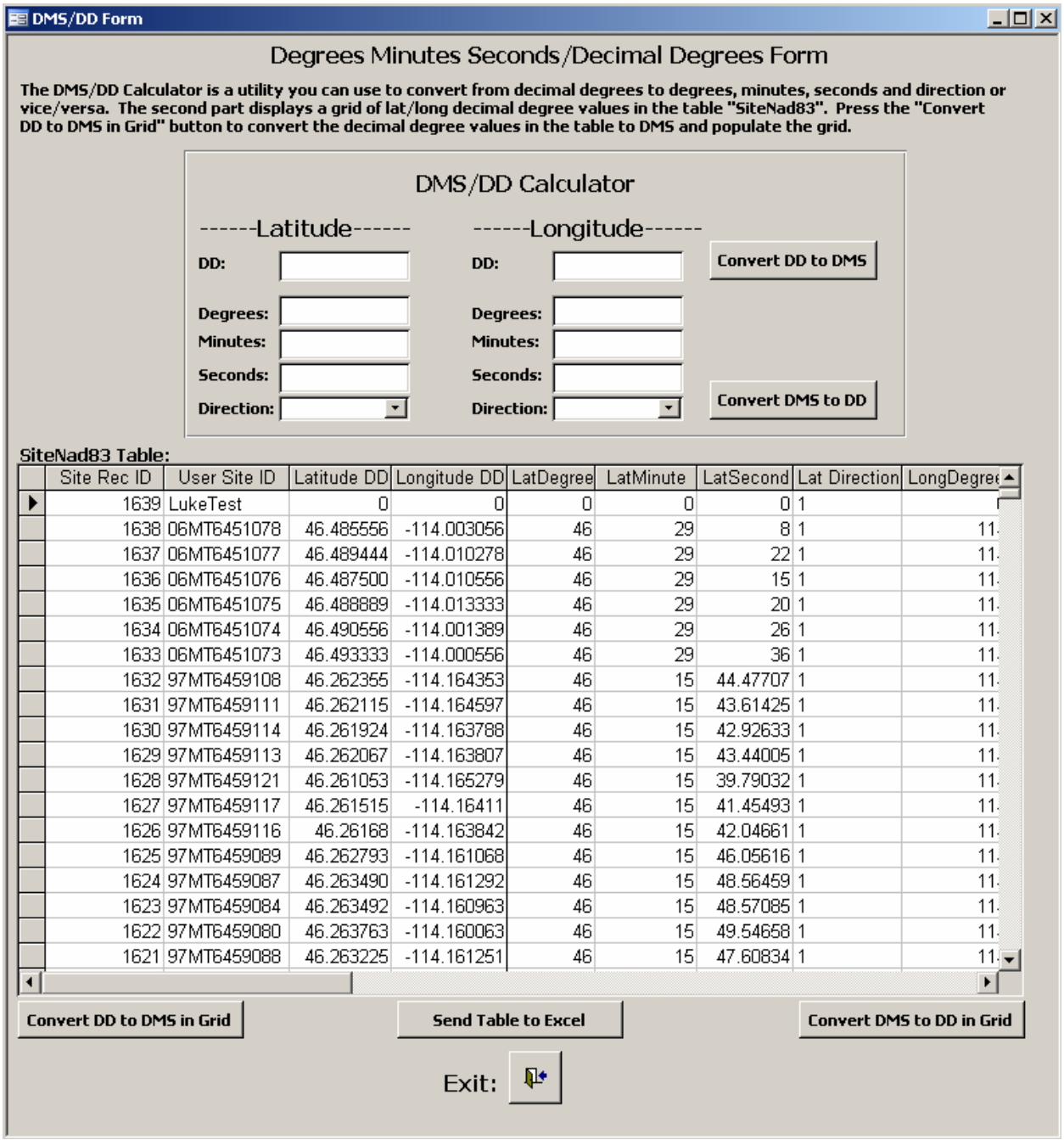
DMS/DD Conversion

NASIS does not store decimal degree information in the site database table. However, the database does contain degrees, minutes and seconds, and UTM coordinates. Using The Analysis Form, Analysis PC plots points in ArcMap through decimal degrees. A table unique to Analysis PC to store point information is called "SiteNad83". It contains a link back to the site table (siteiid), the site table's point information (latitude and longitude degree, minute, second, and direction), and latitude and longitude decimal degrees. If all site information exists and can be converted, then the SiteNad83 table will contain as many records as the site table. However, if site information is

missing or in a projection that cannot be converted, then the SiteNad83 table will contain fewer records than the site table.

The DMS/DD Conversion Form allows the user to convert from degrees, minutes and seconds (DMS) to decimal degrees and vice-versa within the SiteNad83 table. There also exists a calculator to convert user-defined values. The calculator exists as a convenience and is not a requirement or a step to be performed in this form.

In order to access the DMS/DD Form, navigate to **Main Menu >> Utilities Menu… >> DMS/DD Conversion**.



Site Rec ID	User Site ID	Latitude DD	Longitude DD	LatDegree	LatMinute	LatSecond	Lat Direction	LongDegree
1639	LukeTest	0	0	0	0	0	1	
1638	06MT6451078	46.485556	-114.003056	46	29	8	1	11
1637	06MT6451077	46.489444	-114.010278	46	29	22	1	11
1636	06MT6451076	46.487500	-114.010556	46	29	15	1	11
1635	06MT6451075	46.488889	-114.013333	46	29	20	1	11
1634	06MT6451074	46.490556	-114.001389	46	29	26	1	11
1633	06MT6451073	46.493333	-114.000556	46	29	36	1	11
1632	97MT6459108	46.262355	-114.164353	46	15	44.47707	1	11
1631	97MT6459111	46.262115	-114.164597	46	15	43.61425	1	11
1630	97MT6459114	46.261924	-114.163788	46	15	42.92633	1	11
1629	97MT6459113	46.262067	-114.163807	46	15	43.44005	1	11
1628	97MT6459121	46.261053	-114.165279	46	15	39.79032	1	11
1627	97MT6459117	46.261515	-114.16411	46	15	41.45493	1	11
1626	97MT6459116	46.26168	-114.163842	46	15	42.04661	1	11
1625	97MT6459089	46.262793	-114.161068	46	15	46.05616	1	11
1624	97MT6459087	46.263490	-114.161292	46	15	48.56459	1	11
1623	97MT6459084	46.263492	-114.160963	46	15	48.57085	1	11
1622	97MT6459080	46.263763	-114.160063	46	15	49.54658	1	11
1621	97MT6459088	46.263225	-114.161251	46	15	47.60834	1	11

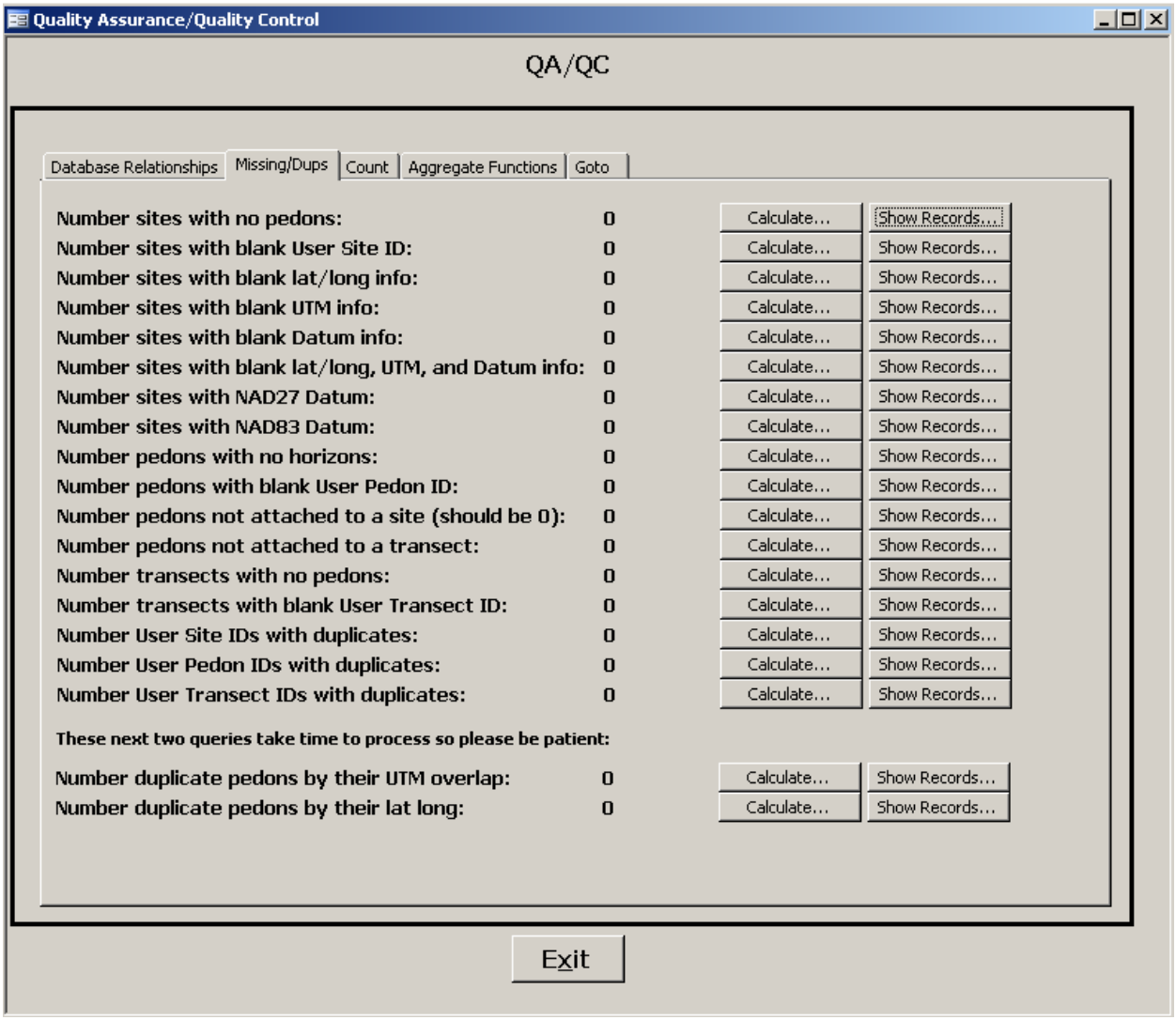
The DMS/DD Form is shown above.

The first part of the form displays the DMS/DD Calculator. DMS stands for Degree Minute Second and DD stands for Decimal Degrees. To use this utility properly to convert from DMS to DD enter Degrees, Minutes, Seconds and Direction for both Latitude and Longitude. Conversely, to use this utility properly to convert from DD to DMS simply enter the decimal degrees for both Latitude and Longitude. This utility is to be used as needed by the user, and is not required.

The second part of the form displays a grid format containing records from the SiteNad83 table. The table contains degree, minute, second (DMS), and direction information, and also decimal degree information. Two buttons displayed at the bottom of the form allow the user to convert from one format to the other, depending on what is filled in the table. Press the “Convert DD to DMS in Grid” button to convert from decimal degrees to degrees, minutes, seconds and direction for all records in the SiteNad83 table. Press the “Convert DMS to DD in Grid” button to convert from degrees, minutes, seconds and direction to decimal degrees for all records in the SiteNad83 table. Press the “Send Table to Excel” to send the SiteNad83 table to the Microsoft Excel environment, from which the user can save or print the data.

Quality Assurance/Quality Control

The Quality Assurance Form enables a user to view and verify pedon description data. There are five tabs on this form. The Database Relationships tab allows the user to view data in various formats. A user can view site, pedon and horizon data at once, view transect, pedon and horizon data at once and so on. The Missing/Dups tab enables the user to run queries to show any missing or duplicate data, such as the number of sites with no pedons, and the number of duplicate User Site IDs. The Count tab enables the user to verify database completeness. The Aggregate Functions tab allows the user to perform basic statistical functions such as count, mean, min, max and average for any table field. The Goto tab allows the user to view any table, query or form in the database.



The Quality Assurance Form (Missing/Dups tab) is shown above.

Compact and Repair Database

This button does not bring up a form or screen. This function will repair and compress your database to ensure efficiency. This will cause Microsoft Access to shut down your Analysis PC database, compact and repair it, and then re-open it. This is a good thing to perform from time to time as it will shrink the size of your Analysis PC database. It can also be accessed through the Microsoft Access menu by navigating to **Tools >> Database Utilities >> Compact and Repair Database**.

4.10 Laboratory Data

The key to connecting laboratory data to the pedon database is through the pedon and pedon horizon sample (phsample) tables. The relationship to the other pedon tables is shown in the graphic below (site is the topmost level).

Site→Site Observation→Pedon→Pedon Horizon→Pedon Horizon Sample

As you can see, there are many levels to the pedon database hierarchy. The following discussion will start from the "bottom-up", that is, the pedon horizon sample table will be discussed first and then the pedon table.

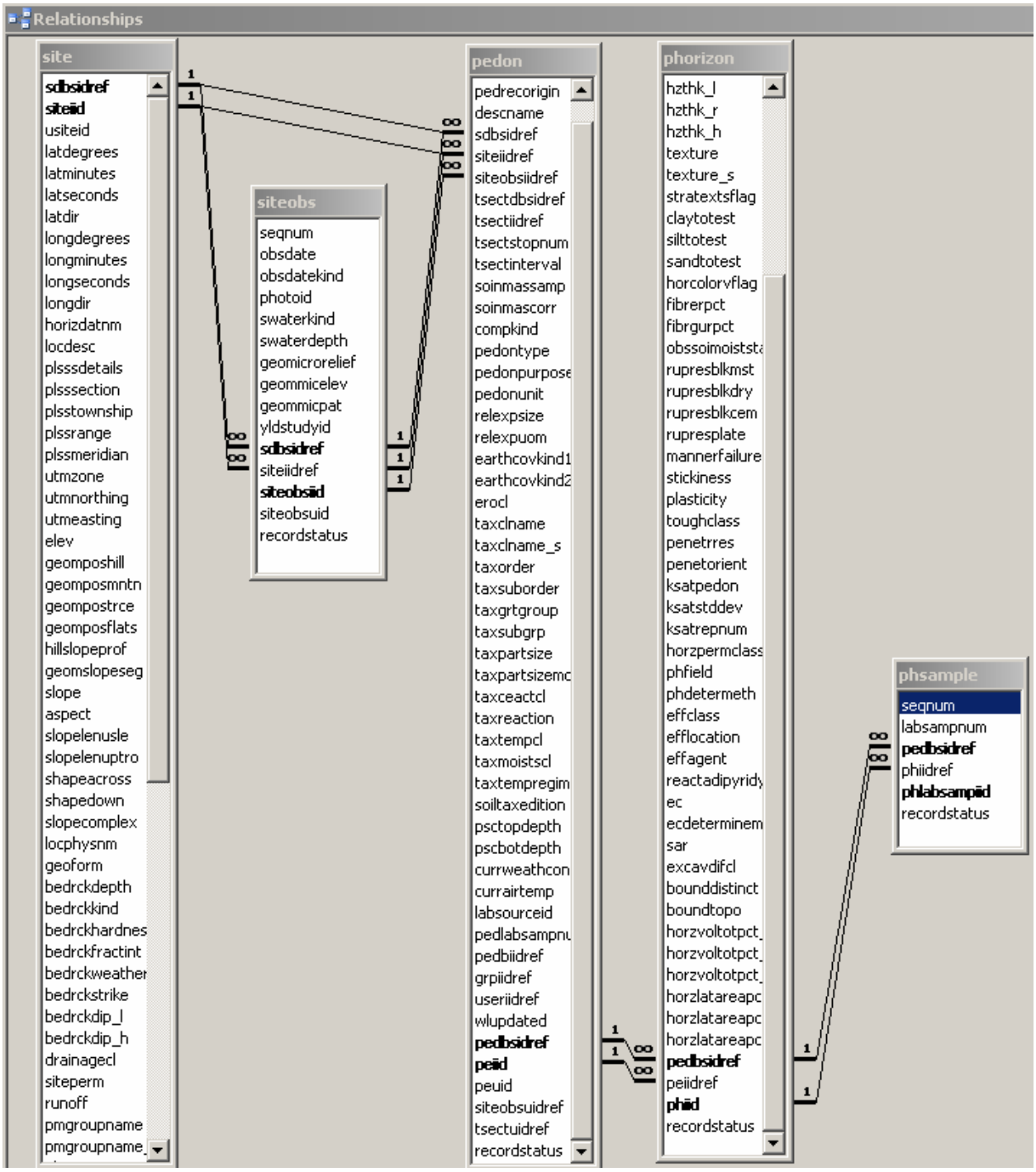
The "pedon horizon sample" table describes the relationship between a soil horizon description and other types of data that may be in the database that relate to that specific horizon, i.e. laboratory analysis results.

An important field in the "pedon horizon sample" table (phsample) table is the labsampnum field. The labsampnum field (lab sample #) is the internal laboratory sample number for the horizon. It is constructed by the two digit fiscal year * 10000 + consecutive sample number in that year. It is a text field that can be up to 8 characters.

Another important table is the "pedon" table. The "pedon" table contains information collected at the time a soil profile description is made. It has data that relates to the profile as a whole.

Two important fields in the "pedon" table are the lab source ID (labsourceid) and the lab pedon number (pelabsampnum). The lab source ID is a soil characterization laboratory identification value. The lab pedon number is an identifier number for the pedon assigned by the laboratory. This number is used to link the morphological pedon description with the associated measured property values from the laboratory. The lab source ID is a text field that can be up to 7 characters and the lab pedon number is a text field that can be up to 12 characters.

The lab pedon number and the lab sample number are typically used together, since one represents the pedon and the other represents the horizon or layer. The lab pedon number may be repeated but the lab sample number should be unique.



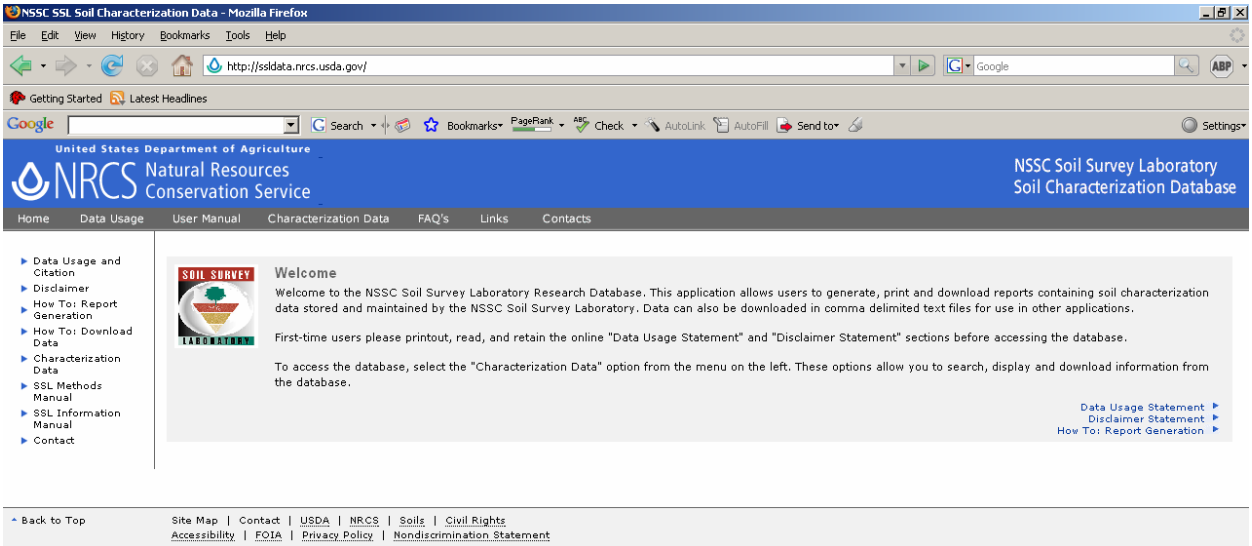
From left to right: the site, site observation, pedon, pedon horizon and pedon horizon sample tables. The pedon database relationship for the pedon and pedon horizon sample tables is shown above. The pedon table connects to the pedon horizon sample table through the pedon horizon table.

The process to obtain lab data is to navigate to the NSSC Soil Survey Lab Research Database using your web browser, perform a query and download lab data into a

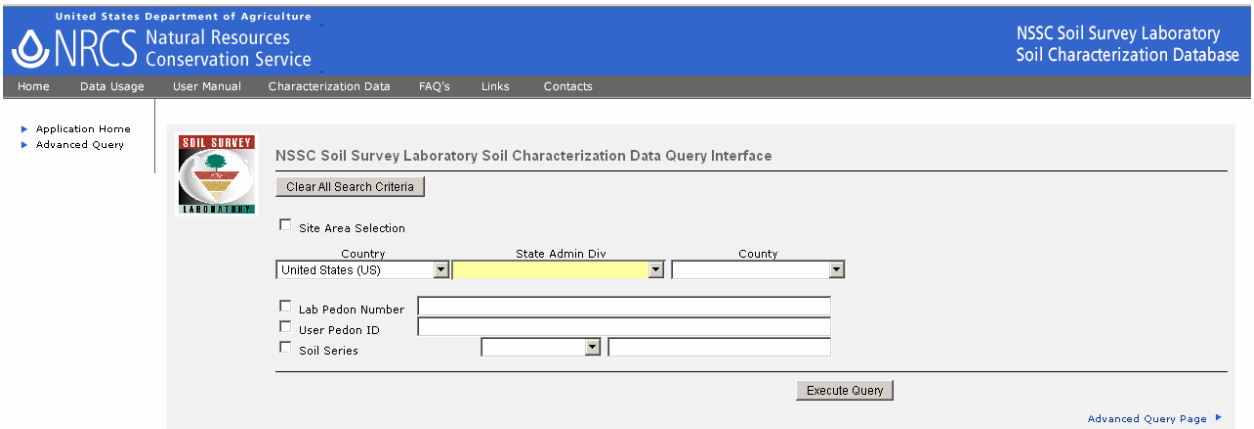
comma delimited text file (CSV file), and then use the Microsoft Access import function to transfer one or more text files into one or more Access tables.

The NSSC Soil Survey Laboratory Research Database is where lab data may be obtained for use in Analysis PC. The URL is http://ssldata.nrcs.usda.gov/.

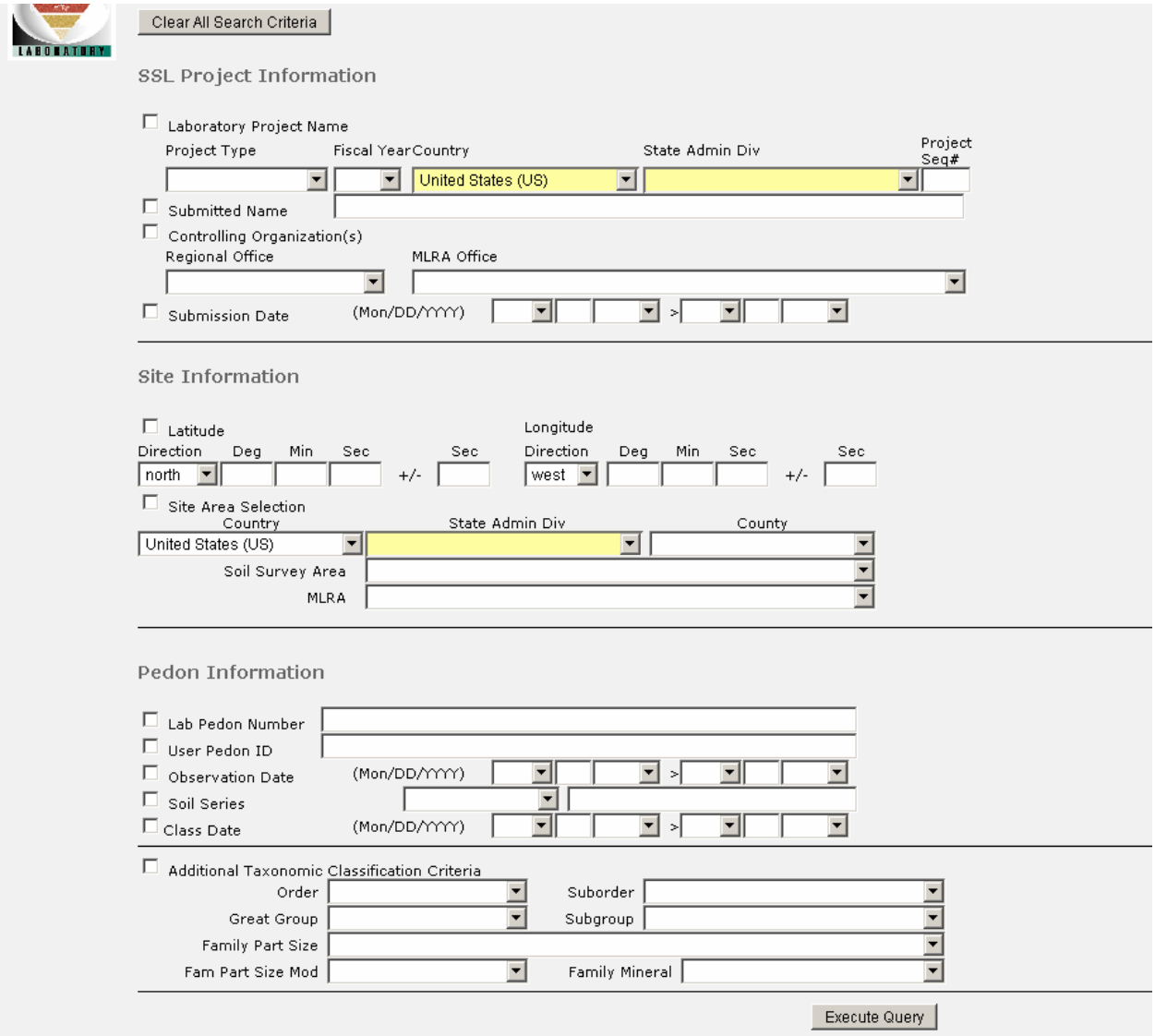
This web site allows users to generate, print and download reports containing soil characterization data stored and maintained by the NSSC Soil Survey Laboratory. Data can also be downloaded in comma delimited text files for use in other applications. To access the database, select the "Characterization Data" option from the main menu on the left. There are options that allow you to search, display and download information from the database.



The lab soil characterization database website is shown above. Select the "Characterization Data" option from the menu on the left.



The basic NSSC Soil Survey Laboratory Soil Characterization Data Query Interface is shown above.



The advanced NSSC Soil Survey Laboratory Soil Characterization Data Query Interface is shown above.

The basic interface with the state of Montana and Missoula county being queried is shown above.

Return to Query Page

Check All

	pedon_number	user_pedon_id	series
☑	40A3319	61MT063002	Greenough
☑	40A3320	61MT063001	Greenough
☐	40A3321	61MT063005	Holloway
☐	40A3322	61MT063006	Holloway
☐	40A3329	61MT063003	Tarkio
☐	40A3330	61MT063004	Tarkio
☐	40A3331	61MT063007	Yourame
☐	70C0089	70MT063012	Yourame
☑	74C0032	74MT063001	Greenough
☐	74C0033	74MT063002	Crow
☑	74C0034	74MT063003	Greenough

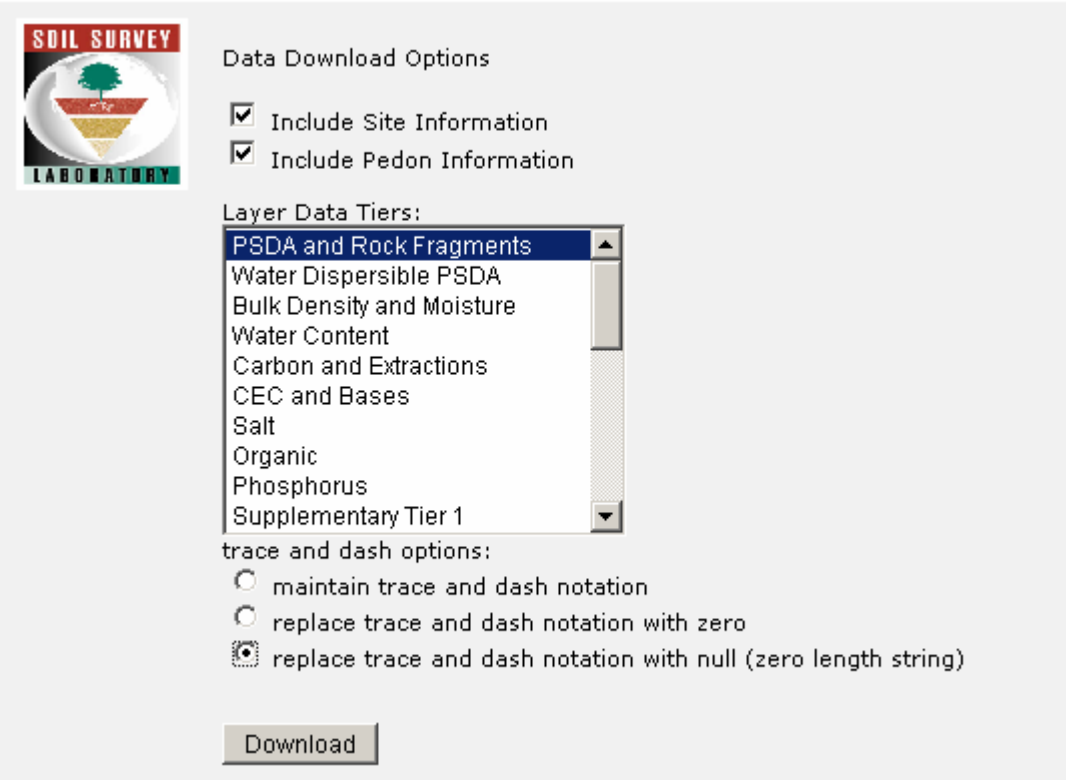
○ Generate Report

OR

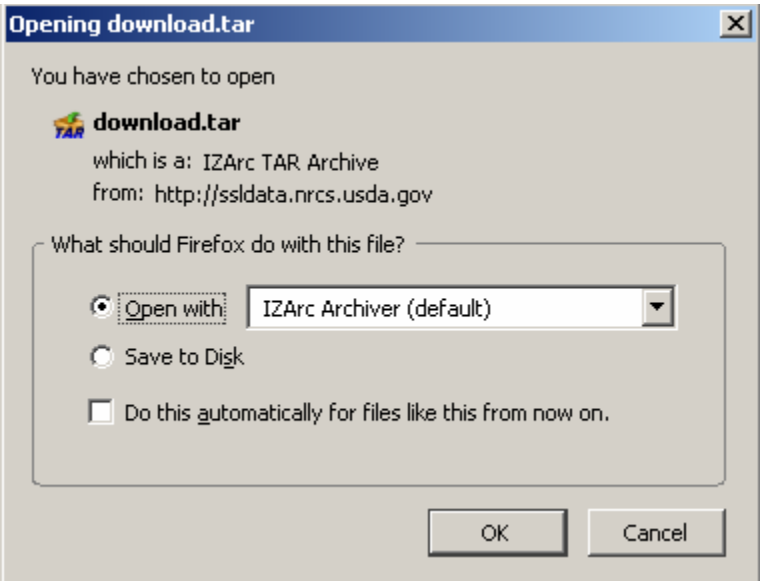
◉ Download Data

Continue

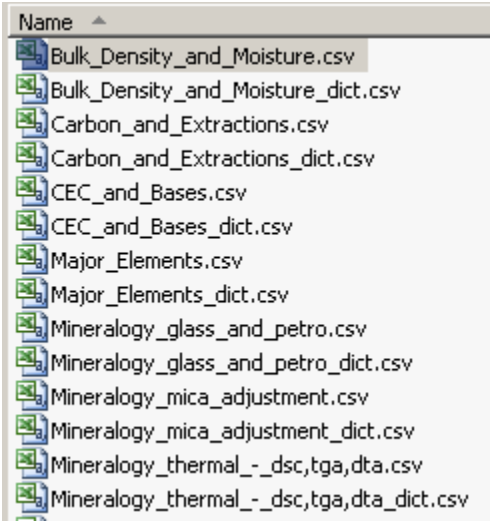
A portion of the query result is shown above. Select one or more pedons using the checkboxes, select the "Download Data" radio button and then press the "Continue" button. In this case, we chose the "Greenough" soil series in Missoula County, Montana (MT063).

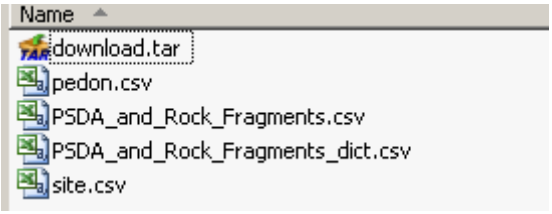


A Data Download Option screen will be displayed as shown above. We are including site and pedon information in this example (site.csv and pedon.csv files will be returned). Generally, you will want to replace the dash notation with null or zero. Select one or more Layer Data Tiers using the Ctrl or Shift keys.



A "download.tar" (zip) file will be shown with the option to Open or Save. Normally, you will want to save the file to your local machine. The tar extension is from the UNIX days and stands for "tape archive".





After the file is saved to your local machine and extracted (via WinZip or similar utility), a list of CSV files (native format is Excel) will be shown. Any of these files may also be imported into Access for use with Analysis PC.

Let's open the site.csv, pedon.csv and PSDA_and_Rock_Fragments.csv files and inspect their contents. These files are flagged as Excel files so we open each file and examine its contents in Excel.

The site text file contains the User Site IDs 61MT063002, 61MT063001, 74MT063001 and 74MT063003.

A
user_site_id
61MT063002
61MT063001
74MT063001
74MT063003

The User Site ID field in the "site.csv" file is shown above.

The pedon text file also contains the User Site IDs 61MT063002, 61MT063001, 74MT063001 and 74MT063003 (as the site text file does), matching User Pedon IDs and also some pedon keys. The pedon keys are 40A3319, 40A3320, 74C0032 and 74C0034.

A	B	C
user_site_id	pedon_key	user_pedon_id
61MT063002	40A3319	61MT063002
61MT063001	40A3320	61MT063001
74MT063001	74C0032	74MT063001
74MT063003	74C0034	74MT063003

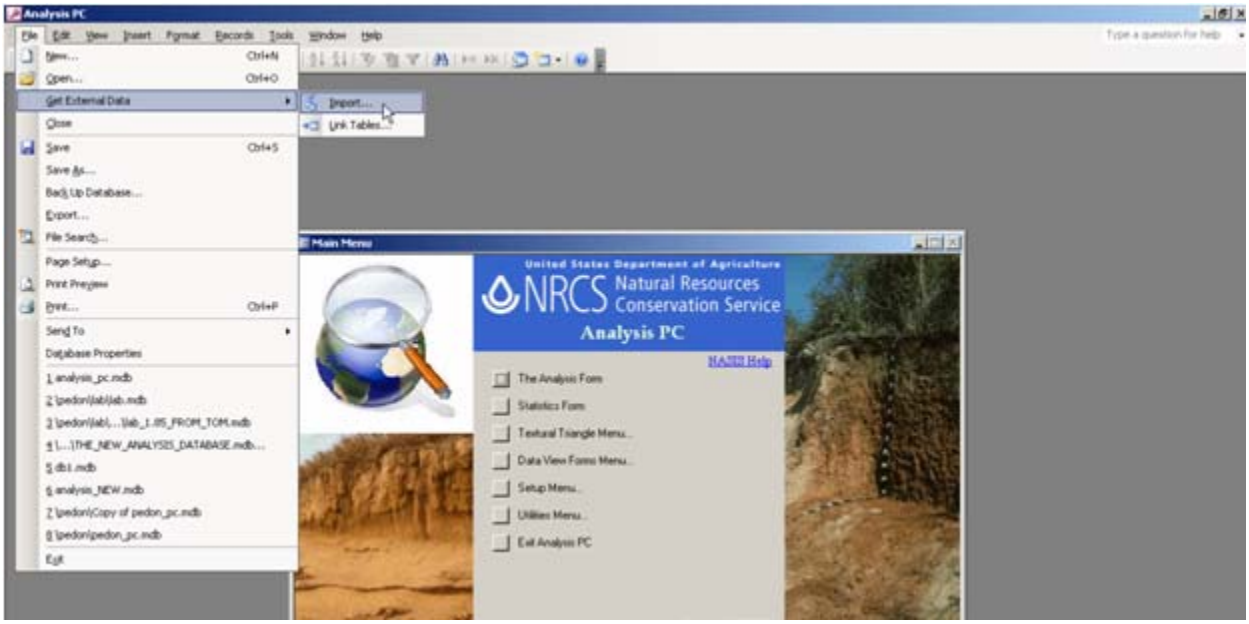
The User_Site_ID, Pedon_Key and User_Pedon_ID fields in the pedon.csv file are shown above.

The PSDA and Rock Fragments text file contains the pedon keys 40A3319, 40A3320, 74C0032 and 74C0034 (as the pedon text file does), and some layer keys. Note that the pedon key values are repeated but the layer key values are unique.

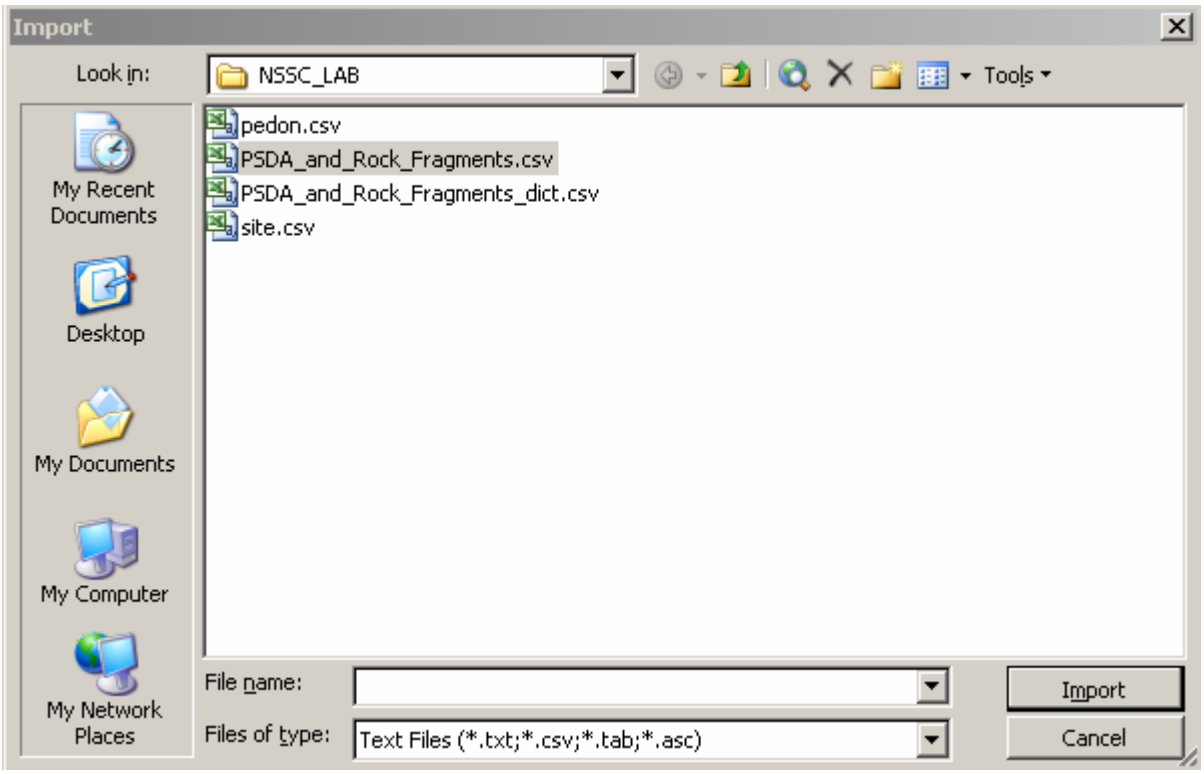
A	B
pedon_key	layer_key
40A3319	40A25818
40A3319	40A25819
40A3319	40A25820
40A3319	40A25821
40A3319	40A25822
40A3319	40A25823
40A3319	40A25824
40A3319	40A25825
40A3319	40A25826
40A3320	40A25827
40A3320	40A25828
40A3320	40A25829
40A3320	40A25830
40A3320	40A25831
40A3320	40A25832
40A3320	40A25833
40A3320	40A25834
40A3320	40A25835
40A3320	40A25836
40A3320	40A25837
40A3320	40A25838
74C0032	74C00230
74C0032	74C00231
74C0032	74C00232
74C0032	74C00233
74C0032	74C00234
74C0032	74C00235
74C0034	74C00244
74C0034	74C00245
74C0034	74C00246
74C0034	74C00247

The Pedon Key and Layer Key fields in the PSDA_And_Rock_Fragments.csv file are shown above.

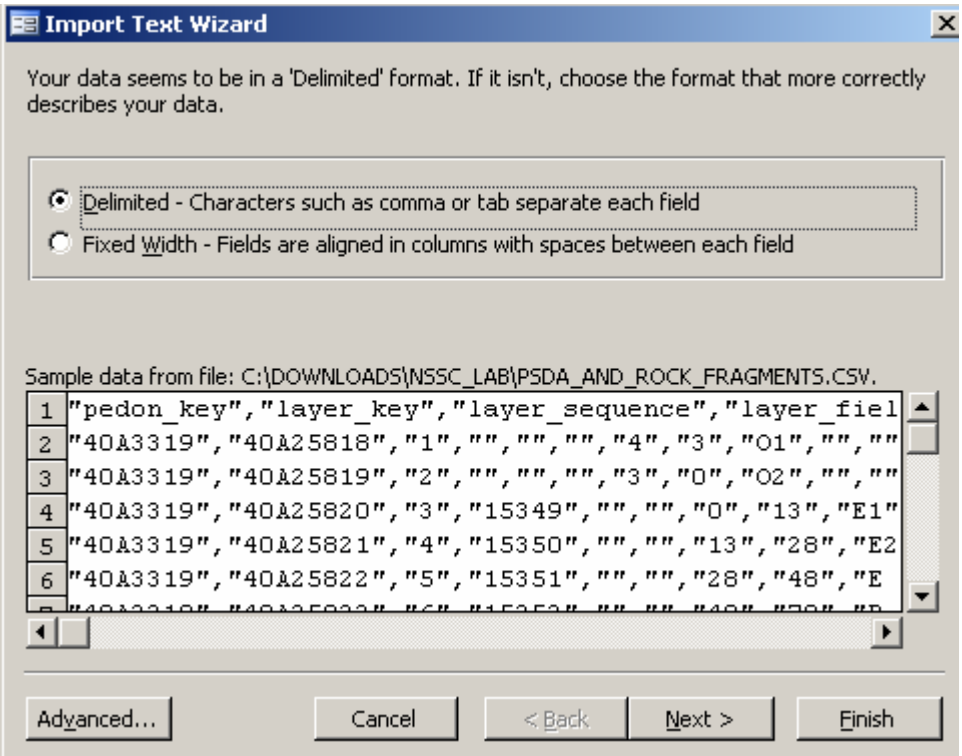
At this point, we could import the site, pedon and PSDA and Rock Fragment text files into their own tables in Analysis PC. It would be easy to connect these three tables by using the User Site ID, User Pedon ID and Pedon Key fields. Alternately, we could import the PSDA_and Rock_Fragments.csv file and connect its layer_key field to the pedon horizon sample field “labsampnum”, and/or connect the pedon_key field to the pedon table field “pelabsampnum”. The native Access import process will be shown next.



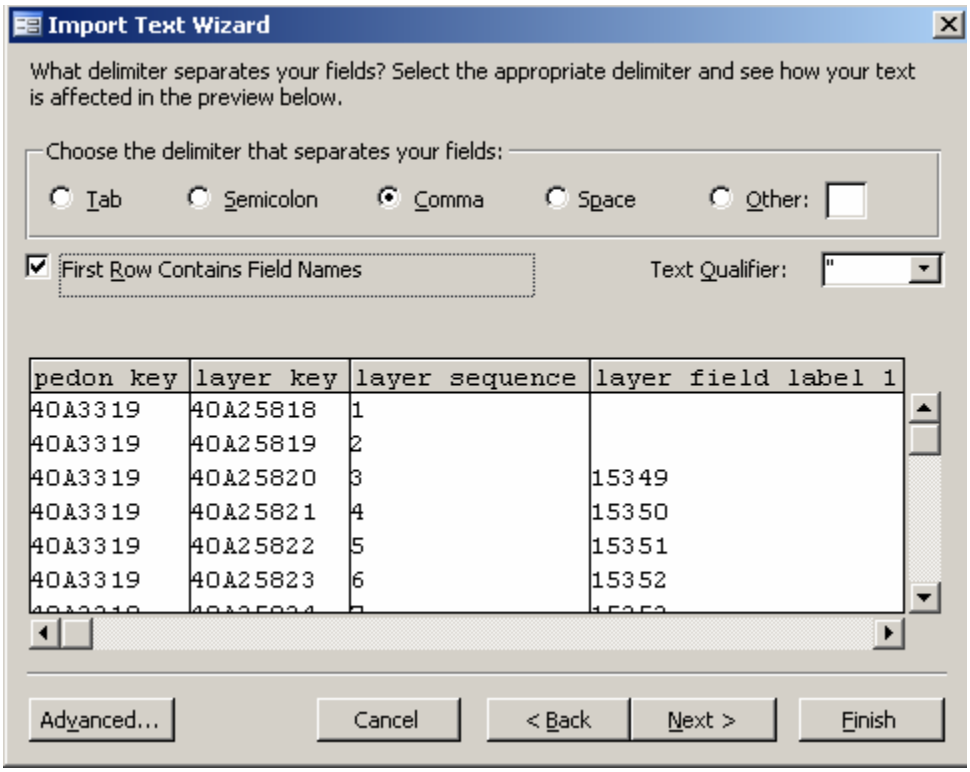
Open Microsoft Access, launch Analysis PC and import one of the CSV files by navigating to ***File >> Get External Data >> Import****.*



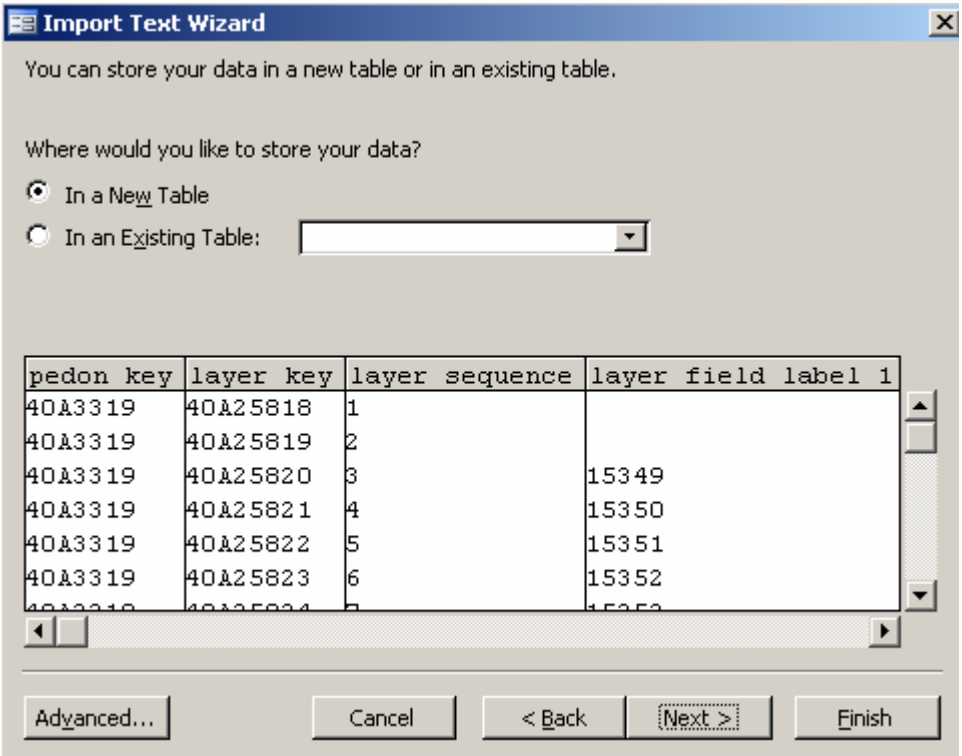
Choose the appropriate CSV file, for example "PSDA_and_Rock_Fragments.csv" as shown above.



Use the Microsoft Access Import Text Wizard to help you import the CSV file. The text file will always be delimited by commas.



A comma is the delimiter that separates the fields and the first row in the text file contains field names. The Text qualifier is the double quote character (“).

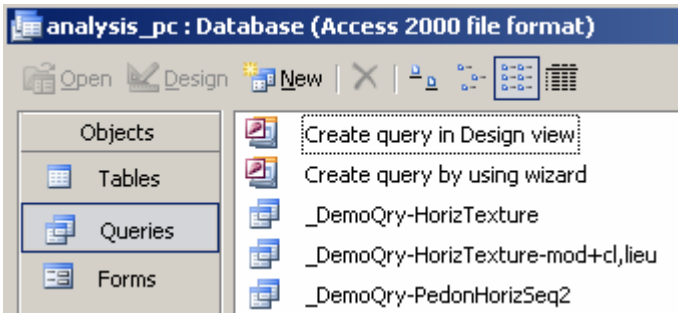


As seen above, you may store the data in a new table or an existing table. Use common sense when using these wizards; i.e. choose options which are appropriate for the specific file you are importing.

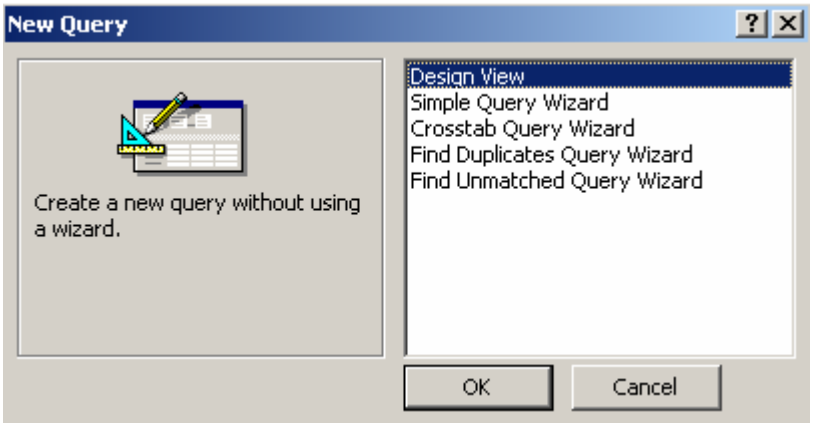
PSDA_and_Rock_Fragments : Table

ID	pedon_key	layer_key	layer_sequence	layer_field_label	layer_field_label	layer_field_label
1	40A3319	40A25818	1			
2	40A3319	40A25819	2			
3	40A3319	40A25820	3	15349		
4	40A3319	40A25821	4	15350		
5	40A3319	40A25822	5	15351		
6	40A3319	40A25823	6	15352		
7	40A3319	40A25824	7	15353		
8	40A3319	40A25825	8	15354		
9	40A3319	40A25826	9			
10	40A3320	40A25827	1			
11	40A3320	40A25828	2			
12	40A3320	40A25829	3			
13	40A3320	40A25830	4	15341		
14	40A3320	40A25831	5	15342		
15	40A3320	40A25832	6	15343		
16	40A3320	40A25833	7	15344		
17	40A3320	40A25834	8	15345		
18	40A3320	40A25835	9	15346		
19	40A3320	40A25836	10	15347		
20	40A3320	40A25837	11	15348		
21	40A3320	40A25838	12			
22	74C0032	74C00230	1	74230		
23	74C0032	74C00231	2	74231		
24	74C0032	74C00232	3	74232		
25	74C0032	74C00233	4	74233		
26	74C0032	74C00234	5	74234		
27	74C0032	74C00235	6	74235		
28	74C0034	74C00244	1	74244		
29	74C0034	74C00245	2	74245		
30	74C0034	74C00246	3	74246		
31	74C0034	74C00247	4	74247		

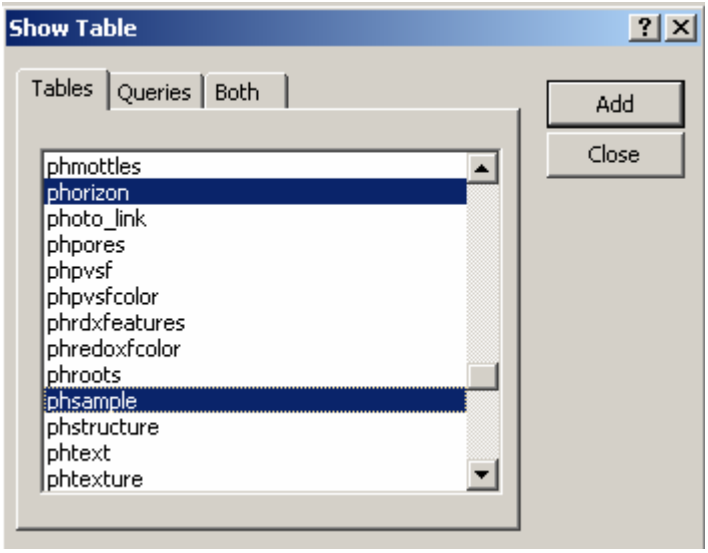
We chose to store the data in a new table and the results are shown above. Note that Access has added a unique field ID to the table. This is typically the Record ID in a database table. Two important fields are the pedon_key and layer_key fields. These fields are the ones you will use to link this table to the current pedon database. The "pedon_key" field in the new table corresponds to the "pelabsampnum" field in the pedon table and the "layer_key" field in the new table corresponds to the "labsampnum" field in the phsample table.



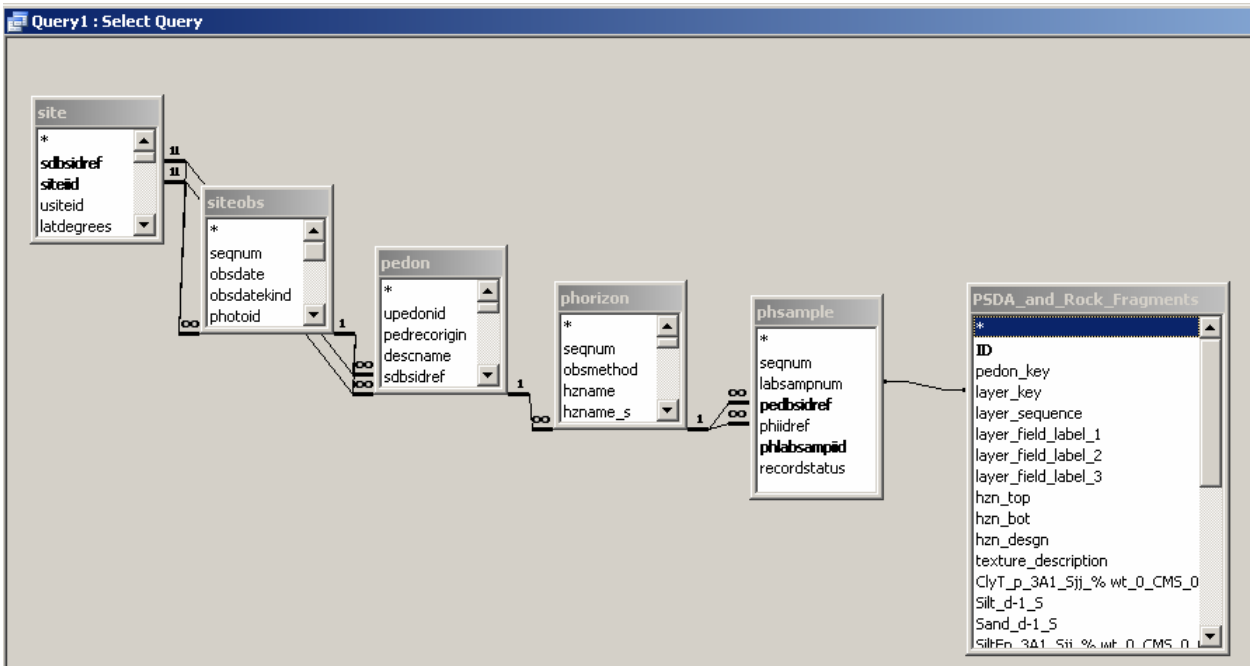
To create a new query in Access, navigate to the main Analysis PC database window, select the "Queries" object, and then press the "New" button.



The next step is to select Design View and press the OK button.

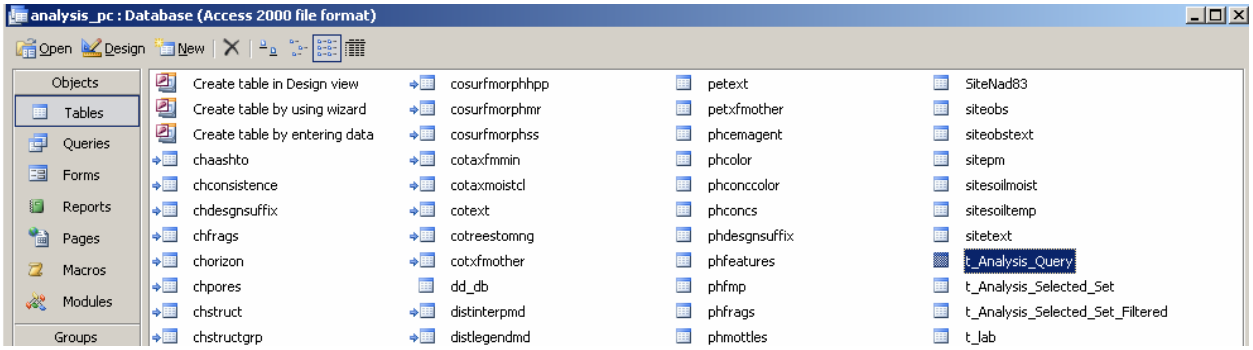


The Show Table form appears. Select the tables in the query using the Ctrl button and the left mouse button. For example, in this case we select the site, site observation (siteobs), pedon, pedon horizon (phorizon), pedon horizon sample (phsample) and PSD_And_Rock_Fragments tables. We then press the Add button.



We can connect the new table named "PSDA_And_Rock_Fragments" to the pedon database via the phsample table. The "layer_key" field in the new table corresponds to the "labsampnum" field in the phsample table.

If an existing Analysis PC query is modified to add a lab data table (for example the PSDA_And_Rock_Fragments table), no further action is required by the user. However, if a new query is created as we have done above, then this query will have to be added as an entry in the t_Analysis_Query table. This is the table which is used to produce the drop down list of queries in The Analysis Form.



The t_Analysis_Query table can be activated by navigating to the main Analysis PC database window, selecting the "Tables" object and double-clicking the table "t_Analysis_Query".

The "ID" field is the table's primary key, the "Label" field is what the user sees in the Query drop down list box, the "Name" field is the actual query name in the database, the "Description" field is the user-defined query description, the "Source" field represents

the creator of the query and the “Has Points?” field is a Boolean value representing whether or not a query contains latitude/longitude (point) information.

Analysis Query Data Entry

Analysis Query Data Entry

Analysis Query Table (Label Required):

Sequ	Label	Name	Description	Source	Has Points?
1	all soils	q_analysis_all_soils_no_points	Displays all the soil series names, no point	NGDC	☐
2	all soils and plot	q_analysis_all_soils_points	Displays all the soil series names, has poir	NGDC	☑
3	mapunit elements and plot	q_analysis_muelements_points	Query for mapunit elements, has points (lat	NGDC	☑

Some records in the “t_Analysis_Query” table are shown above.

To add, remove or edit an entry in the Query drop down list, you must add, remove or edit a record in the t_Analysis_Query” table. This can be done through the basic Access interface or through the “Add Query” button (the notebook icon) on the Analysis Form. Note that the Label and Name are required fields in this table because you need a Label for the Query drop down list and you need a Name for the actual query name in the Analysis PC database.

5.0 Appendix A: Frequently Asked Questions

5.0 APPENDIX A: FREQUENTLY ASKED QUESTIONS

1- Q: What is Analysis PC?
A: Analysis PC is what we are calling this analysis tools program. It allows a user to analyze soil survey databases in tabular and spatial formats.

2- Q: What do I need to run Analysis PC?
The program runs in Microsoft Access and can be used on a laptop, desktop PC or a Tablet PC.

The Analysis PC application requirements:

- A modern desktop, laptop or Tablet PC
- Microsoft Windows operating system (XP, XP Tablet Edition)
- Microsoft Office 2003: Access 2003 and Excel 2003
- ESRI ArcGIS 9.2: ArcMap and ArcToolbox

The database file format used is the Access 2000 file format.

3- Q: What files are required to run Analysis PC?
Analysis PC consists of four Access database files, one ArcMap file and one ArcToolbox file.

There are a total of four Microsoft Access database files within the Analysis PC application. They are analysis_pc.mdb, templatedb.mdb, PG645.mdb and arcmap_link.mdb. The analysis_pc.mdb contains its own local database tables, the pedon database and links to an external database named templatedb.mdb. It also contains imported tables from the arcmap_link.mdb database in order to synchronize the data in The Analysis Form.

A way to think of these files is through their functionality. The analysis_pc.mdb file is the “application” containing the pedon database, the templatedb.mdb can be thought of as the “SSURGO” database, the PG645.mdb is the “personal geodatabase” containing point, line, flag, area, boundary and update layers, and the arcmap_link.mdb file is the “spatial link” database.

On the ArcMap side, two files are required. One file is the ArcToolbox named “Analysis_PC.tbx” and the other file is the ArcMap document file (mxd file). The total number of files required is therefore six (four mdb files, one mxd file and one tbx file).

4- Q: Where do I get all the required files?
A: http://nasis.nrcs.usda.gov/downloads/ and under the Analysis PC section, click on the link “Download Analysis PC v1.0”. Visit this alternate link in case this one is down: http://www2.ngdc.wvu.edu/~smagnotta/

5- Q: Where can I get a user's guide or help?
http://nasis.nrcs.usda.gov/downloads/ and under the Analysis PC section, click on the link "Download Analysis PC User Guide". Visit this alternate link in case this one is down: http://www2.ngdc.wvu.edu/~smagnotta/

6- Q: What is the difference between the Pedon PC and Analysis PC?
A: Pedon PC is a data entry program with some analysis built in. Choice lists are integer choices and pedons may be uploaded into NASIS. Analysis PC allows a user to perform analysis on a textual database; integers are not used for choices. Also, data cannot be uploaded into NASIS.

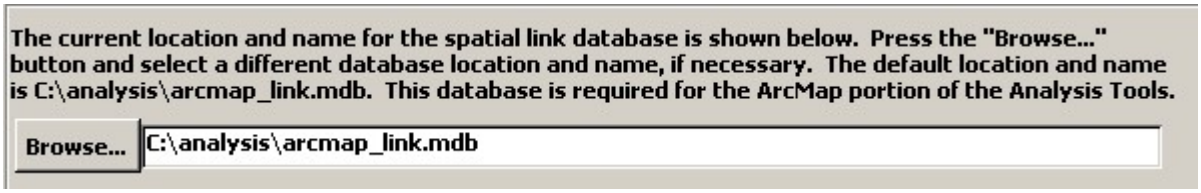
7. Q: Do I have to use the C:\analysis directory and the C drive as the storage area for this application?
A: No, you do not have to use a specific location or a specific drive. You can change the default file locations in the Analysis PC Setup Form under the Setup Menu (**Main Menu >> Setup Menu >> Setup**).

8. Q: How do I change the default file locations?
A: Use the Analysis PC Setup Form by navigating to **Main Menu >> Setup Menu…>> Setup**.

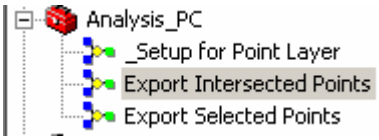
9. Q: Can I rename files? Which ones?
A: Yes, you may rename all the files. You can rename analysis_pc.mdb, templatedb.mdb and arcmap_link.mdb. Be careful when changing the file arcmap_link.mdb because the change must be done in both Access and ArcMap. You will name the personal geodatabase name and the ArcMap document file name according to your specific soil survey area. The ArcToolbox name can also be changed. You can change the default filenames in the Analysis PC Setup Form under the Setup Menu (navigating to **Main Menu >> Setup Menu…>> Setup**).

10. Q: Is there any danger changing the names or locations of the files?
A: All files may be changed but the arcmap_link.mdb file must be resynchronized in order for the ArcMap environment to work correctly. Analysis PC and the ArcToolbox models both write to the arcmap_link.mdb file. In order to change the name and/or location successfully, you must change the name and/or location in the Analysis PC Setup Form and also make changes to the ArcToolbox models. There are currently three models and each writes to the C:\analysis\arcmap_link.mdb default location. This location would need to be changed wherever it appears in each of the models. The following screenshots show where the changes need to be made.

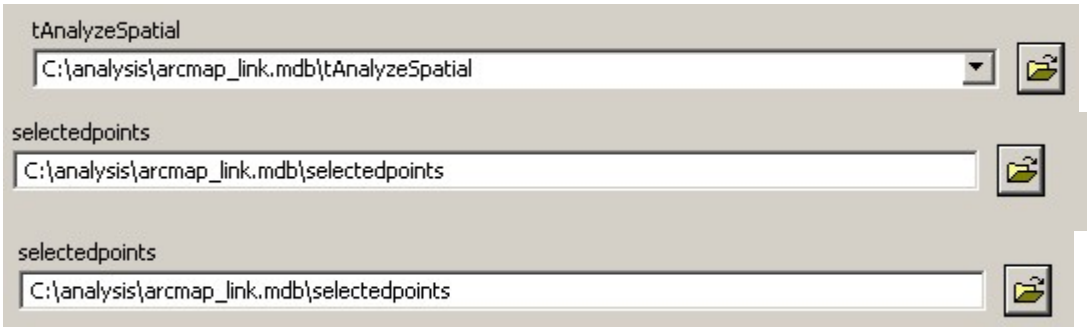
Navigate to the Analysis PC Setup Form through **Main Menu >> Setup Menu… >> Setup**:



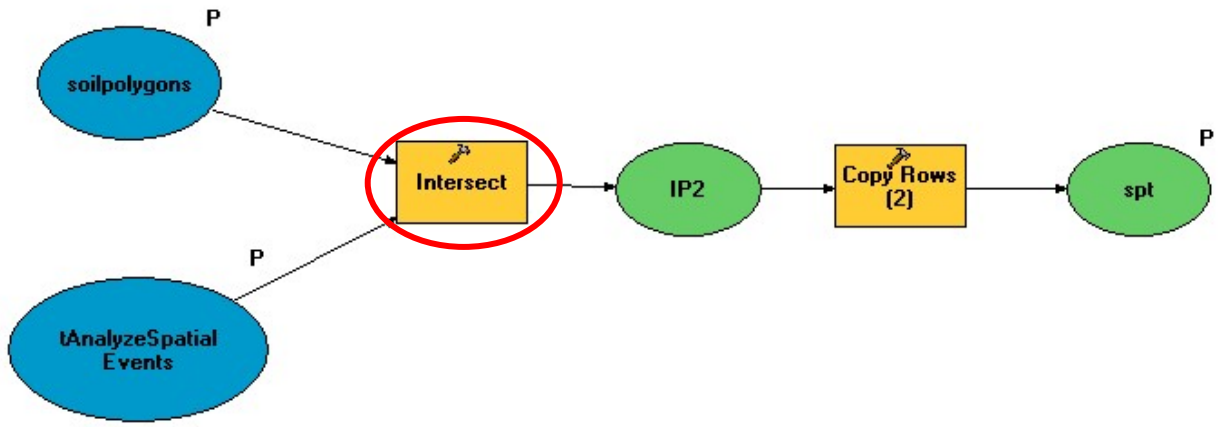
Make the desired change using the Browse… button. Once this change has been made, open the ArcMap program and show the "Analysis_PC" toolbox. Double-click each of the models in the ArcToolbox "Analysis_PC":



Each occurrence of "arcmap_link.mdb" in each of the models must be changed using the Browse button (folder icons on the right):



You will also need to make another change in the model "Export Intersected Points". The model is shown below. Double-click on the "Intersect" rectangle and change the path of the output feature class.

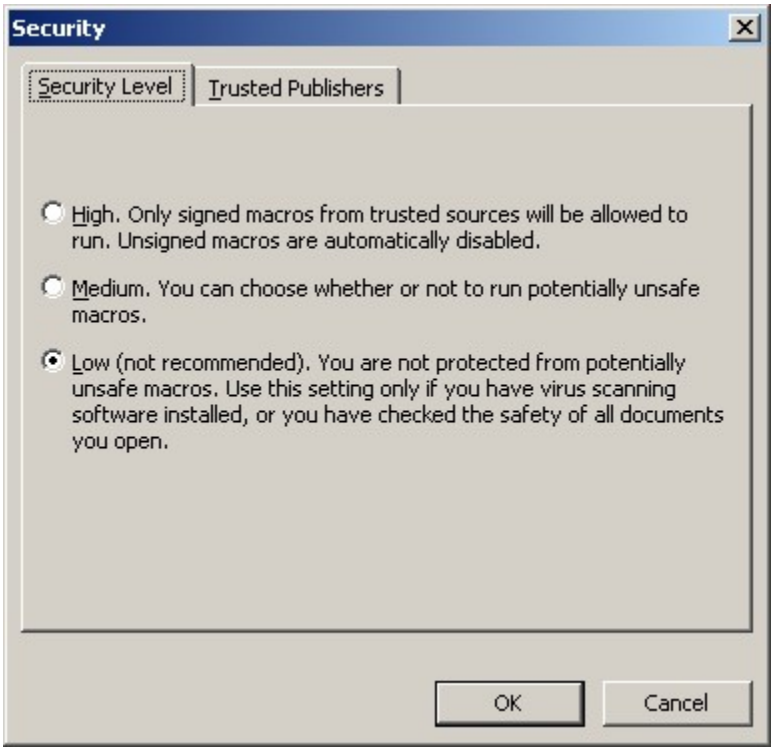


If you wish to change the ArcToolbox name from “Analysis_PC” to something else, right click the toolbox name in ArcToolbox and choose the “Rename” option.

11. Q: Why do I need ArcMap? What version should I use?
A: ArcMap allows the user to view selected set data spatially. Typically the latest ArcMap version should be used. At the time of this writing, version 9.2 should be used.

12. Q: What version of Access and Excel should I use?
A: Use version 2003 of Excel and Access. The Access file format is in Access 2000.

13. Q: I get security messages every time I open up the program. How do I get rid of them?
A: If you want to change your security settings, in Access navigate to **Tools >> Macro >> Security…**
You will receive the following dialog box. Choose only Medium or Low Security Levels. Choosing Low is not recommended but will result in no security messages popping up when opening the program.



14. Q: Is there a summary of setup steps available?
A: Yes a summary of setup steps is as follows:

- Download the analysis_pc.mdb file plus support files from http://nasis.nrcs.usda.gov/downloads/ and place it in the folder C:\analysis. If the download is not found then try this alternate download site: http://www2.ngdc.wvu.edu/~smagnotta.
- Import a pedon data file from NASIS.
- Download a SSURGO template database and data from http://soildatamart.nrcs.usda.gov/, unzip the SSURGO template database and the SSURGO Data, place in C:\analysis and rename the file to "templatedb.mdb". Import the SSURGO data .txt files into the templatedb.mdb.
- Create an Access personal geodatabase.
- Add the Analysis_PC.tbx toolbox and check an option under **Tools >> Options** (Under the "Geoprocessing tab", check the box next to "Overwrite the outputs of geoprocessing operations" if it is not checked).
- Open ArcMap, create a new document and create the point layer for your ArcMap project, or run the model "_Setup for Point Layer" in the "Analysis_PC" toolbox.
- Within ArcMap, add the area and boundary layers to your previously created personal geodatabase. Rename your area layer to "soilpolygons". Optionally rename your boundary layer to "boundary".

Once you are done with the setup steps you may navigate to the location of "analysis_pc.mdb" (the default is C:\analysis) and double-click the file to launch the program.

15. Q: How do I manually Compact and Repair the database?
A: In Access, navigate to **Tools >> Database Utilities >> Compact and Repair Database…**

16. Q: How do I look at a listing of all the tables, forms and queries in Analysis PC?
A: Simply open up the main database window in Access. It will have the title bar "analysis_pc: Database (Access 2000 file format)". Under Objects you will see Tables, Queries, Forms, Reports, Pages, Macros and Modules. Many of the objects are hidden from the user so a checkbox must be checked in **Tools >> Options**.

In Microsoft Access, navigate to the **Tools >> Options >> View** tab. Make sure the box next to **Show >> Hidden Objects** is checked. This step will allow you to see any hidden database tables, forms, queries and reports.

17- Q: Does Analysis PC use the same backend pedon database as Windows Pedon and Pedon PC?
A: Yes, Analysis PC uses the same pedon database as Windows Pedon and Pedon PC. The default name of this database is pedon.mdb. Pedon PC was created after Windows Pedon was released and Analysis PC was created after Pedon PC was released. The Windows Pedon database uses a subset of the NASIS database. All applications were written using Visual Basic. Unlike Pedon PC, the pedon database is embedded within Analysis PC, which means it is part of the analysis_pc.mdb file. Also, the pedon database contains textual data for all choice lists instead of integer data. This makes it easier for the user to view the raw data in the database, since text data is stored and not random integers.

18- Q: How do I start the Analysis PC application?
A: The Analysis PC application can be launched in three ways:

1. From Microsoft Access
    a. Open Microsoft Access (For example, **Start >> All Programs >> Microsoft Office >> Microsoft Office Access 2003**)
    b. Choose **File >> Open** from the Menu bar up top
    c. Choose the analysis_pc.mdb database file (default location is at C:\analysis)

2. From Windows Explorer/My Computer
    a. Navigate Windows Explorer or My Computer to the location of the analysis_pc.mdb database file (default location is at C:\analysis)

b. Double-click the file to launch Microsoft Access

3. Via shortcut on your Desktop or Start Menu
   a. Navigate to the analysis_pc.mdb database file as in 2.a. above
   b. Right click on the file and select “Create Shortcut”. This places a shortcut to this file in the same folder.
   c. Click and drag the shortcut to your Desktop or to the Start Menu.
   d. Right click on the shortcut and then select “Rename”.
   e. Type in “Analysis_PC” or similar text.
   f. Start the Analysis PC application by double-clicking the shortcut.

Currently, the default parent folder in which all files must be placed is called “analysis” and resides on the C letter-designated hard drive (i.e. C:\analysis). The default Analysis PC database filename is currently “analysis_pc.mdb”.

19- Q: The application will not run. I get a Startup script error.
A: The Microsoft Access version that you are running is probably missing one or more DLL files. One solution is to download "Microsoft JET service pack 8" via http://support.microsoft.com/?kbid=829558 (this link may be changed by Microsoft so please do a Google search for “Microsoft JET service pack 8”). This will most likely require administrator privileges so ask your IT department to help you with this issue. Similar issues would occur if your version of Access does not have all the latest updates loaded. The Microsoft Access version used is 2003.

20- Q: When I receive a new version of the Analysis PC, can I overwrite all my files?
A: No, you should not have to overwrite all your files. Feel free to overwrite any documentation (Word doc files) and the analysis_pc.mdb file (the application file), but you should not replace any other file. The support files are sample files created for the state of Montana, so those files would need to be replaced by your own files.

21. Q: Can I make my own customizations?
A: Yes, use Access functionality to make this application tailor-made for your specific soil survey area.

22- Q: I need help with the database and understanding some table fields. Where can I get help?
A: You can go to the NASIS help site at http://nasis.usda.gov/documents/help/_index.htm. Analysis PC has a link to this site on the Main Menu named “NASIS Help”.

23- Q: It seems that I cannot find certain columns in some of the tables presented in the forms. Why?
A: In the default view, the columns are not displayed because they are hidden. Microsoft Access gives the user the option to customize the view by showing and hiding columns in tables. In order to show a hidden column, select a column in the table, go

up to the Access main menu and choose **Format >> Unhide Columns...** and check the column you wish to show or unhide (checked = show). To hide a column, select a column in the table, go up to the Access main menu and choose **Format >> Hide Columns...** (unchecked = hide).

Note: You can show or hide one or more columns.

24- Q: How do I move columns in a table?
A: Highlight the column(s) you wish to move and hold down the left mouse button. You will see the mouse pointer change with a little rectangle beside it. Now drag and drop the column(s) where you want them.

25- Q: I found a bug in your program. Where do I send it?
A: You can email your bug find to NGDC via henry.ferguson@wv.usda.gov. Please include what version you found the bug in, a screen shot of the error, and the steps you made right before the error. The version of the program will be on the lower right of the Main Menu; e.g. version 1.0. You can capture a screen shot by pressing the Print Screen button on your keyboard, or pressing Alt + Print Screen. By doing this, the screen has been copied to the clipboard. You can now open up Microsoft Word and paste the screenshot (Ctrl + V) into any Word document.

26- Q: I have an idea for an enhancement to your program. Where do I send it?
A: You can email your idea, enhancement or wish list to NGDC via henry.ferguson@wv.usda.gov.

27- Q: Do I have to know SQL, any computer technical language or script?
A: No, it is not a requirement, but it does help to understand the basics of relational databases and the SQL query language syntax.

The following answer is one of the most important things to understand about the operation of the Analysis Forms.

28- Q: What is the SiteNad83 table? Why is it mentioned in The Analysis Form? Do I need it?
A: Yes, the SiteNad83 table is needed for the proper operation of Analysis PC. It is the key to showing data points spatially in ArcMap. ArcMap displays points in a map using decimal degrees. NASIS does not store point information using decimal degrees but in UTM and DMS data. This means calculations are made using the site table's UTM and DMS data converted to decimal degrees. Upon running a query in The Analysis Form, the SiteNad83 table will be mentioned when it is found there is no data in the table. You can let Access, or the Convert2NAD83 or Convert2WGS84 Tool on the Auto-population toolbar perform the conversion. If NAD83 is the datum used, then either Access or the Convert2NAD83 Tool may be used. However, if NAD83 is not exclusively used, then the Convert2NAD83 Tool (or Convert2WGS84 Tool for the Pacific Basin) on the Auto-population toolbar must be used. Although we call the table SiteNad83, do not assume we are only storing data in the NAD83 projection. ***Only if all data in your site table is in NAD83 format should you let Access perform the conversion to decimal degrees. It is highly recommended to always use the ND83 or WG84 button on the Auto-population toolbar in ArcMap.***

29- Q: I know we don't need to know SQL but can you send me some URL links to read on the web?
A: Sure, here is a list. You can also search for "SQL" or "Structured Query Language" in your favorite search engine.

http://en.wikipedia.org/wiki/SQL

http://www.w3schools.com/sql/sql_intro.asp

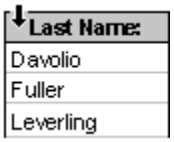
http://sqlcourse.com/intro.html

http://sqlzoo.net/

30- Q: Visually, can you show me how to perform some common Access functions?
A: Please see the descriptions and diagrams below.

How To Move a Field (Column) in Access

1. Select the Datasheet view (grid) you want.
2. Select the columns you want to move.
3. To select one column, click the field selector (field selector: A small box or bar that you click to select an entire column in a datasheet.) for that column.



4. To select adjacent columns, click a column field selector and then, without releasing the mouse button, drag to extend the selection.

5. Click and hold down the mouse button in the field selectors again.

6. Drag the columns to a new position.

How To Hide/Unhide a Field (Column) in Access

1. Select the Datasheet view (grid) you want.

2. Do one of the following:

I. Hide a column or columns

1. Select the columns you want to hide.

2. To select one column, click the field selector (field selector: A small box or bar that you click to select an entire column in a datasheet.) for that column.

3. To select adjacent columns, click a column field selector and then, without releasing the mouse button, drag to extend the selection.

4. On the **Format** menu, click **Hide Columns**.

II. Show a hidden column or columns

1. On the **Format** menu, click **Unhide Columns**.

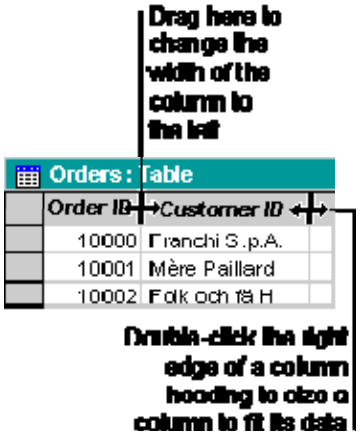
2. In the **Unhide Columns** dialog box, select the names of the columns that you want to show.

How To Resize a Column or Row

1. Select the Datasheet view (grid) you want.

2. Do one or both of the following:

I. Resize a Column

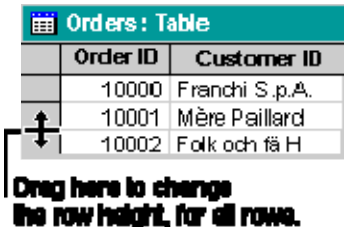


Do one of the following:

To resize a column to a specific width, position the pointer on the right edge of the column you want to resize, as shown in the illustration, and drag until the column is the desired size.

To size a column to fit its data, double-click the right edge of the column heading.

II. Resize Rows



Position the pointer between any two record selectors (record selector: A small box or bar to the left of a record that you can click to select the entire record in Datasheet view and Form view.) at the left side of the datasheet, as shown in the preceding illustration, and drag until the rows are the desired size.