

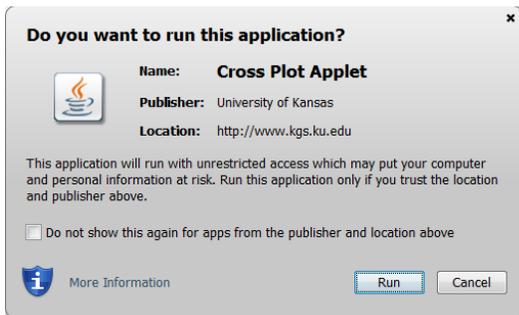
Cross Section Java Applet

by John R. Victorine

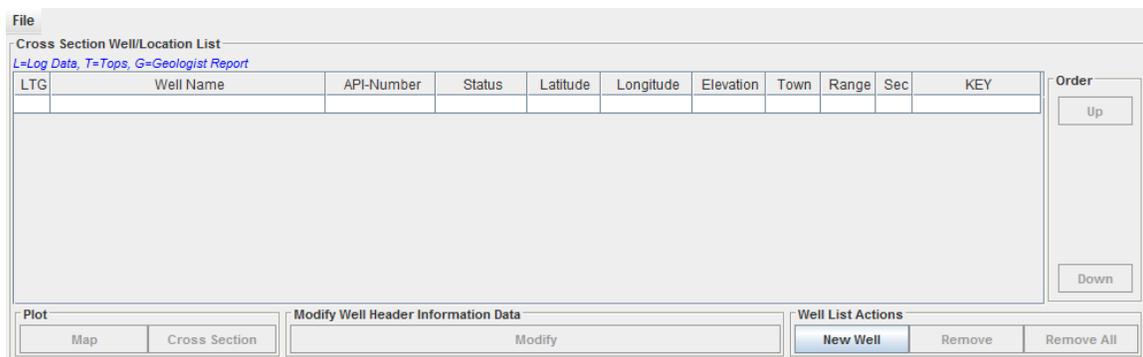
Introduction

The Cross Section web app has 2 sources for importing well data, 1) the user's PC or 2) the Kansas Geological Survey (KGS) Server & ORACLE Database. This program allows the user to import Log, Tops, and Geologist Cuttings Report/Core Description/Measured Sections Data.

There will be occasions when the user would like to inspect the contents of a LAS file. So, for example, the user may wish to find the identity of the well, the types of logs, depth range, well or log parameters. Alternatively, the user can suspect that the file is not coded correctly in LAS format if the Import LAS function fails, and wishes to examine the file to troubleshoot the problem. The LAS file is an ASCII file and can be read by any text editor, i.e. Notepad, WordPad, TextPad, etc. The CSV (Comma Separated Values) files are also ASCII and can be edited in the same way or with Microsoft Excel.



To access Cross Section go to http://www.kgs.ku.edu/stratigraphic/CROSS_SECTION/. At the top of the web page there is a menu "Main Page|Description|Applet|Help|Copyright & Disclaimer|". Select the "Applet" menu option a "Warning - Security" Dialog will appear. The program has to be able to read and write to the user's PC and access the Kansas Geological Survey (KGS) Database and File Server, ORACLE requires this dialog. The program does not save your files to KGS, but allows you to access the KGS for well information that may be missing in your Kansas logs. The program does not use Cookies or any hidden software it only reads the LAS and CSV files for the Cross Section Session. The blue shield on the warning dialog is a symbol that the Java web app is created by a trusted source, which is the University of Kansas. Select the "Run" Button, which will show the Cross Section Panel,



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Cross Section Panel

The Cross Section Panel manages the basic well data for the cross section plot. The user can import multiple well data (log, tops and core/cuttings descriptions) or measured sections to plot in a multiple well profile plot. This program does not necessarily need the X-Y-Z position of the well to plot, but the “Map” button does if the user wishes to plot the location of the well in 2 dimensions and the “Cross Section” button does if the user wishes to plot the wells by elevation.

File Menu Button
• Display Available Memory Dialog

Up Button changes the well/location order by moving it up one row in the table list.

Down Button changes the well/location order by moving it down one row in the table list.

Cross Section Well List
Table displays the wells that are part of the cross section and the order they will be plotted.

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Order
LT_	Santa Fe 21-1	15-187-20637	O&G	37.507	-101.803	3,377.29S		Up
LT_	Santa Fe 22-1	15-187-20640	O&G	37.507	-101.794	3,391.29S		Down
LT_	Santa Fe 22-2	15-187-20650	O&G-P&A	37.507	-101.791	3,389.19S		

Map Button plots the well position

Cross Section Button plots the well data.

Modify Button allows the user to modify the well information data.

New Well Button allows the user to add a well to cross section. The button is enabled until a maximum of 4 wells are reached.

Remove Button to remove well from list.

Remove All Button to remove all data from list.

Figure: Description of the Cross Section Panel, the main entry point for entering multiple well/measured section data.

The cross section requires the user to manage the memory in building the cross section plot, which can be accomplished with the help of the “File” menu, “Display Available Memory Dialog” menu option. For each cross section the user must decide how many wells/locations and their respective depth ranges will fit in one plot. The memory size is dependent on the user's own PC. This applet will allow from 1 to 4 wells or measured sections on one cross section plot.

Quick Cross Section Work Flow

- Select the “**New Well**” button to load data for each well/measured section into the cross section panel.
 - Maximum of 4 wells/measured sections allowed for plotting a cross section.
 - Minimum of 1 well/measured section can be plotted in the cross section plot.
 - For each well/measured section loaded,
 - Verify that the well/measured section has a latitude, longitude and elevation.
 - If any latitude, longitude and elevation is missing then,
 - Highlight the well/measured section in the list.
 - Select the “**Modify**” button to enter the missing data, either manually or by using the “Search KGS Database for Well Information” button to search the Kansas Geological Survey (KGS) database for existing well header information.
- For more 2 wells/measured sections select the “**Map**” button to plot the wells/measured sections on a latitude versus longitude map plot to verify the order is correct.
 - If a well/measured section is out of order then,
 - Highlight the well/measured section in question.
 - Select the “Up” or “Down” buttons to change the order of the well, verify with the latitude versus longitude map plot.
- Select the “**Cross Section**” Button to create a Cross Section Plot.

Loading Well/Measured Section Data

Click the "New Well" Button, which will show the "Load Data" Dialog. The dialog below displays an example of the Wellington KGS 1-32 well data loaded from the PC Data icon buttons with the data in the tables above. The icon buttons in the Data Source Panel assists the user in loading well data into the Cross Section Applet.

Data Source Panel

Load existing well data. User can load from multiple sources.

Data Loaded Panel

Positive feedback to user to verify what source data was loaded and location of the source.

Load data from Kansas Geological Survey (KGS) Database and Server.

Load ASCII Delimited Data Files from PC.

Displays the filename of files loaded.

Show the source of the data and type.

Dialog Buttons:

Add Well Data – Load well data into Cross Section Data Structure for plotting.

Clear – Clear loaded data from this dialog.

Exit – Exit Load Data Dialog without transferring well data.

Data Source Panel

The Data Source Panel provides two methods of importing data into the Cross Section Web App. The Kansas Geological Survey (KGS) Database & File Server and the user's PC. A number of icon buttons are provided to assist the user in importing the specific data type of interest. When the user selects the icon button a search dialog is provided specific to the data type. The CSV (Comma Separated Values) icon buttons under the "PC ASCII Delimited Data Files" Panel are expecting a general type of data presentation. Although the order of the specific data columns is not important, the "Mnemonics" of the data column is. Each data type in GEMINI Tools web apps have a data mnemonic list that will be presented later as each icon search dialog is presented. The CSV Search Dialog will use the first two lines of the CSV file to automatically match the file column data mnemonics with the web app curve mnemonics, but if the program does not recognize the file data mnemonic then it will leave it blank and expect the user to match the file data mnemonic to the web app curve mnemonics, this will be explained later.



Kansas Geological Survey (KGS) Database & Server Data



Kansas Well Data

This button allows the user to access well data stored in the Kansas database & Server. LAS ASCII Standard (LAS) version 2.0 Files & Core Images JPEG Files (Boxes, Core Slab, Thin Sections) Database Data: Perforations Depth Data, Formation Tops (Stratigraphic Units), Measured Core Data



Kansas Measured Sections

Measured Sections (precise measurements and descriptions of a cross section of an outcrop or road cuts) for selected counties in Kansas.



PC ASCII Delimited Data Files



Log ASCII Standard (LAS) File Read

This version will read up to 3 Log ASCII Standard (LAS) Files, versions 2.0 & 3.0. This read process does not necessarily distinguish between the two versions. The LAS Java Read classes follow the rules set up by the Canadian Well Logging Society for both versions.



Tops CSV (comma separated values) ASCII File Read

This version will allow the user to map a comma delimited ASCII file data columns to the tops data variables in the Profile Web Application.



Geologist Report delimited ASCII File Read

This version will allow the user to read & parse a delimited geologist report ASCII file data.

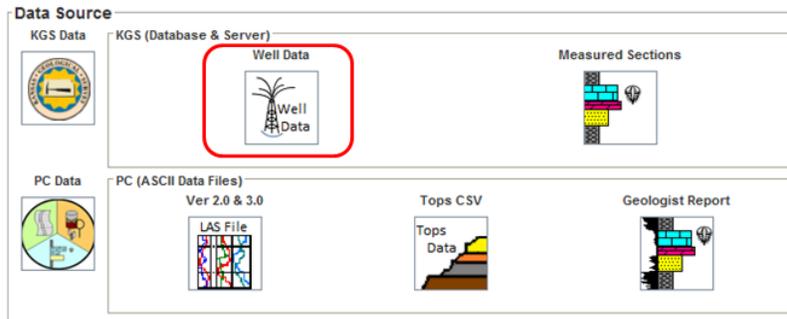
Data Loaded Panel

The Data Loaded Panel provides a visual feedback that the data type was loaded, by the file names of the files that were accessed to load the data and by the data type that is loaded. The data type is important in that it shows where the data came from. The KGS data has the ORACLE Database from which the Tops Data, and Core Data, etc. are retrieved from a XML (Extensible Markup Language) data stream that is constructed using the ORACLE PL/SQL for each data type. The user's PC will load the data from CSV (Comma Delimited Values) files or a delimited file for the Geologist Report. The LAS File can be downloaded automatically from the KGS Server in the program or from the user's PC. This program allows the user to import up to 3 Log ASCII Standard (LAS) version 2.0 or 3.0 files. The LAS version 3.0 file can hold all the well data, but if the user wishes to add log curves from a LAS version 2.0 file it is advised that the LAS version 3.0 file be loaded last. In most cases the user is importing multiple LAS version 2.0 files, which can be saved into a single LAS version 3.0 file.

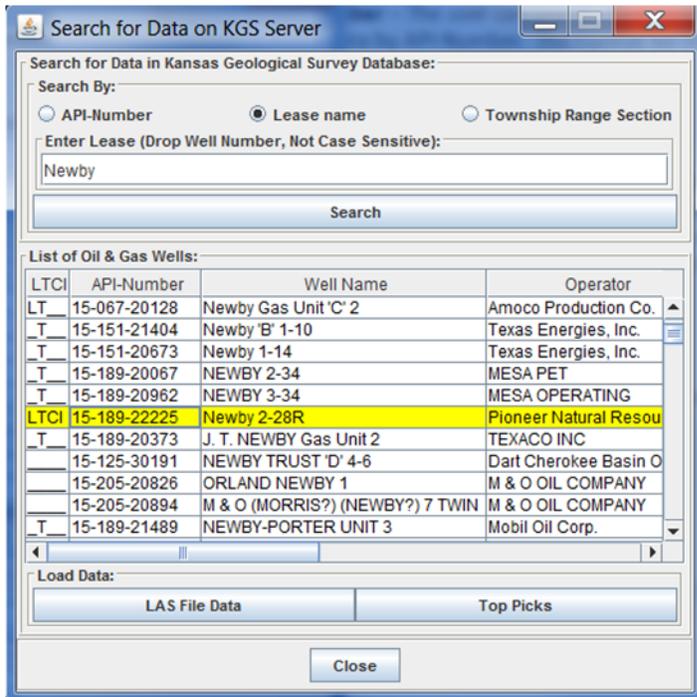
Importing KGS (Database & Server) Data

KGS (Database & Server) - Importing Well Data

The Kansas Geological Survey (KGS) has a good collection of well data stored in the ORACLE Database and File Server as Files Log ASCII Standard (LAS) version 3.0 Files. In this example the user will download the well data available from the KGS, Log data (LAS version 2.0 File), Tops Data, Measured Core Data, and Perforation Data. The ORACLE Database is accessed by making Stored Procedure PL/SQL calls to the ORACLE Database from which an Extensible Markup Language (XML) data stream is created containing the well data that is passed back to the web app making the request.



Left Click on the “Well Data” Icon Button in the Data Source Panel of the Load Data Dialog.



Search for Well Data in KGS Database Search By:

- **API-Number** – The user can search the KGS Database for well data by API-Number. The Format for the API is SS-CCC-99999 where
 - SS – Two Digit State Code
 - CCC – Three Digit County Code
 - 99999 – 5 Digit Well Number
- **Lease Name** – The user can search for well data by lease partial phrase, i.e. “Newby”, which will look for all wells with the phrase “Newby” in the lease name.
- **Township-Range-Section** – Search for a list of Wells by a specific area.

List of Kansas wells that match the search criteria

Load Well Data Buttons

- LAS File Data – Load Log ASCII Standard (LAS) Files
- Tops Picks – Load Formation Tops Picks

NOTE: LTCI Column in Table: L-LAS Files; T-Formation Tops; C-Measured Core Data; I-Core Images

This will display the “Search for Data on KGS Server” Dialog, see above image. This dialog allows the user to search the KGS database for well data. In this example, the well of interest will be the Newby 2-28R, this well contains all the well data that can be retrieved from the KGS Database, i.e. Log Data (LAS version 3.0 File), Tops Data, Core Data, and Perforations.

As the Summary image suggests there are 3 methods for searching for the well data within this dialog,

- By API-Number – KGS has a specific format for the API-Number, i.e. SS-CCC-99999 where SS is the state code for Kansas 15, CCC is the county code for Newby 2-28R it is 189 for Stevens County and the 5-Digit Well Number for Newby 2-28R it is 22225.

The screenshot shows a dialog box titled "Search By:". It has three radio buttons: "API-Number" (selected), "Lease name", and "Township Range Section". Below the radio buttons is a text input field labeled "Enter API-Number:" containing the text "15-189-22225". At the bottom of the dialog is a "Search" button.

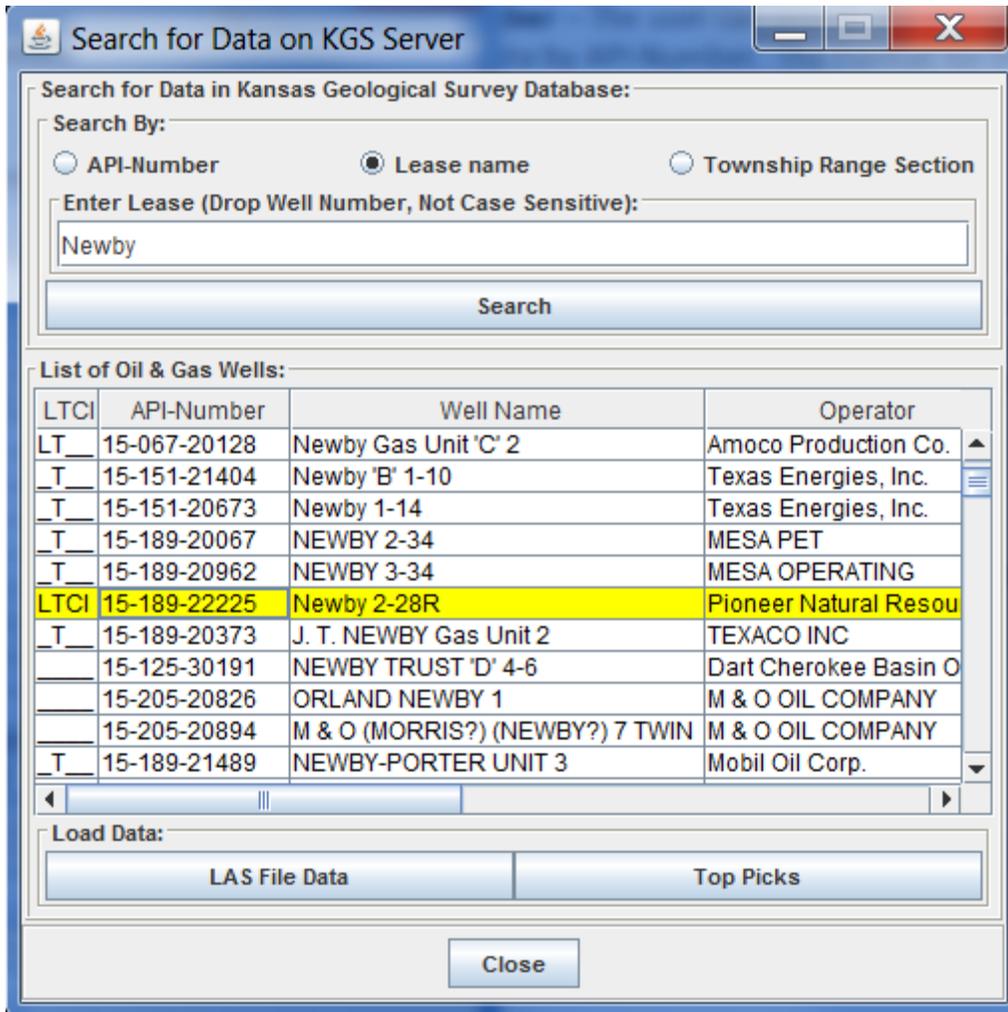
- By Partial Lease Name – The stored procedure used to retrieve the well header information allows the user to enter a partial phrase, in this example Newby. The program places a '%' in front and back of the phrase and sends the request to the Database, i.e. "%Newby%".

The screenshot shows a dialog box titled "Search By:". It has three radio buttons: "API-Number", "Lease name" (selected), and "Township Range Section". Below the radio buttons is a text input field labeled "Enter Lease (Drop Well Number, Not Case Sensitive):" containing the text "Newby". At the bottom of the dialog is a "Search" button.

- By Township Range Section – This search is by location in Kansas, this search also allows the user to enter just the Township and Range to search for wells, e.g. to look for the Newby 2-28R, enter Township as 31 set the S (South) Radio button and Range as 37 set the W (West) Radio button.

The screenshot shows a dialog box titled "Search By:". It has three radio buttons: "API-Number", "Lease name", and "Township Range Section" (selected). Below the radio buttons are three input fields: "Section:" with a text box containing "0", "Township:" with a text box containing "31" and two radio buttons "N" and "S" (with "S" selected), and "Range:" with a text box containing "37" and two radio buttons "W" and "E" (with "W" selected). At the bottom of the dialog is a "Search" button.

The user only needs to enter the above data and select the “Search” Button to display the list of Wells in the Kansas Database that match the search criteria. In the image below the Lease Name “Newby” was entered to search for all wells in Kansas with the Phrase Newby in it. The user searches through the list until they find the well of interest. In this example it is the Newby 2-28R, which is highlighted.



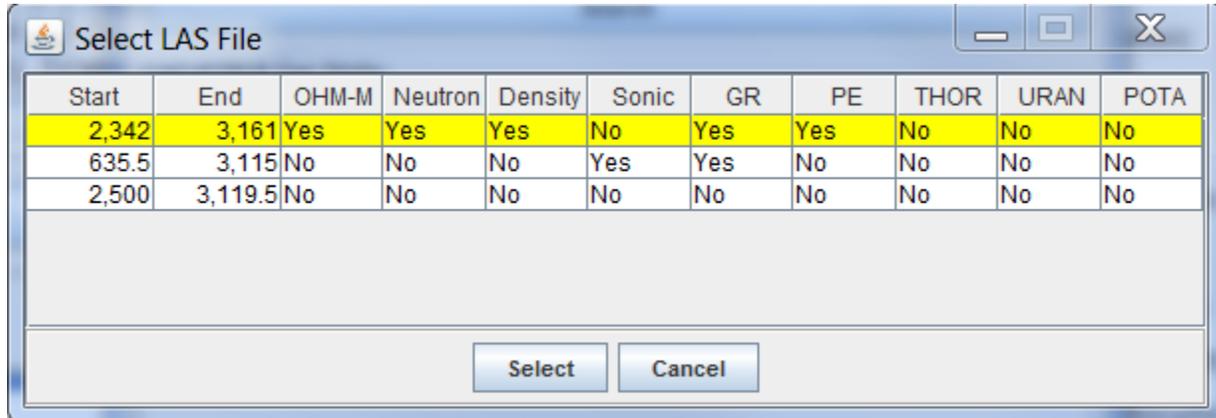
Notice that the LTCI represents the type of data that the well contains. It is a visual aid that lets the user see what is available before trying to download the data. If you require a LAS file you would want to see an L in that column. The LTCI labels stand for the following,

- L – Log ASCII Standard (LAS) version 2.0 Files
- T – Tops Data (Stratigraphic Unit Horizons)
- C – Measured Core Data
- I – Core Joint Photographic Experts Group (JPEG) Image Files

This dialog allows the user to now download each of the data types that are available.

Load KGS Well Data – LAS File Data

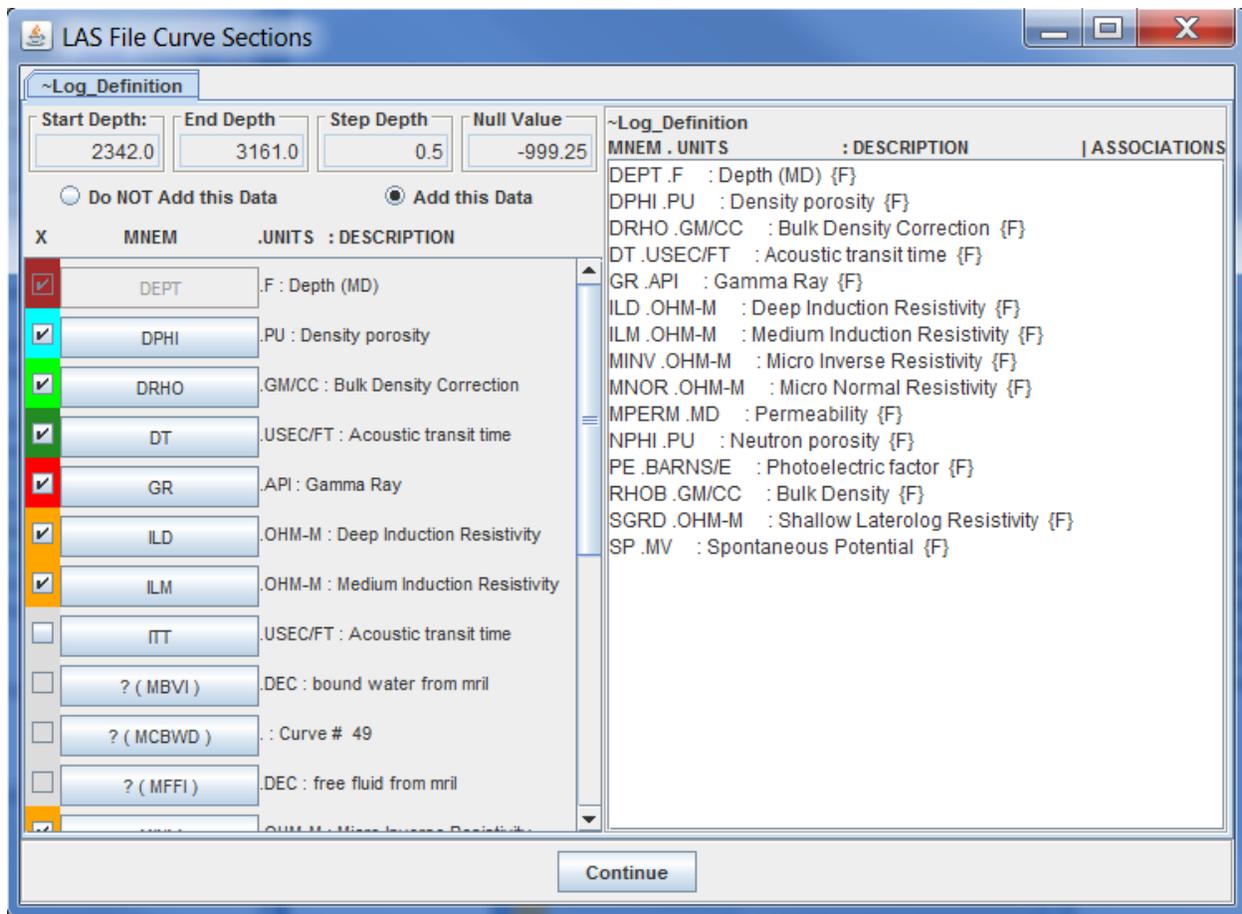
The “Search for Data on KGS Server” Dialog allows the user to download data from the KGS Database & Server to the web app. The “LAS File Data” Button will display the “Select LAS File” Dialog with a list of LAS version 2.0 Files that are available.



In this example there are three LAS files available, with a table suggesting the log data type in the file. In the beginning of the GEMINI Project (2000-2003) a precursor to the GEMINI Tools the KGS populated the Tool Types from every log that was in the KGS Server at that time. Unfortunately KGS has not maintain that table for wells uploaded after 2003 so the LAS File may have “No” for all the log types, which is not accurate. The user will need to open or download the file or search for the Well on the KGS Master List of Oil and Gas Wells in Kansas Web Page (<http://www.kgs.ku.edu/Magellan/Qualified/index.html>) to see what is in the File Header before deciding to download data from this program. For this example the first log has most of the data necessary except the Spectral Gamma Ray Logs. The Table above identifies the following log types,

- OHM-M – Resistivity Logs
- Neutron – Neutron Porosity Log
- Density – Bulk Density and/or Density Porosity Log
- Sonic – Acoustic Transit Time and/or Sonic Porosity Log
- GR – Gamma Ray (API units) Log
- PE – Photoelectric Factor Log
- THOR – Thorium Concentration
- URAN – Uranium Concentration
- POTA – Potassium Concentration)

In this example the first log contains the data needed, highlight the first log and click on the “Select” Button to display the “LAS File Curve Sections” Dialog. The “LAS File Curve Sections” Dialog allows the user to map unknown LAS Curve Mnemonics to the KGS “Standard” Curve Mnemonics so they will be plotted in the 3D Cross Plot. This program reads the “LAS Tool Curve Mnemonics map to KGS Standard Mnemonics” XML File (http://www.kgs.ku.edu/software/gemini/data/las_standard_tools.xml), which will automatically maps the Curve Mnemonics from the LAS file to one of 31 KGS “Standard” Curve Mnemonics.



As you can see this log has all the log types of interest, Gamma Ray API, Resistivity, Neutron/Density, Photoelectric Factor, Sonic and Permeability. If a curve Mnemonic is not recognized the program will place a “?” in front of the Mnemonic, e.g. “?(MPERM16)” for the “ : Curve # 51” Log Curve. If the user is satisfied with the automatic curve selections, which are checked and color coded, they only need to select the “Continue” Button at the bottom of the Dialog to import the file. The next section will take the user through a series of examples in changing the curve selections and mapping unknown curve mnemonics.

Notice that some of the check boxes are colored with different colors, which shows that the curves were automatically selected, but also to represent the curve type by color. The Curves are colored by type (data units) as follows,

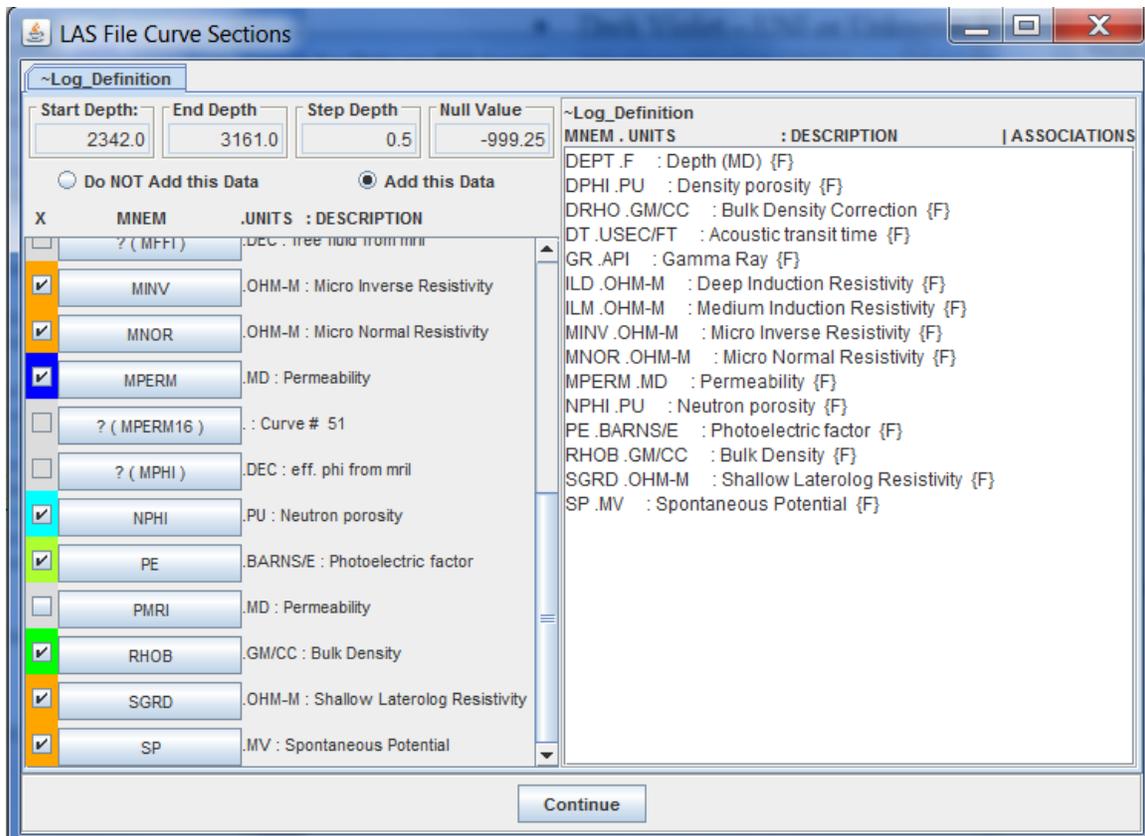
- Orange - OHM-M or Resistivity Logs
- Cyan – PU or porosity Logs, Neutron Porosity, Density Porosity, etc.
- Greenish yellow – BARNS/E or Photoelectric Factor Logs
- Green – GM/CC or Bulk Density Log
- Forest Green – USEC/FT or the Acoustic Transit Time Log
- Red – API, PPM or “%” as Radioactive logs, Gamma Ray, Spectral Gamma Ray, etc.
- Blue – MD or Permeability Logs
- Brown – F, FT or IN or Depth

- Middle yellow – FRAC, or other log curve types.
- Dark Violet – UNI or Unknown Linear Curves
- Medium Violet – UNL or Unknown Logrithum Curves

The color coding of the selected curves were added to also help the user visually recognize that a curve was selected or not.

Map Curves & Change Curve Selections

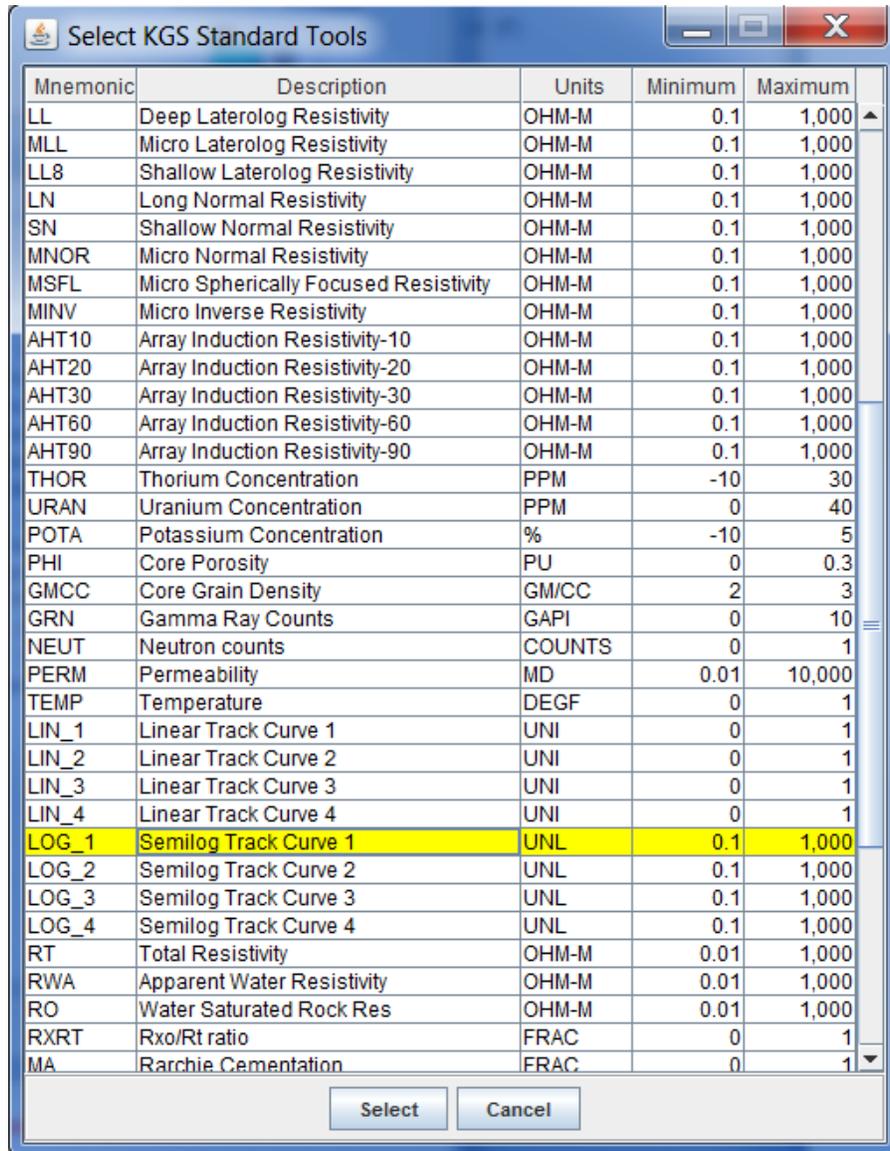
Some logs will have curve mnemonics that are not recognized as one of the KGS “Standard” Curve Mnemonics. The user will need to map the log curve to one of the KGS standard curves if they want to display the curve. Slide the scroll bar down to the Permeability Curves MPERM and ?(MPERM16).



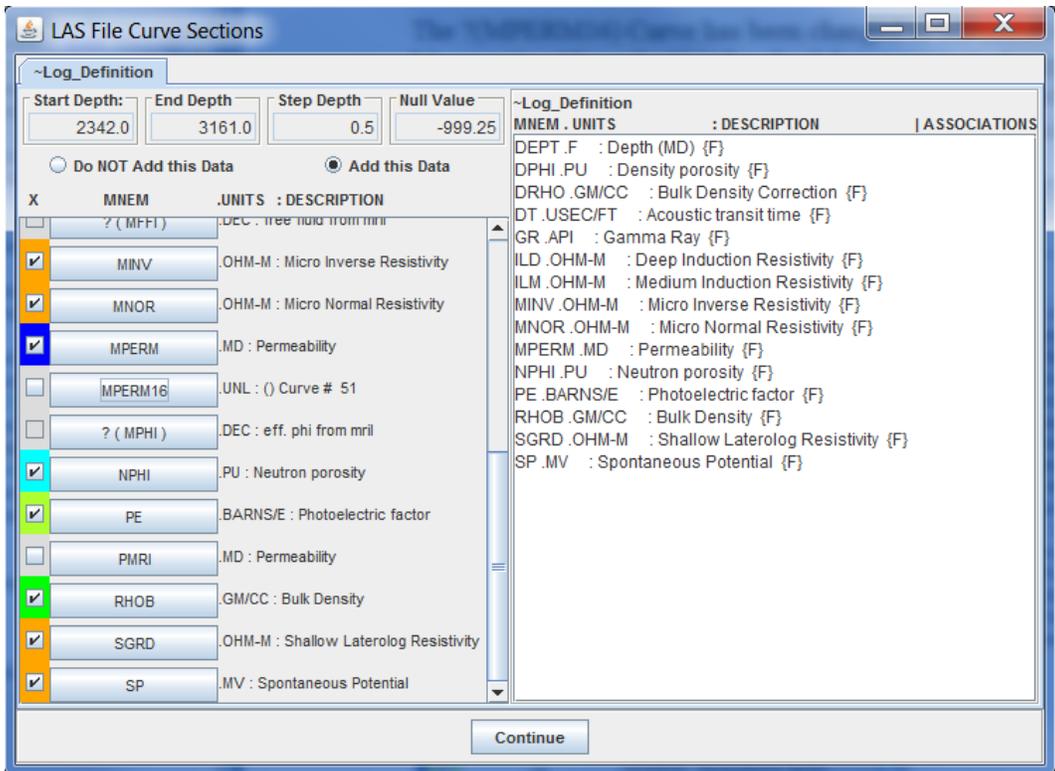
Click on the “?(MPERM16)” Button to display the “Select KGS Standard Tools” Dialog. This dialog provides a list of the KGS “Standard” Curve Mnemonics, from which the user can map an unrecognized log curve to one of the KGS standard curve mnemonics. The KGS “Standard” Curve Mnemonics List was created as a way to standardize the alpha bit soup of Log Mnemonics. Each logging company has their own curve mnemonics to represent similar tools. The Cross Section program is a later version of code from the GEMINI Project Cross Section Module, which needed to standardize the log curves so the curves could be automatically read and assigned a plot track. The “LAS Tool Curve Mnemonics map to KGS Standard

Mnemonics” XML File was created to map the log curves from logs that were part of the KGS LAS File Collection which is not a complete list of possible curve mnemonics.

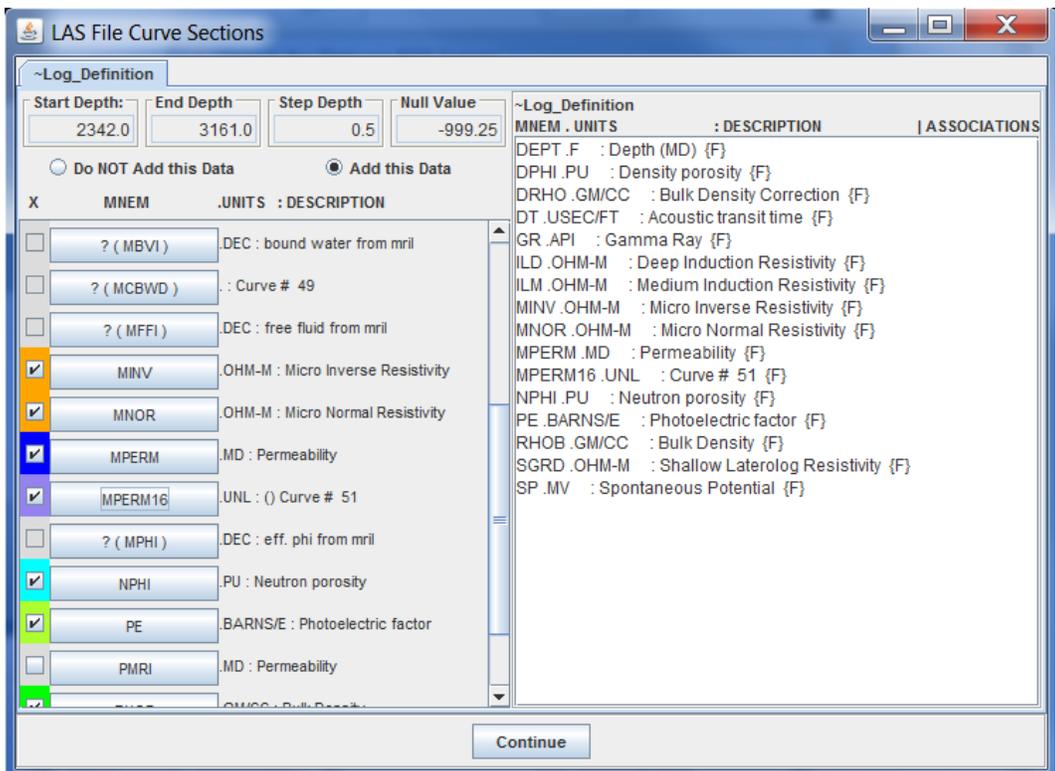
To map the unknown curve mnemonic “?(MPERM16)” you first notice that it similar to the MPERM curve above, which is a permeability curve. In this example both curves will be plotted together, but the Permeability Plot Track can only plot one curve. The web app has the ability to allow the user to plot up to 4 unknown logarithm curves and 4 unknown linear curves. The permeability is usually plotted as logarithmic. Click on the “?(MPERM16)” Button to display the



“Select KGS Standard Tools” Dialog. Slide the scroll bar down to the “LOG_1” Mnemonic – Semilog Track Curve 1 and highlight that curve. Click on the “Select” Button to map the “?(MPERM16) to the Semilog Track Curve 1.



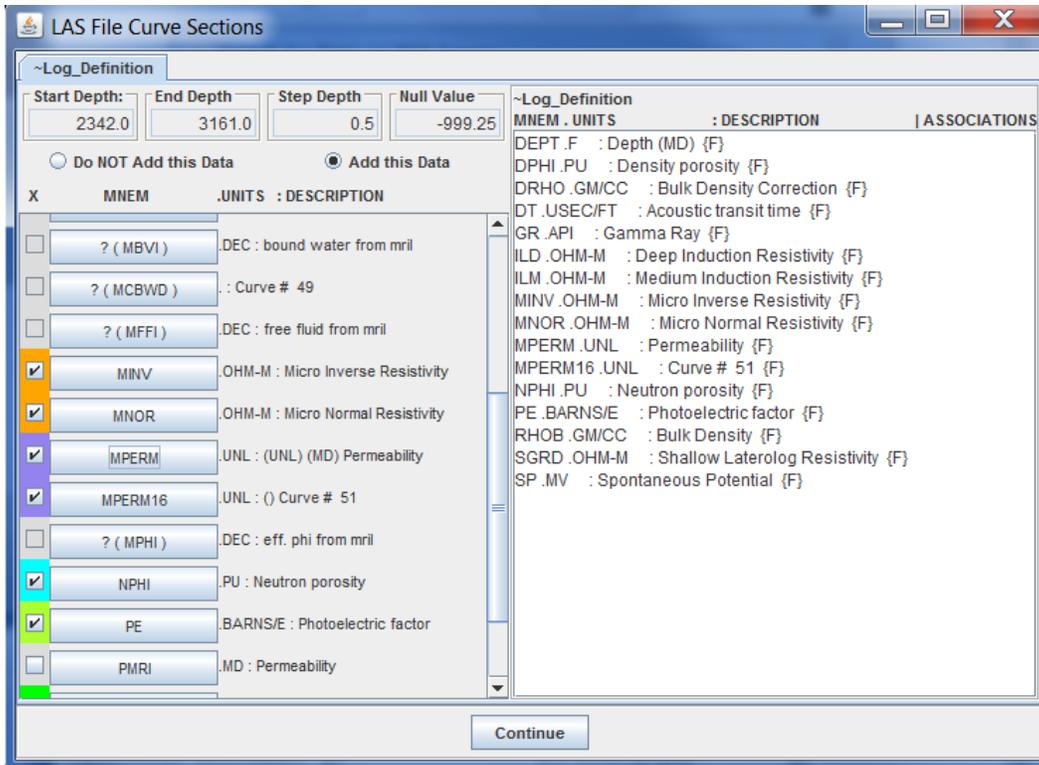
The ?(MPERM16) Curve has been changed to MPERM16 removing the ?() around the Curve Mnemonic. Also select the check box next to it, which changes to a dark violet.



In order to plot both Permeability Curves on the same track, the MPERM must be assigned to the unknown Log Curves with MPERM16. Click on the MPERM Mnemonic Button to display the

Mnemonic	Description	Units	Minimum	Maximum
ILD	Deep Induction Resistivity	OHM-M	0.1	1,000
ILM	Medium Induction Resistivity	OHM-M	0.1	1,000
SFLU	Spherically Focused Resistivity	OHM-M	0.1	1,000
LL	Deep Laterolog Resistivity	OHM-M	0.1	1,000
MLL	Micro Laterolog Resistivity	OHM-M	0.1	1,000
LL8	Shallow Laterolog Resistivity	OHM-M	0.1	1,000
LN	Long Normal Resistivity	OHM-M	0.1	1,000
SN	Shallow Normal Resistivity	OHM-M	0.1	1,000
MNOR	Micro Normal Resistivity	OHM-M	0.1	1,000
MSFL	Micro Spherically Focused Resistivity	OHM-M	0.1	1,000
MINV	Micro Inverse Resistivity	OHM-M	0.1	1,000
AHT10	Array Induction Resistivity-10	OHM-M	0.1	1,000
AHT20	Array Induction Resistivity-20	OHM-M	0.1	1,000
AHT30	Array Induction Resistivity-30	OHM-M	0.1	1,000
AHT60	Array Induction Resistivity-60	OHM-M	0.1	1,000
AHT90	Array Induction Resistivity-90	OHM-M	0.1	1,000
THOR	Thorium Concentration	PPM	-10	30
URAN	Uranium Concentration	PPM	0	40
POTA	Potassium Concentration	%	-10	5
PHI	Core Porosity	PU	0	0.3
GMCC	Core Grain Density	GM/CC	2	3
GRN	Gamma Ray Counts	GAPI	0	10
NEUT	Neutron counts	COUNTS	0	1
PERM	Permeability	MD	0.01	10,000
TEMP	Temperature	DEGF	0	1
LIN_1	Linear Track Curve 1	UNI	0	1
LIN_2	Linear Track Curve 2	UNI	0	1
LIN_3	Linear Track Curve 3	UNI	0	1
LIN_4	Linear Track Curve 4	UNI	0	1
LOG_1	Semilog Track Curve 1	UNL	0.1	1,000
LOG_2	Semilog Track Curve 2	UNL	0.1	1,000
LOG_3	Semilog Track Curve 3	UNL	0.1	1,000
LOG_4	Semilog Track Curve 4	UNL	0.1	1,000
RT	Total Resistivity	OHM-M	0.01	1,000
RWA	Apparent Water Resistivity	OHM-M	0.01	1,000

“Select KGS Standard Tools” Dialog. Slide the scroll bar down to the “LOG_2” Mnemonic – Semilog Track Curve 2 and highlight that curve. Click on the “Select” Button to map the “MPERM to the Semilog Track Curve 2.



Click the check box next to the MPERM Mnemonic Button you will notice that it has the same color as MPERM16, which now groups the two curves together. Select the “Continue” Button to load the LAS File into the web app.

Load KGS Well Data – Top Picks

The “Search for Data on KGS Server” Dialog allows the user to download data from the KGS Database & Server to the web app. The “Top Picks” Button will display the “Move/Merge KGS Data” Dialog with available top picks grouped by the sources creating the tops.

KGS Stratigraphic Units:

- HUG ELOG-EM
- MKD
- MKD-07/2006

List of Sources for the tops, e.g. Newby 2-28R has 3 sources of tops data. The user can search through and add some or all to the web app.

Add to User's Stratigraphic Units List:

Remove & Replace Add to List Add New Units Only

Source	Top	Base	Name	R
HUG ELOG-EM	0	0	Council Grove	GROL
HUG ELOG-EM	728	0	Day Creek Dolomite	FORM
HUG ELOG-EM	1,090	1,170	Blaine	FORM
HUG ELOG-EM	1,250	1,412	Cedar Hills Sandstone	FORM
HUG ELOG-EM	1,690	1,759	Stone Corral	FORM
HUG ELOG-EM	2,182	2,516	Wellington	FORM
HUG ELOG-EM	2,291	0	Hutchinson Salt	MEMB
HUG ELOG-EM	2,496	0	Hollenberg Limestone	MEMB
HUG ELOG-EM	2,516	2,832	Chase	GROL
HUG ELOG-EM	2,516	2,536	Herington Limestone	MEMB

User's Stratigraphic Units:

Source	Top	Base	Name	Rank	
HUG ELOG-EM	728	0	Day Creek Dolomite	FORMATION	P
HUG ELOG-EM	1,090	1,170	Blaine	FORMATION	P
HUG ELOG-EM	1,250	1,412	Cedar Hills Sandstone	FORMATION	P
HUG ELOG-EM	1,690	1,759	Stone Corral	FORMATION	P
HUG ELOG-EM	2,182	2,516	Wellington	FORMATION	P
HUG ELOG-EM	2,291	0	Hutchinson Salt	MEMBER	P
HUG ELOG-EM	2,496	0	Hollenberg Limestone	MEMBER	P
HUG ELOG-EM	2,516	2,832	Chase	GROUP	P
HUG ELOG-EM	2,516	2,536	Herington Limestone	MEMBER	P
HUG ELOG-EM	2,536	2,538	Paddock Shale	MEMBER	P
HUG ELOG-EM	2,544	2,580	Krider Limestone	MEMBER	P
HUG ELOG-EM	2,580	2,594	Odell Shale	FORMATION	P
HUG ELOG-EM	2,594	2,629	Winfield Limestone	FORMATION	P
HUG ELOG-EM	2,632	0	Gage Shale	MEMBER	P
HUG ELOG-EM	2,655	2,704	Towanda Limestone	MEMBER	P
HUG ELOG-EM	2,742	2,756	East Diley Limestone	MEMBER	P

Buttons: Add, Add All, Clear Selection, Clear Selection, Remove, Remove All, Load Data, Close

“Add to User's Stratigraphic Units List” Table shows the tops selected by the source, e.g. “HUG ELOG-EM” Source Tops List.

Radio Buttons

Remove & Replace – move the selected tops and replace any duplicate names

Add to List – move the selected tops to the “User's Stratigraphic Units” Table

Add New Units Only – move on the selected tops that are not already in the “User's Stratigraphic Units” Table

Table Buttons

Add – add the highlighted top(s) to the “User's Stratigraphic Units” Table. Note: this table will allow the user to select multiple wells by using the “Ctrl” Key and the left click of mouse.

Add All – copy the list of tops to the “User's Stratigraphic Units” Table.

Clear Selection – remove the highlight on tops selected.

“Add to User's Stratigraphic Units List” Table.

“User's Stratigraphic Units” Table shows the list of tops that will appear in the web app when the user selects the “Load Data” Button.

Table Buttons

Clear Selection – remove the highlight on tops selected.

Remove – remove the highlighted top(s) from the table. Note: this table will allow the user to select multiple wells by using the “Ctrl” Key and the left click of mouse.

Remove All – remove all tops from the table.

Load Data – transfer the tops list to the web app calling.

Close – Close this dialog

This dialog allows the user to add all or some the tops from each of the sources. Both tables are set up so the user can use the “Ctrl” Key with the left click of mouse to select multiple tops, i.e.

KGS Stratigraphic Units:

- HUG ELOG-EM
- MKD
- MKD-07/2006

Add to User's Stratigraphic Units List:

Remove & Replace Add to List Add New Units Only

Source	Top	Base	Name	R
HUG ELOG-EM	0	0	Council Grove	GROL
HUG ELOG-EM	728	0	Day Creek Dolomite	FORM
HUG ELOG-EM	1,090	1,170	Blaine	FORM
HUG ELOG-EM	1,250	1,412	Cedar Hills Sandstone	FORM
HUG ELOG-EM	1,690	1,759	Stone Corral	FORM
HUG ELOG-EM	2,182	2,516	Wellington	FORM
HUG ELOG-EM	2,291	0	Hutchinson Salt	MEMB
HUG ELOG-EM	2,496	0	Hollenberg Limestone	MEMB
HUG ELOG-EM	2,516	2,832	Chase	GROL
HUG ELOG-EM	2,516	2,536	Herington Limestone	MEMB

Buttons: Add, Add All, Clear Selection

Notice that the only some of the tops are selected. You can then select the Add Button to move only the selected tops to the “User’s Stratigraphic Units” Table.

MKD Source Example:

KGS Stratigraphic Units:

HUG ELOG-EM

MKD

MKD-07/2006

Add to User's Stratigraphic Units List:

Remove & Replace Add to List Add New Units Only

Source	Top	Base	Name	R
MKD	0	2,773	Fort Riley Limestone	MEMB
MKD	0	2,693	Towanda Limestone	MEMB
MKD	2,538	2,580	Krider Limestone	MEMB
MKD	2,629	0	Gage Shale	MEMB
MKD	2,712	0	Fort Riley Limestone	MEMB
MKD	2,777	2,789	Florence Limestone	MEMB
MKD	2,807	0	Wreford Limestone	FORM
MKD	2,832	0	Council Grove	GROU
MKD	2,832	0	Council Grove	GROU
MKD	2,832	2,853.5	Speiser Shale	FORM

(1) Select the MKD Source, which will be displayed in the “Add to User’s Stratigraphic Units List” Table.

Add Add All Clear Selection

KGS Stratigraphic Units:

HUG ELOG-EM

MKD

MKD-07/2006

Add to User's Stratigraphic Units List:

Remove & Replace Add to List Add New Units Only

Source	Top	Base	Name	R
MKD	0	2,773	Fort Riley Limestone	MEMB
MKD	0	2,693	Towanda Limestone	MEMB
MKD	2,538	2,580	Krider Limestone	MEMB
MKD	2,629	0	Gage Shale	MEMB
MKD	2,712	0	Fort Riley Limestone	MEMB
MKD	2,777	2,789	Florence Limestone	MEMB
MKD	2,807	0	Wreford Limestone	FORM
MKD	2,832	0	Council Grove	GROU
MKD	2,832	0	Council Grove	GROU
MKD	2,832	2,853.5	Speiser Shale	FORM

(2) Select the “Add to List” Radio button.

Add Add All Clear Selection

KGS Stratigraphic Units:

HUG ELOG-EM

MKD

MKD-07/2006

(3) Select the "Add All" Button to move the contents from the "Add to User's Stratigraphic Units List" Table to the "User's Stratigraphic Units" table.

Add to User's Stratigraphic Units List:

Remove & Replace Add to List Add New Units Only

Source	Top	Base	Name	R
MKD	0	2,773	Fort Riley Limestone	MEMB
MKD	0	2,693	Towanda Limestone	MEMB
MKD	2,538	2,580	Krider Limestone	MEMB
MKD	2,629	0	Gage Shale	MEMB
MKD	2,712	0	Fort Riley Limestone	MEMB
MKD	2,777	2,789	Florence Limestone	MEMB
MKD	2,807	0	Wreford Limestone	FORM
MKD	2,832	0	Council Grove	GROU
MKD	2,832	0	Council Grove	GROU
MKD	2,832	2,853.5	Speiser Shale	FORM

User's Stratigraphic Units:

Source	Top	Base	Name	Rank
MKD	2,538	2,580	Krider Limestone	MEMBER P
MKD	2,629	0	Gage Shale	MEMBER P
MKD	2,712	0	Fort Riley Limestone	MEMBER P
MKD	2,777	2,789	Florence Limestone	MEMBER P
MKD	2,807	0	Wreford Limestone	FORMATION P
MKD	2,832	0	Council Grove	GROUP P
MKD	2,832	0	Council Grove	GROUP P
MKD	2,832	2,853.5	Speiser Shale	FORMATION P
MKD	2,853.5	2,894.5	Funston Limestone	FORMATION P
MKD	2,894.5	2,910.5	Blue Rapids Shale	FORMATION P
MKD	2,910.5	2,929	Crouse Limestone	FORMATION P
MKD	2,929	2,933.5	Easley Creek Shale	FORMATION P
MKD	2,933.5	2,947	Middleburg Limestone	MEMBER P
MKD	2,947	2,957.5	Hooser Shale	MEMBER P
MKD	2,957.5	2,962.5	Eiss Limestone	MEMBER P
MKD	2,962.5	2,972.5	Steele Shale	FORMATION P

Buttons: Add, **Add All**, Clear Selection

Buttons: Clear Selection, Remove, Remove All, Load Data, Close

Once the list of tops are in the "User's Stratigraphic Units" Table the user can edit the list by removing any duplicate or invalid tops. Notice that the "Council Grove" Top occurs 2 times in the list. Highlight the one of the "Council Grove" tops.

User's Stratigraphic Units:

Source	Top	Base	Name	Rank	
MKD	2,538	2,580	Krider Limestone	MEMBER	P ▲
MKD	2,629	0	Gage Shale	MEMBER	P
MKD	2,712	0	Fort Riley Limestone	MEMBER	P
MKD	2,777	2,789	Florence Limestone	MEMBER	P
MKD	2,807	0	Wreford Limestone	FORMATION	P
MKD	2,832	0	Council Grove	GROUP	P
MKD	2,832	0	Council Grove	GROUP	P
MKD	2,832	2,853.5	Speiser Shale	FORMATION	P
MKD	2,853.5	2,894.5	Funston Limestone	FORMATION	P
MKD	2,894.5	2,910.5	Blue Rapids Shale	FORMATION	P
MKD	2,910.5	2,929	Crouse Limestone	FORMATION	P
MKD	2,929	2,933.5	Easley Creek Shale	FORMATION	P
MKD	2,933.5	2,947	Middleburg Limestone	MEMBER	P
MKD	2,947	2,957.5	Hooser Shale	MEMBER	P
MKD	2,957.5	2,962.5	Eiss Limestone	MEMBER	P
MKD	2,962.5	2,972.5	Stearns Shale	FORMATION	P ▼

Buttons: Clear Selection, Remove, Remove All, Load Data, Close

Now select the "Remove" Button.

User's Stratigraphic Units:

Source	Top	Base	Name	Rank	
MKD	2,538	2,580	Krider Limestone	MEMBER	P ▲
MKD	2,629	0	Gage Shale	MEMBER	P
MKD	2,712	0	Fort Riley Limestone	MEMBER	P
MKD	2,777	2,789	Florence Limestone	MEMBER	P
MKD	2,807	0	Wreford Limestone	FORMATION	P
MKD	2,832	0	Council Grove	GROUP	P
MKD	2,832	2,853.5	Speiser Shale	FORMATION	P
MKD	2,853.5	2,894.5	Funston Limestone	FORMATION	P
MKD	2,894.5	2,910.5	Blue Rapids Shale	FORMATION	P
MKD	2,910.5	2,929	Crouse Limestone	FORMATION	P
MKD	2,929	2,933.5	Easley Creek Shale	FORMATION	P
MKD	2,933.5	2,947	Middleburg Limestone	MEMBER	P
MKD	2,947	2,957.5	Hooser Shale	MEMBER	P
MKD	2,957.5	2,962.5	Eiss Limestone	MEMBER	P
MKD	2,962.5	2,972.5	Stearns Shale	FORMATION	P ▼
MKD	2,972.5	2,979	Merrill Limestone	MEMBER	P

Buttons: Clear Selection, Remove, Remove All, Load Data, Close

The MKD-07/2006 has only one top, so this dialog allows the user to add that top to the "User's Stratigraphic Units" Table. The MKD does not have this top and this is an extra top missing from the MKD data set.

KGS Stratigraphic Units:

HUG ELOG-EM
 MKD
 MKD-07/2006

Add to User's Stratigraphic Units List:

Remove & Replace
 Add to List
 Add New Units Only

Source	Top	Base	Name	Rank
MKD-07/2006	2,789	2,807	Matfield Shale	FORMAT

(1) Select the MKD-07/2006 Source, which will be displayed in the "Add to User's Stratigraphic Units List" Table.

(2) Select the "Add All" Button to move the contents from the "Add to User's Stratigraphic Units List" Table to the "User's Stratigraphic Units" table.

Buttons: Add, **Add All**, Clear Selection

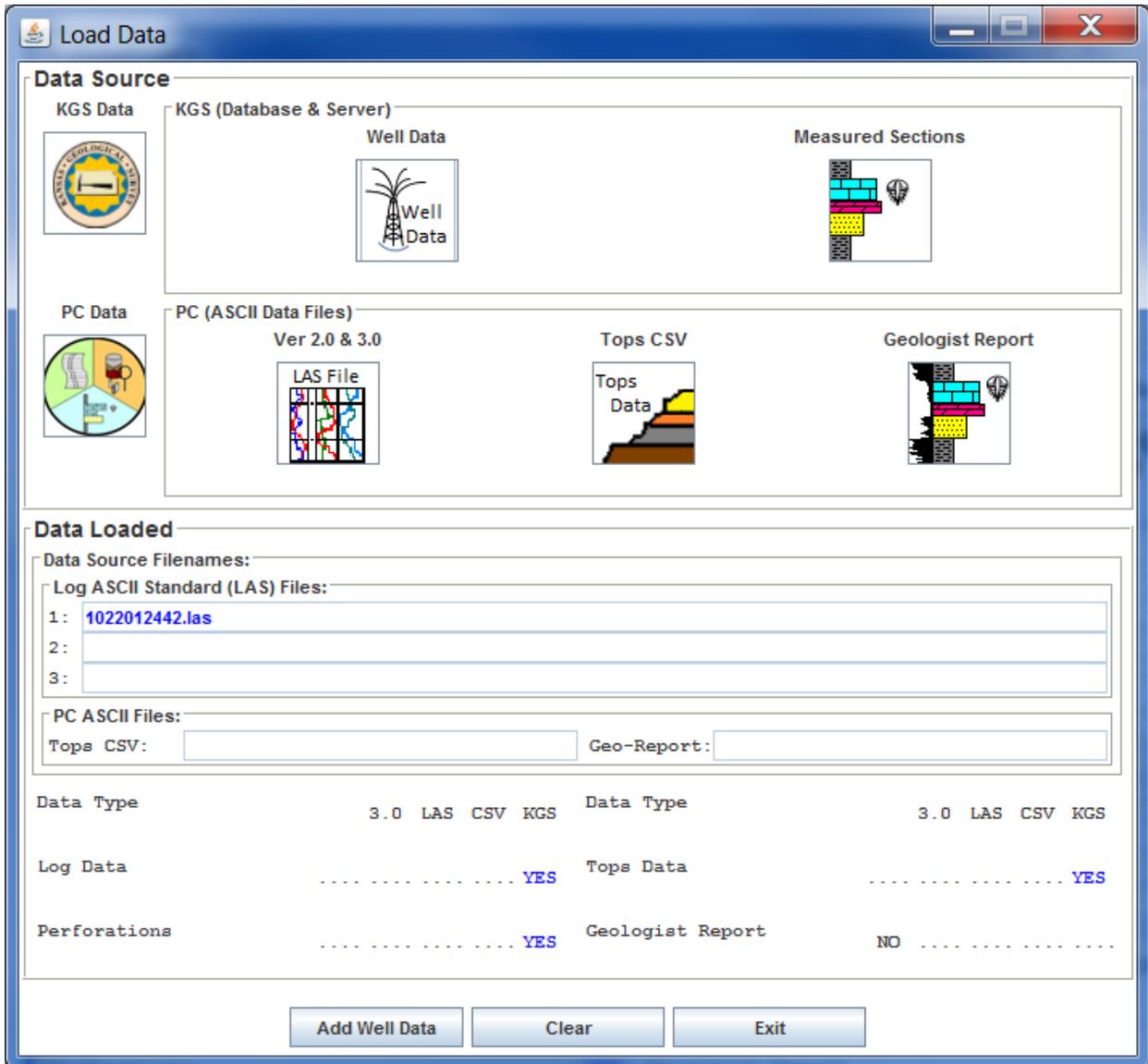
User's Stratigraphic Units:

Source	Top	Base	Name	Rank
MKD	2,538	2,580	Krider Limestone	MEMBER P
MKD	2,629	0	Gage Shale	MEMBER P
MKD	2,712	0	Fort Riley Limestone	MEMBER P
MKD	2,777	2,789	Florence Limestone	MEMBER P
MKD-07/2006	2,789	2,807	Matfield Shale	FORMATION P
MKD	2,807	0	Wreford Limestone	FORMATION P
MKD	2,832	0	Council Grove	GROUP P
MKD	2,832	2,853.5	Speiser Shale	FORMATION P
MKD	2,853.5	2,894.5	Funston Limestone	FORMATION P
MKD	2,894.5	2,910.5	Blue Rapids Shale	FORMATION P
MKD	2,910.5	2,929	Crouse Limestone	FORMATION P
MKD	2,929	2,933.5	Easley Creek Shale	FORMATION P
MKD	2,933.5	2,947	Middleburg Limestone	MEMBER P
MKD	2,947	2,957.5	Hooser Shale	MEMBER P
MKD	2,957.5	2,962.5	Eiss Limestone	MEMBER P
MKD	2,962.5	2,972.5	Stearns Shale	FORMATION P

Buttons: Clear Selection, Remove, Remove All, Load Data, Close

Now with the data set complete select the "Load Data" Button to import the Tops data into the web app.

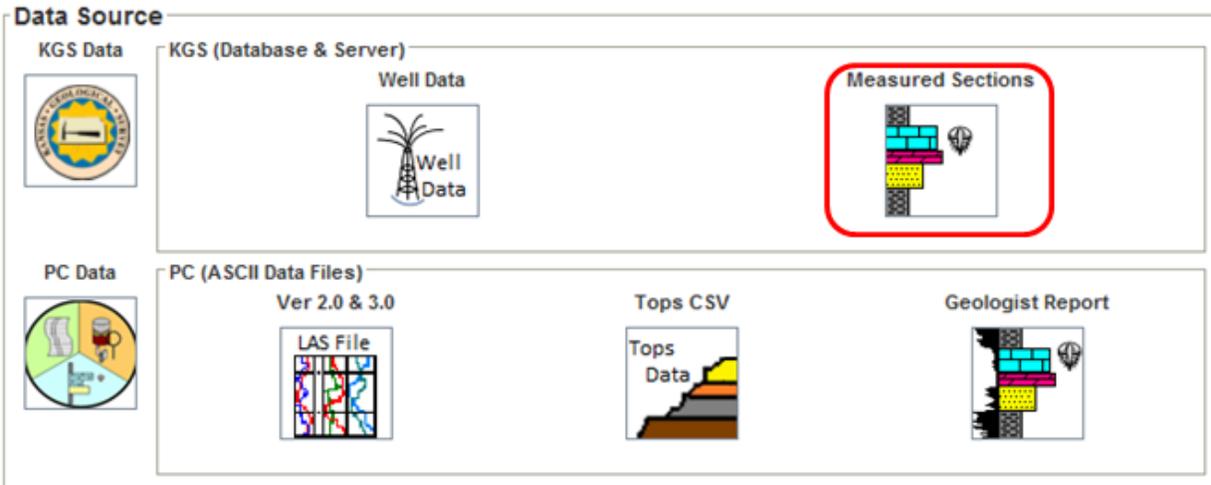
As the user accepted each data type the “Data Source Filenames:” Panel in the Load Data Dialog changes. The LAS File that was downloaded from the KGS Server to the Cross Section Web App is added to the “Log ASCII Standard (LAS) Files” panel will show the filename downloaded. The Log Data, Perforations and Tops Data, have been downloaded from KGS.



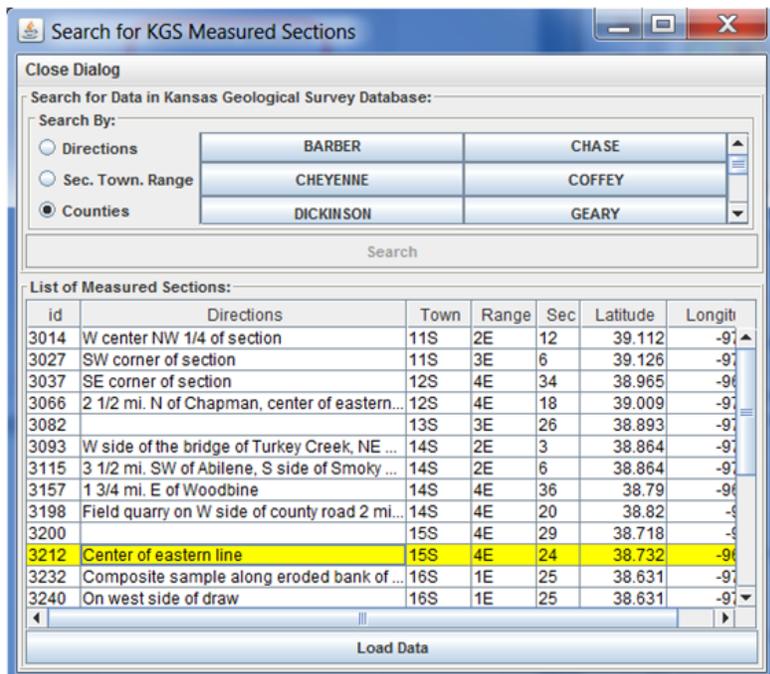
Select the “Add Well Data” Button to transfer the Newby 2-28R Well Data to the Cross Section Data Structure.

KGS (Database & Server) - Importing Measured Sections

The Kansas Geological Survey (KGS) has a good collection of Measured Section data stored in the ORACLE Database. In this example the user will download the measured sections that are available, for each section will contain Measured Sections Data and Fossil Genera Names (Bio-Stratigraphy) and in some cases top picks. The ORACLE Database is accessed by making Stored Procedure PL/SQL calls to the ORACLE Database from which an Extensible Markup Language (XML) data stream is created containing the measured section data that is passed back to the web app making the request.



To Display the “Search for KGS Measured Sections” left click the mouse on the “Measured Sections” Icon Button in the Data Source Panel of the Load Data Dialog.



Search for Measured Sections in KGS Database Search By:

- **Directions** – The user can search for measured sections by directions partial phrase, i.e. “quarry”, which will look for all wells with the phrase “quarry” in the directions text field .
- **Section Township Range** – Search for a list of measured sections by a specific area.
- **Counties** – Search for a list of measured sections within counties available in Measured Section Database Table.

List of Measured Sections that match the search criteria

Load Data Button – transfers the selected measured section to the calling web app.

This will display the “Search for KGS Measured Sections” Dialog, see above image. This dialog allows the user to search the KGS database for measured sections data. In this example, the measured section of interest will be the Measured Section 3212 “Center of eastern line”.

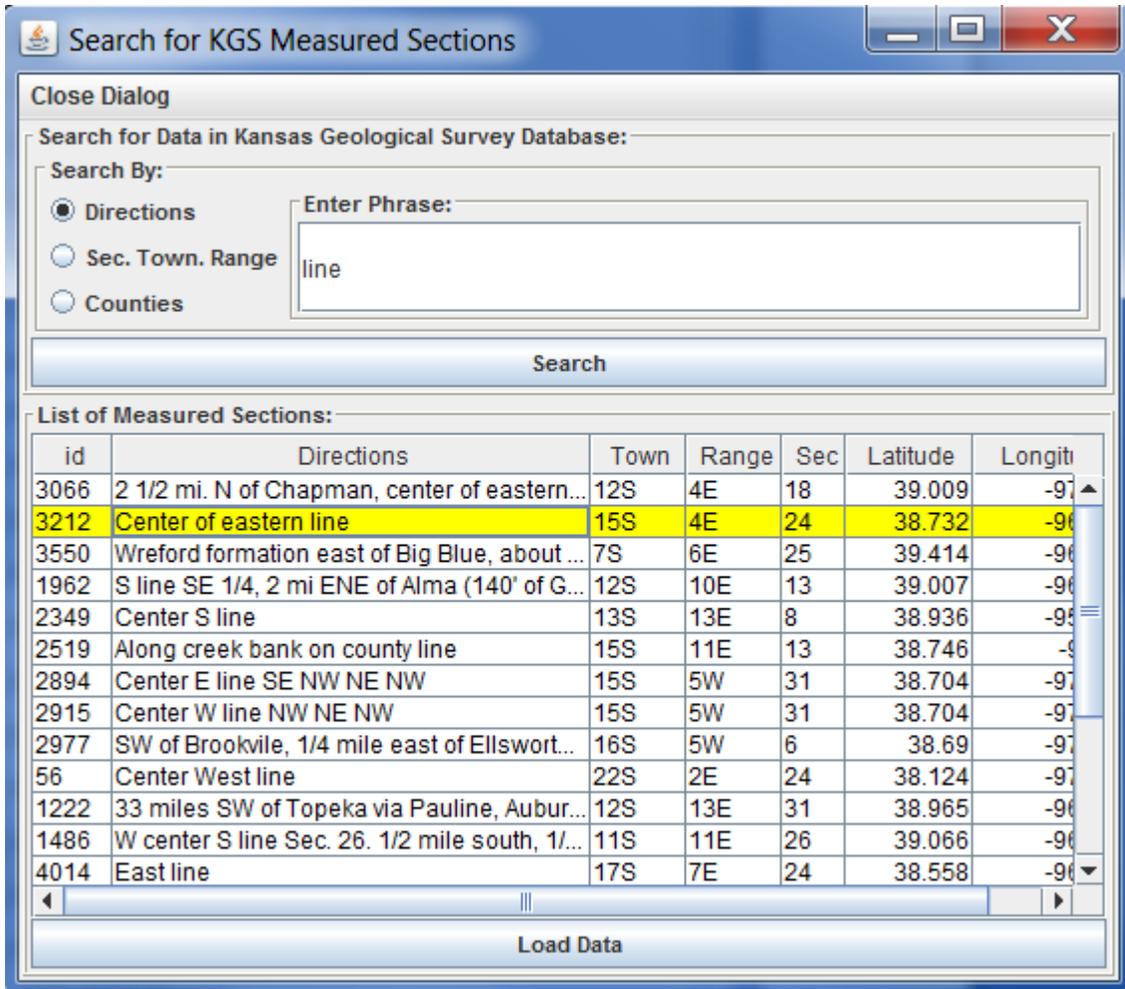
As the Summary image suggests there are 3 methods for searching for the well data within this dialog,

- By Partial Directions Phrase – The stored procedure used to retrieve the list of measured sections from the KGS Database allows the user to enter a partial phrase in this example “line” is entered. The program places a ‘%’ in front and back of the phrase and sends the request to the Database, i.e. “%line%”.

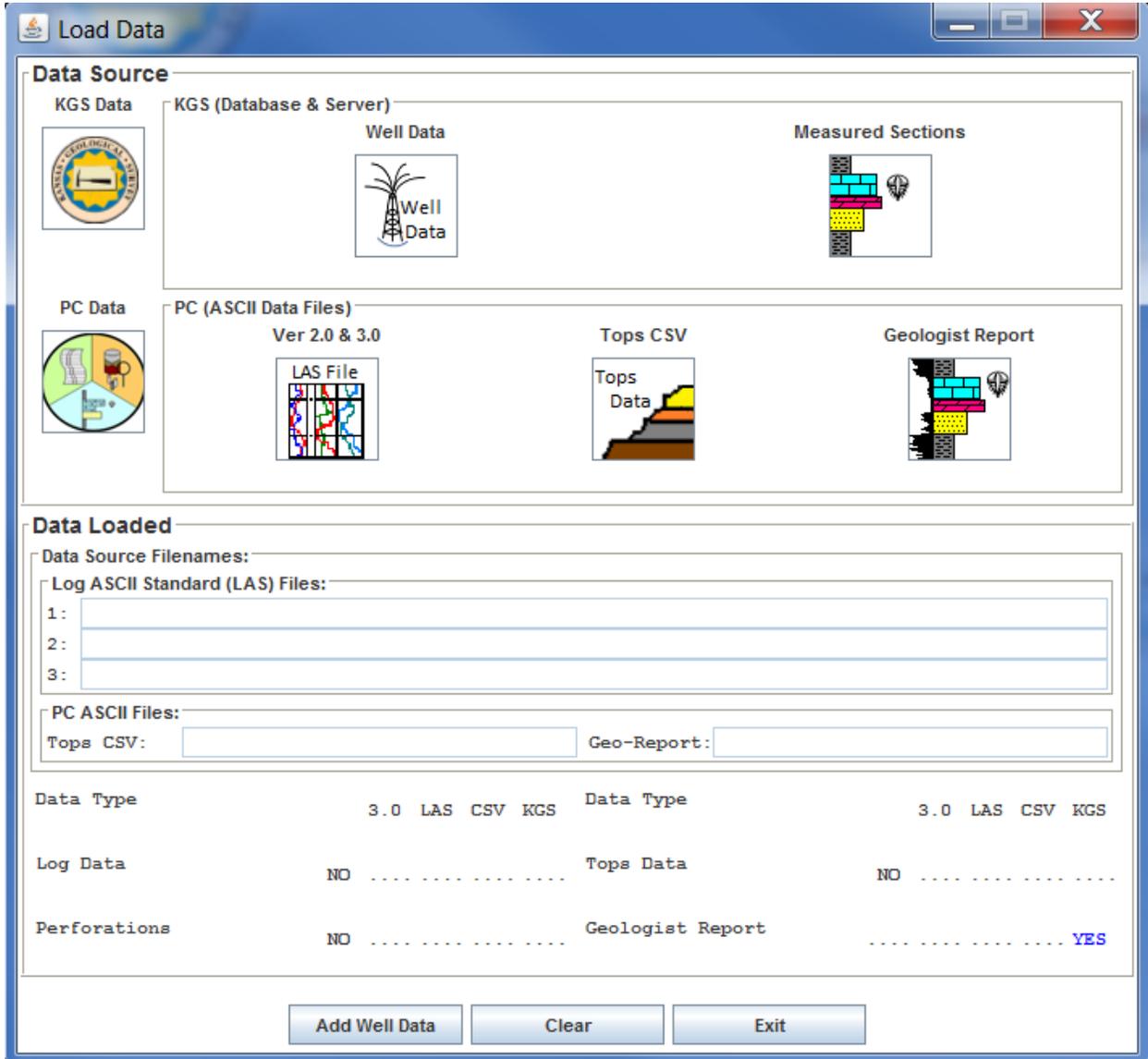
- By Township Range Section – This search is for measured sections in Kansas by, e.g. to look for the 3212 Measured Section, enter Section as 24, Township as 15 set the S (South) Radio button and Range as 4 set the E (East) Radio button.

- By County – This panel allows the user to search for measured sections by counties with measured section database table, e.g. select the DICKINSON County Button.

The user only needs to enter the above data and select the “Search” Button to display the list of measured sections in the Kansas Database that match the search criteria. In the image below the Lease Name “line” was entered to search for all measured sections in Kansas with the Phrase “line” in it. The user searches through the list until they find the well of interest.



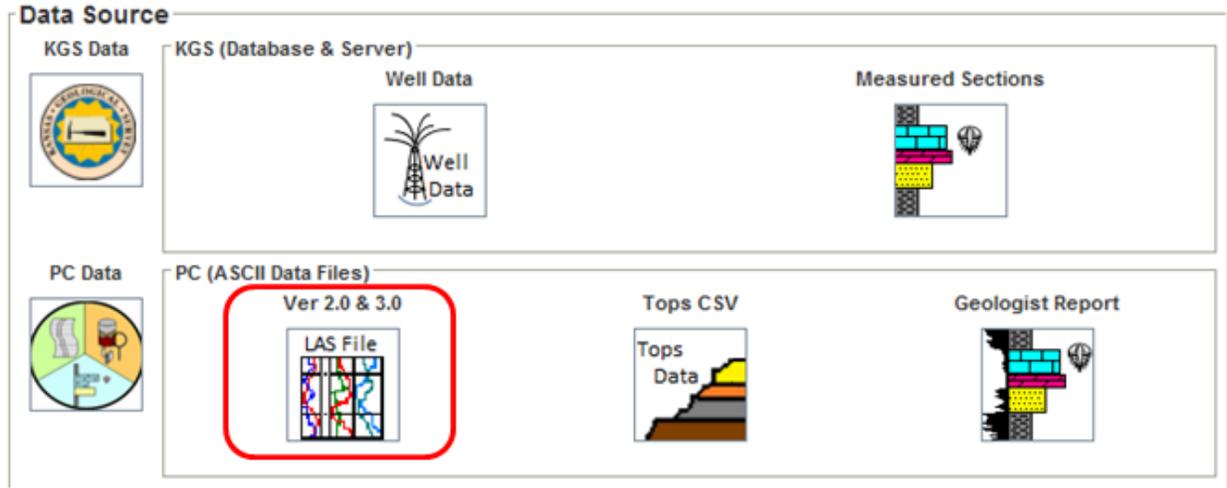
The “Load Data” will display the selection on the panel showing the data type by location of data. Notice that the Geologist Report Data Type was selected. There are tops within the Measured Section Report, but the Tops are within the report and not part of the query process so this panel will not reflect that the tops are there.



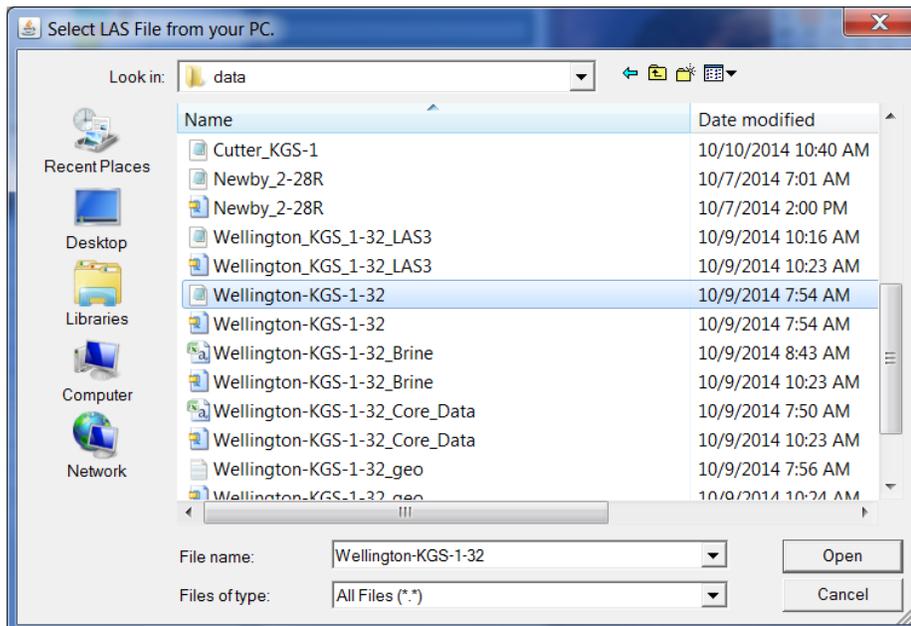
Importing PC Data - Download Well Data to PC

Importing PC Data – Log ASCII Standard (LAS) version 2.0 File

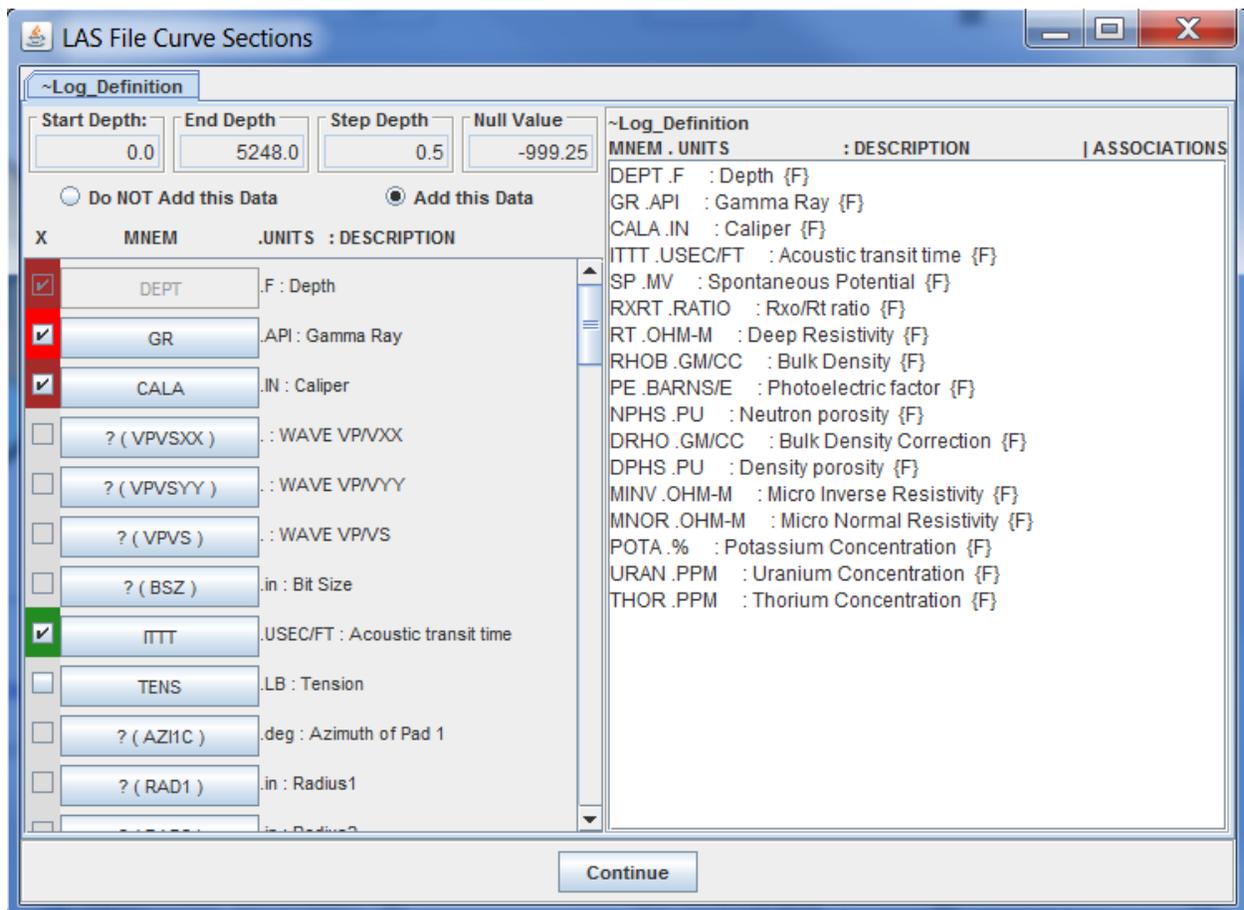
Most of the web apps will use the same input dialogs to import Log ASCII Standard (LAS) version 2.0 or 3.0 files. The Load Data Dialog is basically the same for most of the Web Apps, except they only load a subset of the total data types. In this example a LAS version 2.0 file is being imported into the web app.



Left Click on the “LAS File” Icon Button in the Data Source Panel of the Load Data Dialog. This will display the “Select LAS File from your PC” Dialog. This dialog allows the user to search their PC for the file of interest. In this example it is the LAS version 2.0 file Wellington-KGS-1-32.las, highlighted below. Select the Open button to display the “LAS File Curve Sections” Dialog.



The “LAS File Curve Sections” Dialog allows the user to map unknown LAS Curve Mnemonics to the KGS “Standard” Curve Mnemonics so they will be plotted in the 3D Cross Plot. This program reads the “LAS Tool Curve Mnemonics map to KGS Standard Mnemonics” XML File (http://www.kgs.ku.edu/software/gemini/data/las_standard_tools.xml), which will automatically maps the Curve Mnemonics from the LAS file to one of 31 KGS “Standard” Curve Mnemonics. If a curve Mnemonic is not recognized the program will place a “?” in front of the Mnemonic, e.g. “?(BSZ)” for the “.in : Bit Size” Log Curve. If the user is satisfied with the automatic curve selections, which are checked and color coded, they only need to select the “Continue” Button at the bottom of the Dialog to import the file. The next section will take the user through a series of examples in changing the curve selections and mapping unknown curve mnemonics.



Notice that some of the check boxes are colored with different colors, which shows that the curves were automatically selected, but also to represent the curve type by color. The Curves are colored by type (data units) as follows,

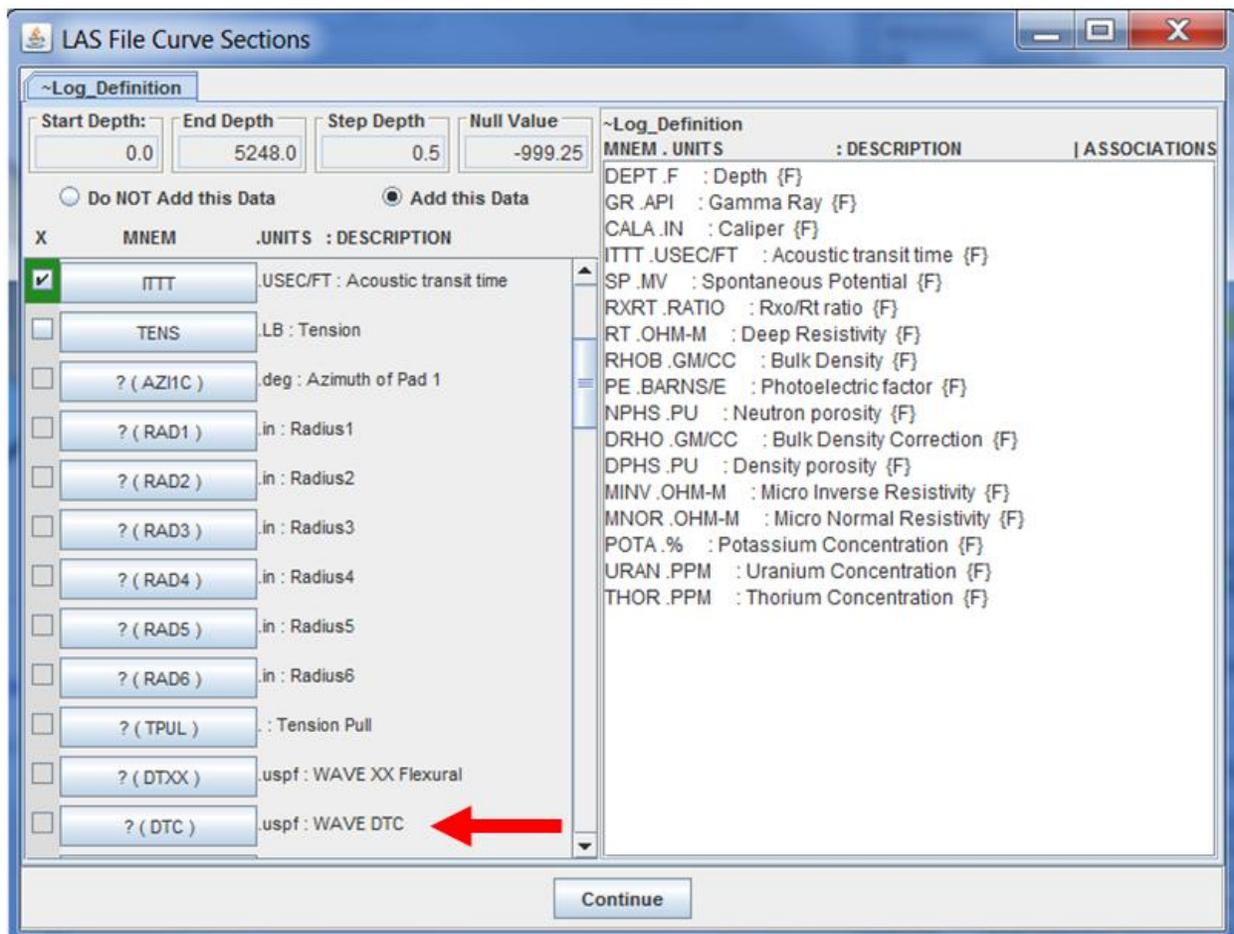
- Orange - OHM-M or Resistivity Logs
- Cyan – PU or porosity Logs, Neutron Porosity, Density Porosity, etc.
- Greenish yellow – BARNS/E or Photoelectric Factor Logs
- Green – GM/CC or Bulk Density Log
- Forest Green – USEC/FT or the Acoustic Transit Time Log

- Red – API, PPM or “%” as Radioactive logs, Gamma Ray, Spectral Gamma Ray, etc.
- Blue – MD or Permeability Logs
- Brown – F, FT or IN or Depth
- Middle yellow – FRAC, or other log curve types.
- Dark Violet – UNI or Unknown Linear Curves
- Medium Violet – UNL or Unknown Logrithum Curves

The color coding of the selected curves were added to also help the user visually recognize that a curve was selected or not.

Map Curves & Change Curve Selections

Some logs will have curve mnemonics that are not recognized as one of the KGS “Standard” Curve Mnemonics. The user will need to map the log curve to one of the KGS standard curves if they want to display the curve. The first example is to map the Acoustic Transit Time (DT), which is labeled as “.uspf : WAVE DTC” log curve in the LAS File. Also notice that the button label “?(DTC)” is not recognized by the Cross Section web app.

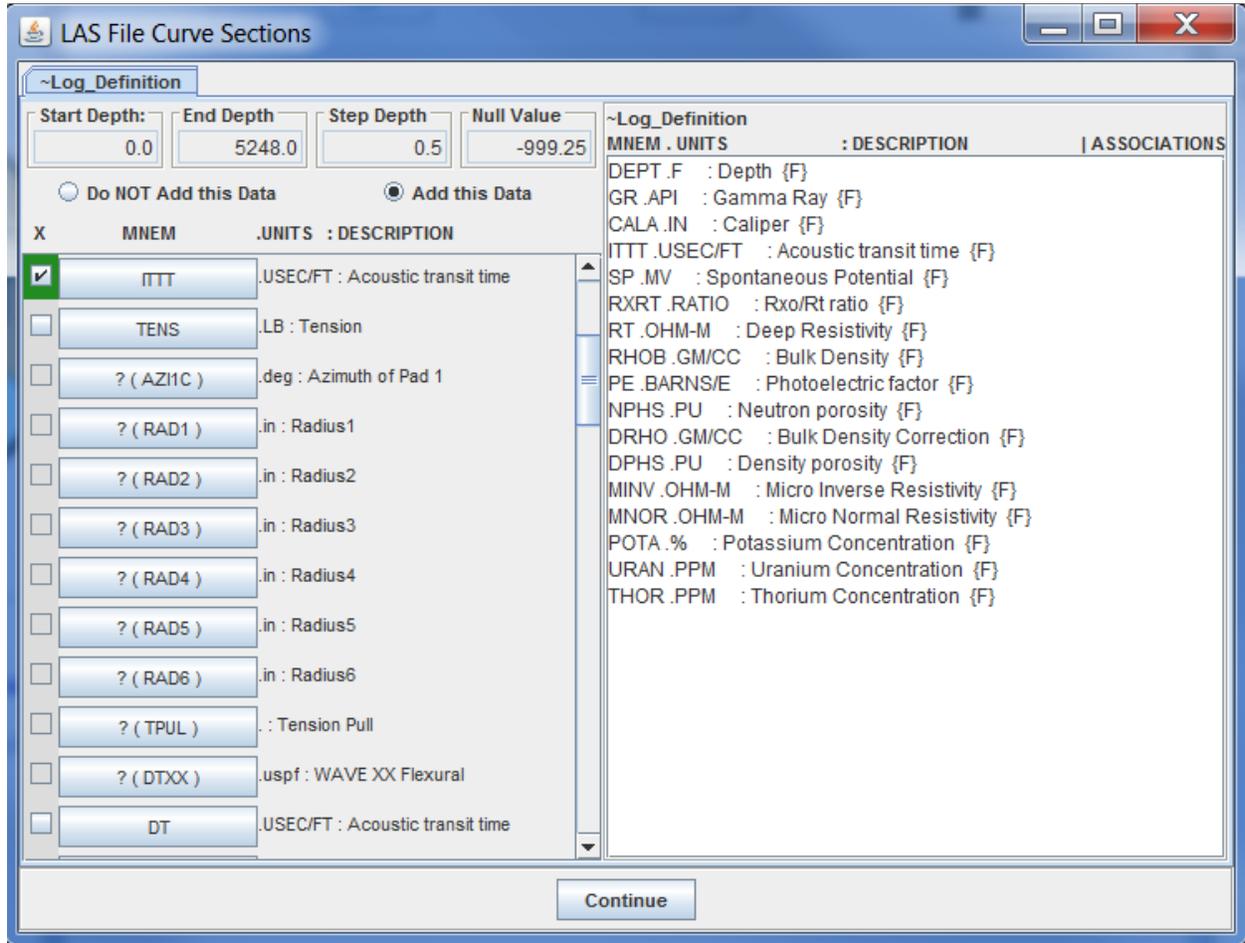


Click on the “?(DTC)” Button to display the “Select KGS Standard Tools” Dialog. This dialog provides a list of the KGS “Standard” Curve Mnemonics, from which the user can map an unrecognized log curve to one of the KGS standard curve mnemonics. The KGS “Standard” Curve Mnemonics List was created as a way to standardize the alpha bit soup of Log Mnemonics. Each logging company has their own curve mnemonics to represent similar tools. The Cross Section program is a later version of code from the GEMINI Project Cross Section Module, which needed to standardize the log curves so the curves could be automatically read and assigned a plot track. The “LAS Tool Curve Mnemonics map to KGS Standard Mnemonics” XML File was created to map the log curves from logs that were part of the KGS LAS File Collection which is not a complete list of possible curve mnemonics.

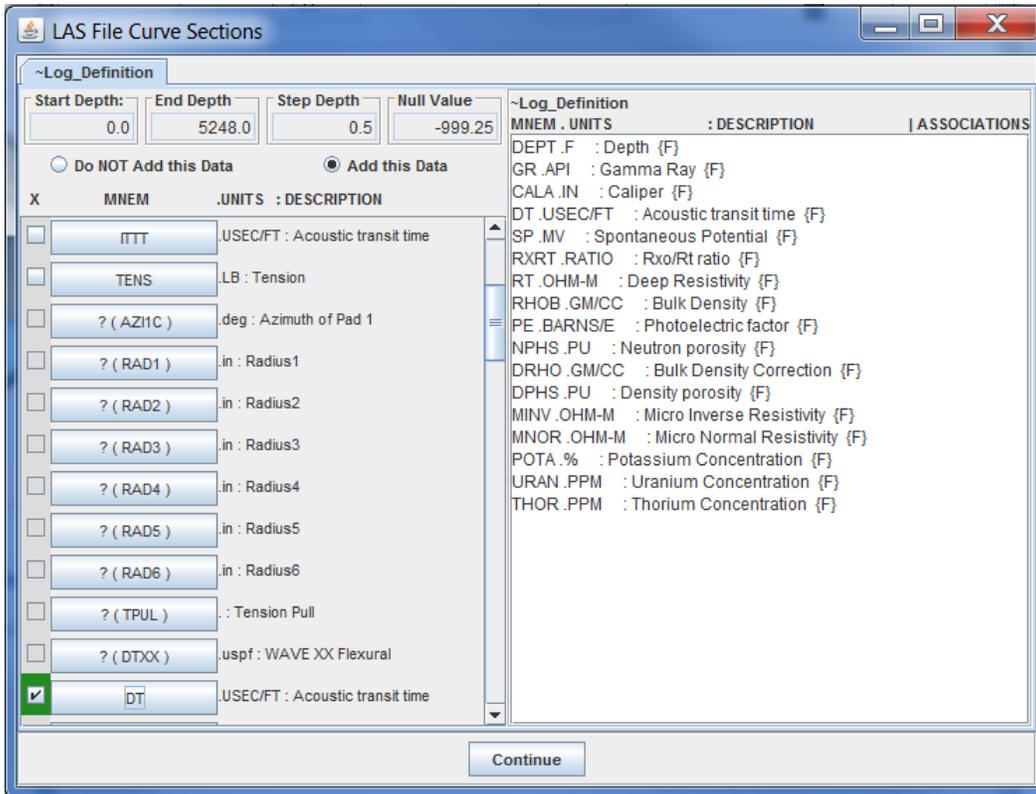
To map the unknown curve mnemonic “?(DTC)” you first notice that the unit is “uspf” (micro seconds per foot) a unit of time. Also the Acoustic Transit Time Curve Mnemonic is similar to the KGS “Standard” Curve Mnemonic “DT”. By selecting the “?(DTC)” Button you will display the “Select KGS Standard Tools” Dialog.

Mnemonic	Description	Units	Minimum	Maximum
GR	Gamma Ray	API	0	150
CGR	Gamma Ray Minus Uranium	API	0	150
SP	Spontaneous Potential	MV	0	1
CAL	Caliper	IN	6	12
PE	Photoelectric factor	BARNS/E	0	20
RHOB	Bulk Density	GM/CC	2	3
DRHO	Bulk Density Correction	GM/CC	-1.5	0.5
DPHI	Density porosity	PU	-0.1	0.3
NPHI	Neutron porosity	PU	-0.1	0.3
SPHI	Sonic porosity	PU	-0.1	0.3
DT	Acoustic transit time	USEC/FT	40	140
COND	Conductivity	MMHO/M	0	2,000
CILD	Deep Induction Conductivity	MMHO/M	0	2,000
CILM	Medium Induction Conductivity	MMHO/M	0	2,000
RES	Resistivity	OHM-M	0.1	1,000
RDEP	Deep Resistivity	OHM-M	0.1	1,000
RMED	Medium Resistivity	OHM-M	0.1	1,000
RSHAL	Shallow Resistivity	OHM-M	0.1	1,000
ILD	Deep Induction Resistivity	OHM-M	0.1	1,000
ILM	Medium Induction Resistivity	OHM-M	0.1	1,000
SFLU	Spherically Focused Resistivity	OHM-M	0.1	1,000
LL	Deep Laterolog Resistivity	OHM-M	0.1	1,000
MLL	Micro Laterolog Resistivity	OHM-M	0.1	1,000
LL8	Shallow Laterolog Resistivity	OHM-M	0.1	1,000
LN	Long Normal Resistivity	OHM-M	0.1	1,000
SN	Shallow Normal Resistivity	OHM-M	0.1	1,000
MNOR	Micro Normal Resistivity	OHM-M	0.1	1,000
MSFL	Micro Spherically Focused Resistivity	OHM-M	0.1	1,000
MINV	Micro Inverse Resistivity	OHM-M	0.1	1,000
AHT10	Array Induction Resistivity-10	OHM-M	0.1	1,000
AHT20	Array Induction Resistivity-20	OHM-M	0.1	1,000
AHT30	Array Induction Resistivity-30	OHM-M	0.1	1,000
AHT60	Array Induction Resistivity-60	OHM-M	0.1	1,000
AHT90	Array Induction Resistivity-90	OHM-M	0.1	1,000
THOR	Thorium Concentration	PPM	-10	30

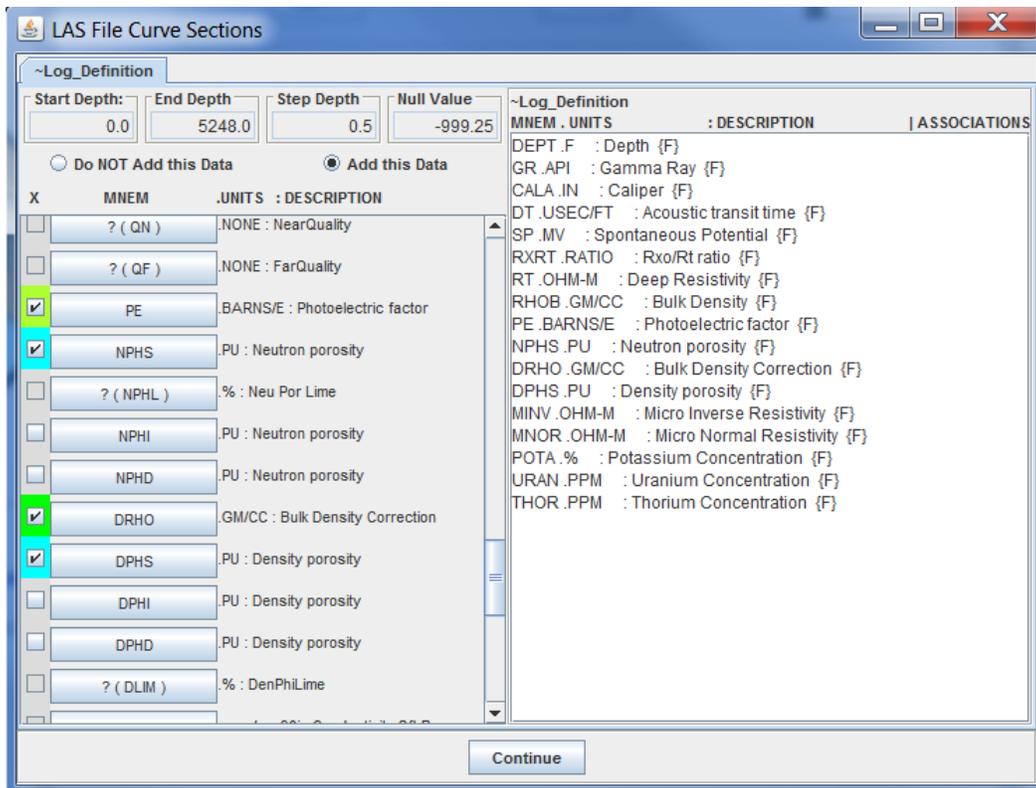
Highlight the “DT” Mnemonic Row and click on the “Select” Button to map the “?(DTC)” Curve Mnemonic to “DT” KGS Standard Curve Mnemonic.



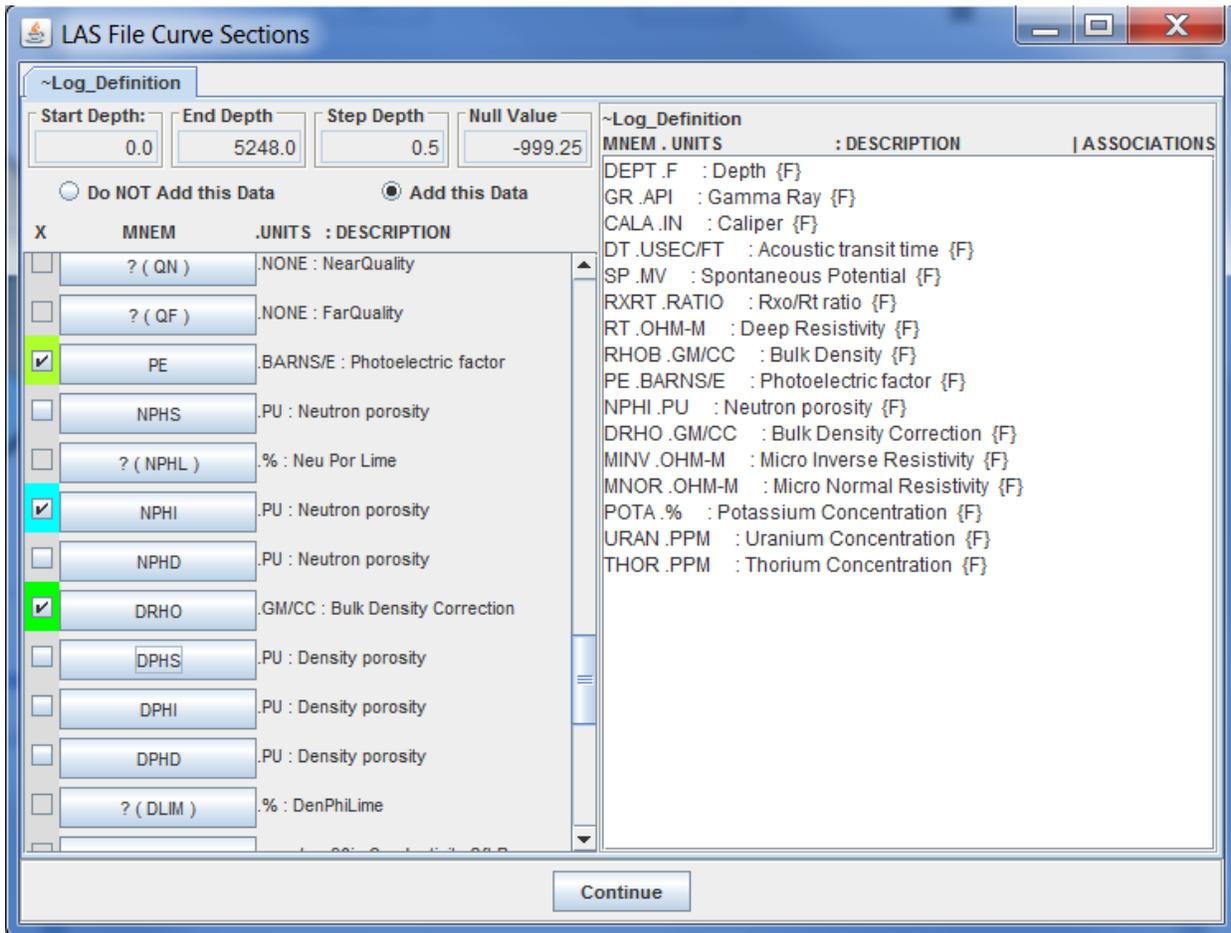
The “?(DTC). uspf : WAVE DTC” has changed to “DT.usc/ft : Acoustic transit time”. We want to change the selected “ITTT” Log Curve to “DT” Log Curve. The reason is that “ITTT” is the wrong curve type for the Acoustic Transit Time. The program found the curve mnemonic as similar to the “DT” Standard Curve Mnemonic, but this curve will not plot correctly in the 3D Cross Plot. Just click on the green check box in front of the “ITTT” Mnemonic Button to deselect the curve and then click on the check box in front of the “DT” Mnemonic Button to select it. Also notice that the ~Log_Definition Text Area was modified to show the change.



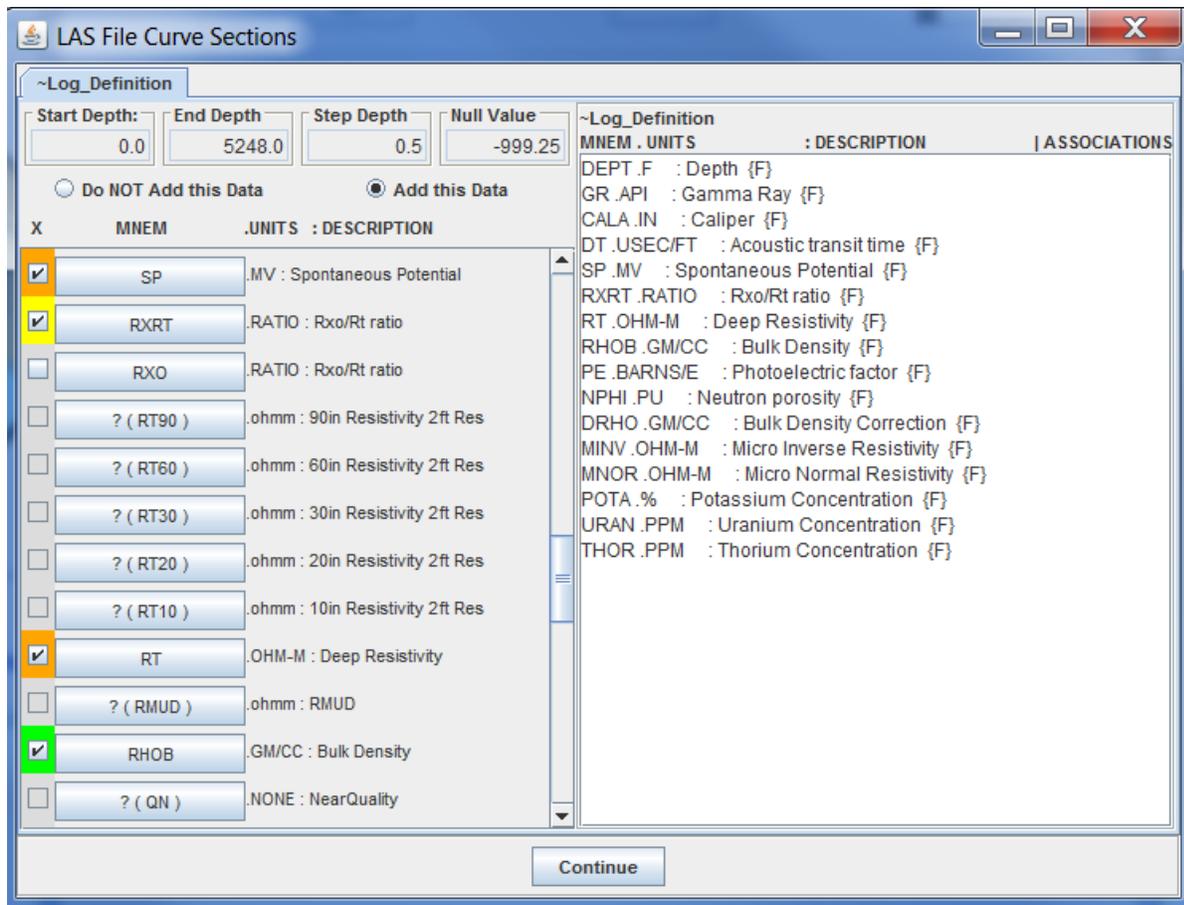
Moving the scroll bar down to the porosity curves, Neutron Porosity, and Density Porosity.



The LAS File Read will select the first curve that it recognizes and selects and color codes the curve. In this case the Neutron porosity mnemonic selected is “NPHS”, which is a valid curve, but the “NPHI” curve is desired so like the Acoustic Transit Time, you can deselect the “NPHS” and then select the “NPHI” Curve. Also the “DPHS” Density Porosity Curve can be deselected since the “RHOB” Bulk Density Curve has been selected. The reason for deselecting the Density Porosity Curve, if the Bulk Density Curve is present, is to force the Cross Section program to recompute the Density Porosity using a Limestone Matrix. If the Neutron Porosity, Bulk Density, Gamma Ray with/without a Photoelectric Factor Logs are present then the program will automatically compute a Lithology Composition Plot, but the Density Porosity has to be computed with a Limestone Matrix or the Lithology Composition Plot will not be computed correctly.



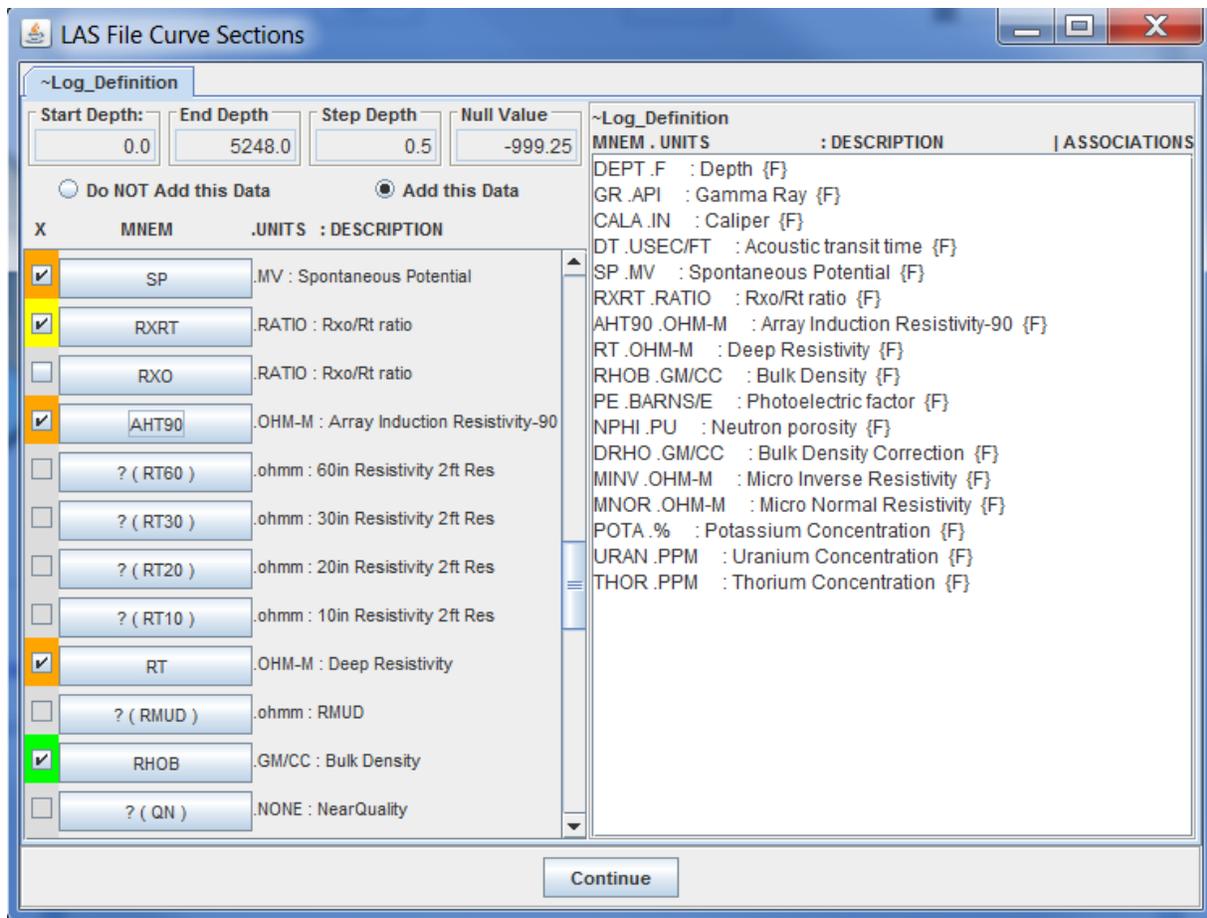
The above dialog represents the changes made for the neutron/density porosity logs. The last curves to be modified are the Array Induction Logs. Haliburton uses a different curve mnemonic for these logs. Move the scroll bar up to find the Array Induction Logs, RT90, RT60, etc.



Like the Acoustic Transit Time the “?(RT90).ohmm: 90in Resistivity 2ft Res” through “?(RT10).ohmm : 10in Resistivity 2ft Res” are not recognized. These curves can be map to the “AHT90 Array Induction Resistivity-90” to “AHT10 Array Induction Resistivity-10” KGS Curves Respectively. Click on the “?(RT90)” Mnemonic Button to display the “Select KGS Standard Tools” Dialog.

Mnemonic	Description	Units	Minimum	Maximum
GR	Gamma Ray	API	0	150
CGR	Gamma Ray Minus Uranium	API	0	150
SP	Spontaneous Potential	MV	0	1
CAL	Caliper	IN	6	12
PE	Photoelectric factor	BARNS/E	0	20
RHOB	Bulk Density	GM/CC	2	3
DRHO	Bulk Density Correction	GM/CC	-1.5	0.5
DPHI	Density porosity	PU	-0.1	0.3
NPHI	Neutron porosity	PU	-0.1	0.3
SPHI	Sonic porosity	PU	-0.1	0.3
DT	Acoustic transit time	USEC/FT	40	140
COND	Conductivity	MMHO/M	0	2,000
CILD	Deep Induction Conductivity	MMHO/M	0	2,000
CILM	Medium Induction Conductivity	MMHO/M	0	2,000
RES	Resistivity	OHM-M	0.1	1,000
RDEP	Deep Resistivity	OHM-M	0.1	1,000
RMED	Medium Resistivity	OHM-M	0.1	1,000
RSHAL	Shallow Resistivity	OHM-M	0.1	1,000
ILD	Deep Induction Resistivity	OHM-M	0.1	1,000
ILM	Medium Induction Resistivity	OHM-M	0.1	1,000
SFLU	Spherically Focused Resistivity	OHM-M	0.1	1,000
LL	Deep Laterolog Resistivity	OHM-M	0.1	1,000
MLL	Micro Laterolog Resistivity	OHM-M	0.1	1,000
LL8	Shallow Laterolog Resistivity	OHM-M	0.1	1,000
LN	Long Normal Resistivity	OHM-M	0.1	1,000
SN	Shallow Normal Resistivity	OHM-M	0.1	1,000
MNOR	Micro Normal Resistivity	OHM-M	0.1	1,000
MSFL	Micro Spherically Focused Resistivity	OHM-M	0.1	1,000
MINV	Micro Inverse Resistivity	OHM-M	0.1	1,000
AHT10	Array Induction Resistivity-10	OHM-M	0.1	1,000
AHT20	Array Induction Resistivity-20	OHM-M	0.1	1,000
AHT30	Array Induction Resistivity-30	OHM-M	0.1	1,000
AHT60	Array Induction Resistivity-60	OHM-M	0.1	1,000
AHT90	Array Induction Resistivity-90	OHM-M	0.1	1,000
THOR	Thorium Concentration	PPM	-10	30

Highlight the AHT90 and click on the “Select” Button.



The “(?AHT90).ohmm : 90in Resistivity 2ft Res” has changed to “AHT90.OHM-M : Array Induction Resistivity-90” and the orange check box is selected. The rest of the Array Induction Log Curves each are mapped to the respective KGS Mnemonic Curve as follows,

(?RT90).ohmm : 90in Resistivity 2ft Res to AHT90.OHM-M : Array Induction Resistivity-90
 (?RT60).ohmm : 60in Resistivity 2ft Res to AHT60.OHM-M : Array Induction Resistivity-60
 (?RT30).ohmm : 30in Resistivity 2ft Res to AHT30.OHM-M : Array Induction Resistivity-30
 (?RT20).ohmm : 20in Resistivity 2ft Res to AHT20.OHM-M : Array Induction Resistivity-20
 (?RT10).ohmm : 10in Resistivity 2ft Res to AHT10.OHM-M : Array Induction Resistivity-10

LAS File Curve Sections

~Log_Definition

Start Depth: 0.0 End Depth: 5248.0 Step Depth: 0.5 Null Value: -999.25

Do NOT Add this Data
 Add this Data

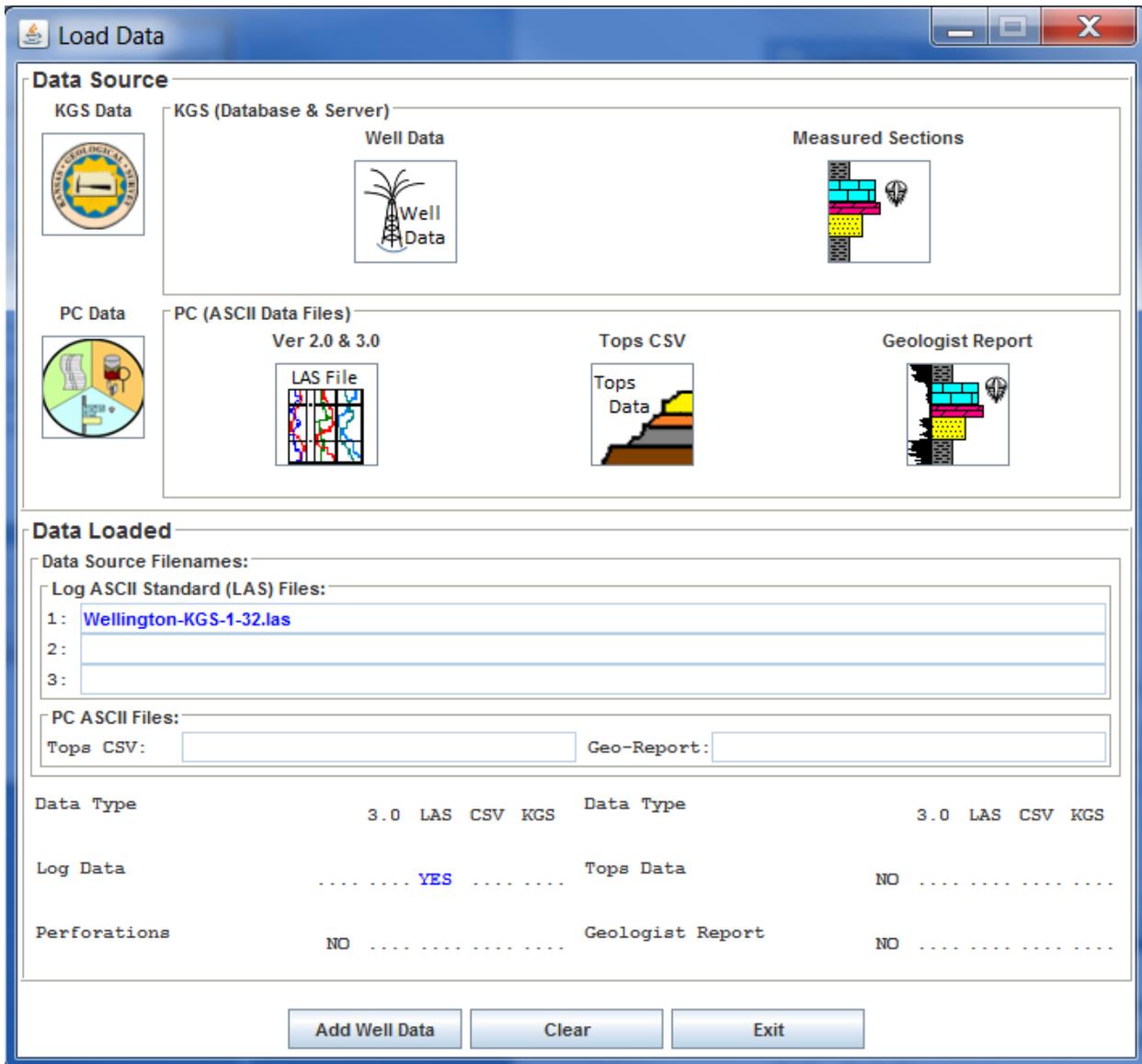
X	MNEM	.UNITS : DESCRIPTION
<input checked="" type="checkbox"/>	SP	MV : Spontaneous Potential
<input checked="" type="checkbox"/>	RXRT	RATIO : Rxo/Rt ratio
<input type="checkbox"/>	RXO	RATIO : Rxo/Rt ratio
<input checked="" type="checkbox"/>	AHT90	.OHM-M : Array Induction Resistivity-90
<input checked="" type="checkbox"/>	AHT60	.OHM-M : Array Induction Resistivity-60
<input checked="" type="checkbox"/>	AHT30	.OHM-M : Array Induction Resistivity-30
<input checked="" type="checkbox"/>	AHT20	.OHM-M : Array Induction Resistivity-20
<input checked="" type="checkbox"/>	AHT10	.OHM-M : Array Induction Resistivity-10
<input checked="" type="checkbox"/>	RT	.OHM-M : Deep Resistivity
<input type="checkbox"/>	? (RMUD)	.ohmm : RMUD
<input checked="" type="checkbox"/>	RHOB	.GM/CC : Bulk Density
<input type="checkbox"/>	? (QN)	.NONE : NearQuality

~Log_Definition

MNEM . UNITS	: DESCRIPTION	| ASSOCIATIONS
DEPT .F	: Depth {F}	
GR .API	: Gamma Ray {F}	
CALA .IN	: Caliper {F}	
DT .USEC/FT	: Acoustic transit time {F}	
SP .MV	: Spontaneous Potential {F}	
RXRT .RATIO	: Rxo/Rt ratio {F}	
AHT90 .OHM-M	: Array Induction Resistivity-90 {F}	
AHT60 .OHM-M	: Array Induction Resistivity-60 {F}	
AHT30 .OHM-M	: Array Induction Resistivity-30 {F}	
AHT20 .OHM-M	: Array Induction Resistivity-20 {F}	
AHT10 .OHM-M	: Array Induction Resistivity-10 {F}	
RT .OHM-M	: Deep Resistivity {F}	
RHOB .GM/CC	: Bulk Density {F}	
PE .BARNSE	: Photoelectric factor {F}	
NPHI .PU	: Neutron porosity {F}	
DRHO .GM/CC	: Bulk Density Correction {F}	
MINV .OHM-M	: Micro Inverse Resistivity {F}	
MNOR .OHM-M	: Micro Normal Resistivity {F}	
POTA .%	: Potassium Concentration {F}	
URAN .PPM	: Uranium Concentration {F}	
THOR .PPM	: Thorium Concentration {F}	

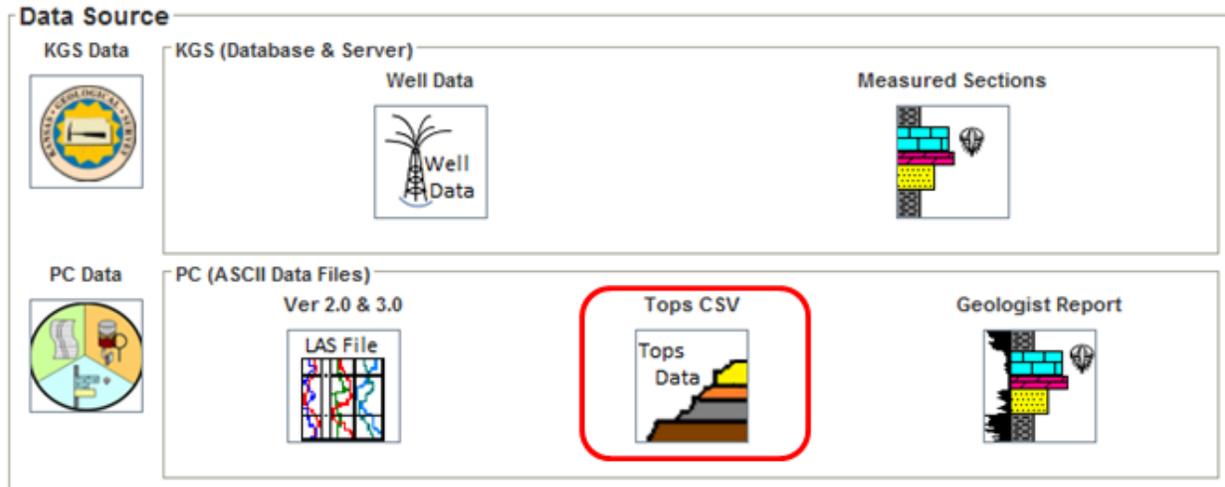
Continue

Select the Continue Button to read and parse the LAS log curves selected into the Cross Section Web App. Notice that the “Data Source Filenames:” Panel lists the LAS version 2.0 File that was just read in as well as the type of data, i.e. Log Data from LAS Data Type.

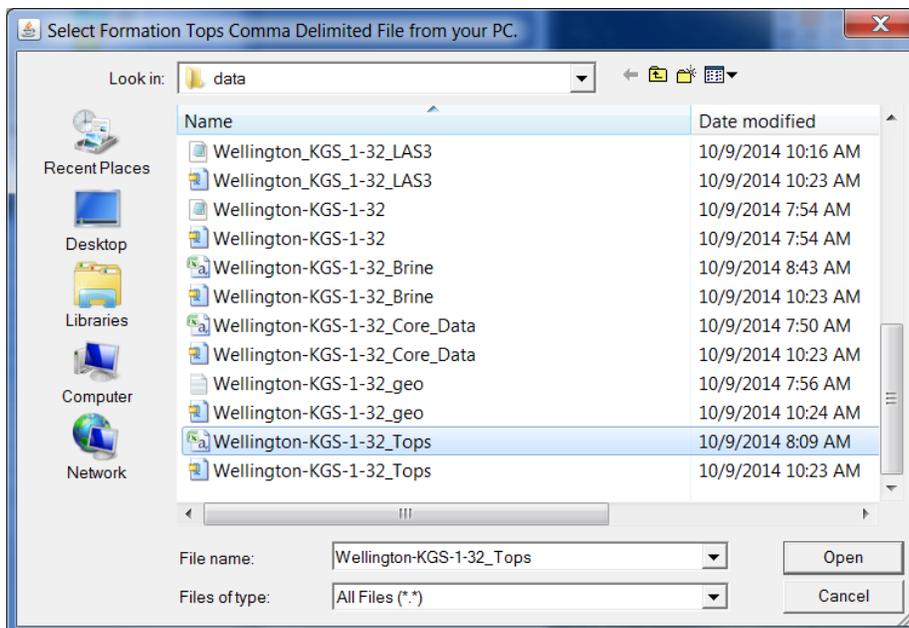


Importing PC Data – Tops CSV (Comma Separated Values) File.

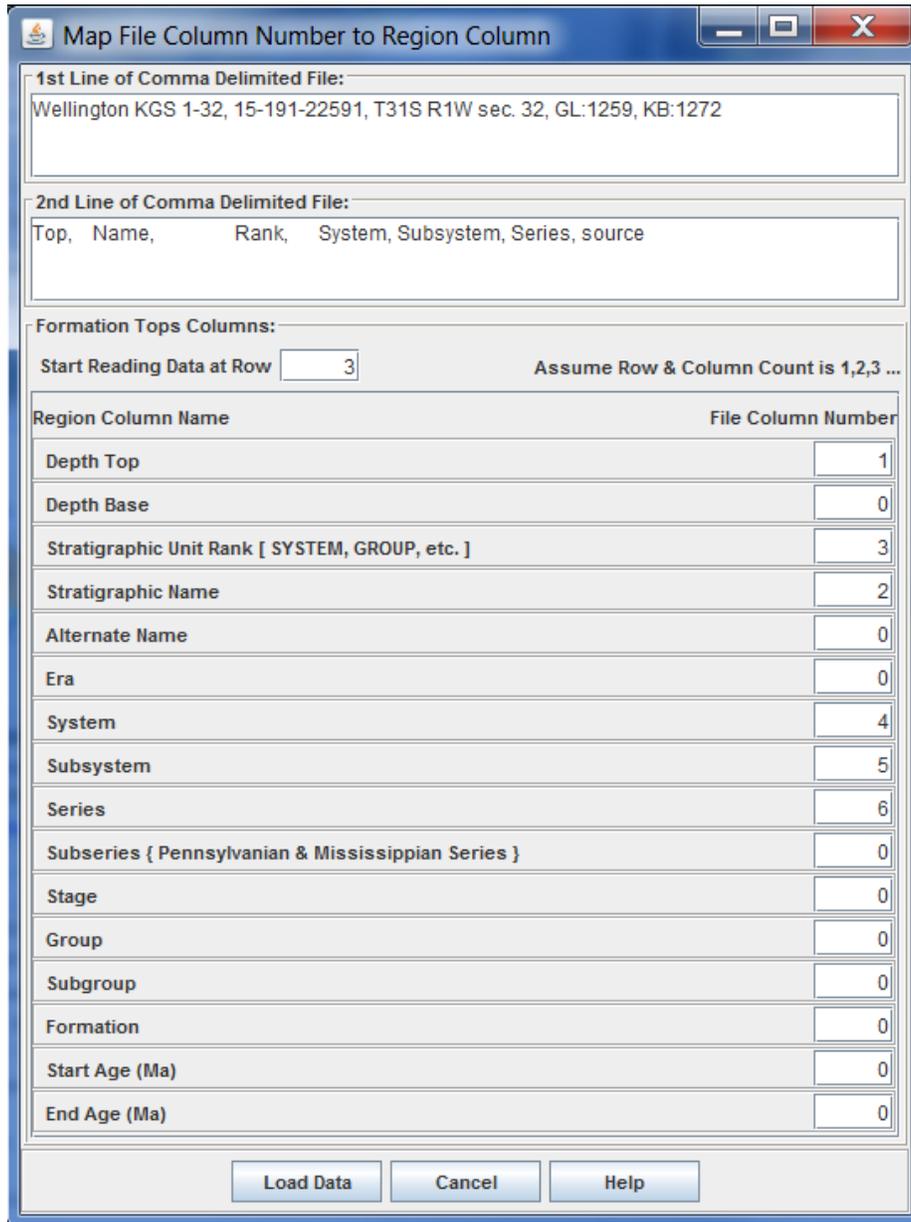
Most of the web apps will use the same input dialogs to import tops CSV (Comma Separated Values) file. The Load Data Dialog is basically the same for most of the Web Apps except they only load a subset of the total data types. In this example a Tops CSV file is being imported into the web app.



Left Click on the “Tops Data” Icon Button in the Data Source Panel of the Load Data Dialog. This will display the “Select Formation Tops Comma Delimited File from your PC” Dialog. This dialog allows the user to search their PC for the file of interest. In this example it is the Tops CSV file Wellington-KGS-1-32_Tops.csv, highlighted below. Select the Open button to display the “Map File Column Number to Region Column” Dialog.



The “Map File Column Number to Region Column” Dialog allows the user to map the file columns number to the web app tops data structure. In this example the file has the well information in line one of the Tops CSV File and line two of the Tops CSV File has the file data columns. In this case the chosen file columns match the Tops Mnemonics for the tops data structure. The File Column Number is automatically assigned to the Region Column Names. The user only needs to select the “Load Data” Button to parse the Tops Data into the web app.



Tops CSV (Comma Separated Values) File Structure.

The Wellington KGS 1-32 Tops CSV example has two introduction lines, the first line is the well header information and the second line is the actual column labels for the tops data, illustrated below,

```

Line 1 Well Header Info Wellington KGS 1-32, 15-191-22591, T31S R1W sec. 32, GL:1259, KB:1272
Line 2 Data Column Labels Top, Name, Rank, System, Subsystem, Series, source
Line 3 Data Start 620, Chase, GROUP, Permian, , Wolfcampian, PG
748, Towanda Limestone, MEMBER, Permian, , Wolfcampian, PG
1595, Wabaunsee, GROUP, Carboniferous, Pennsylvanian, Upper, PG
1622, Root Shale, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
1662, Stotler Limestone, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
1920, Severy Shale, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
1980, Topeka Limestone, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
2312, Lecompton Limestone, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
2402, Heebner Shale, MEMBER, Carboniferous, Pennsylvanian, Upper, PG
2703, Stalnaker Sandstone, BED, Carboniferous, Pennsylvanian, Upper, PG
3039, Kansas City, GROUP, Carboniferous, Pennsylvanian, Upper, PG
3169, Stark Shale, MEMBER, Carboniferous, Pennsylvanian, Upper, PG

```

Figure: Partial Contents of the Wellington-KGS-1-32_Tops.csv File.

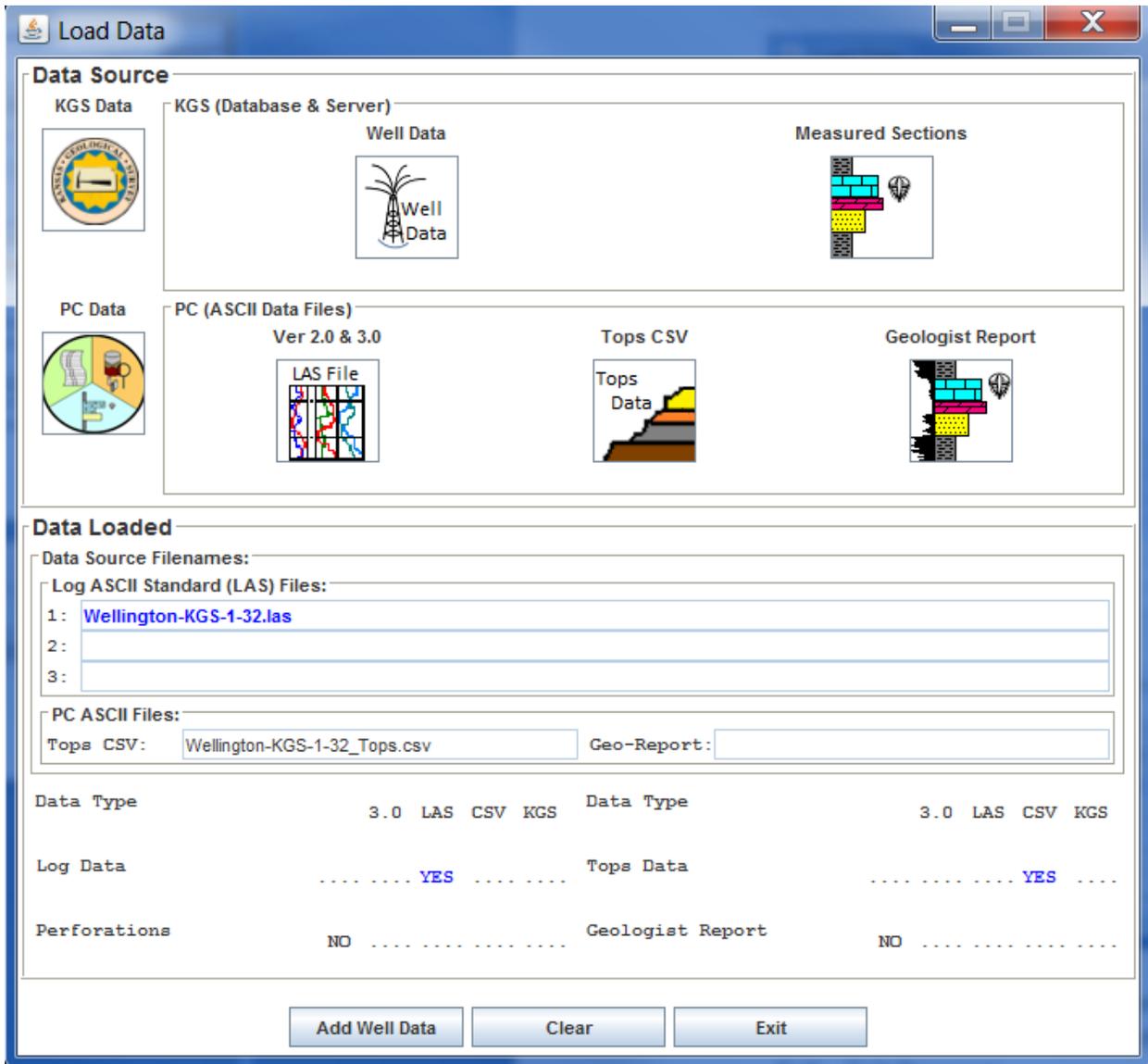
The “Map File Column Number to Region Column” Dialog allows the user to map the data in the Tops CSV File to the web app data structure variables. The program first reads the first and second line of the CSV File looking for the data column headers. The lines are each parsed to single out the data column headers and to match those headers to the tops data structure. The program then assigns the column number to the Region Column Name starting at column 1,2,3, ... if the file column name used matches the expected region column name. The Column Names matrix used to parse the file column variables are listed below,

Depth Top	Top	Start
Depth Base	Base	End
Stratigraphic Unit Rank [SYSTEM, GROUP, etc.]	Rank	
Stratigraphic Name	Name	
Alternate Name	Alt Name	
Era		
System	Sys	
Subsystem	subsys	
Series	Ser	
Subseries { Pennsylvanian & Mississippian Series }	Subseries	Subser
Stage	Stg	
Group	Grp	
Subgroup	subgrp	
Formation	Form	
Start Age (Ma)	Start Age	
End Age (Ma)	End Age	

The Wellington KGS 1-32 Tops CSV File example above line 2 has only the Top, Tops Name, Rank, System, Subsystem, Series and Source as the column name variables. The program was able to map each of the column headers to the tops data structure, except Source, i.e.

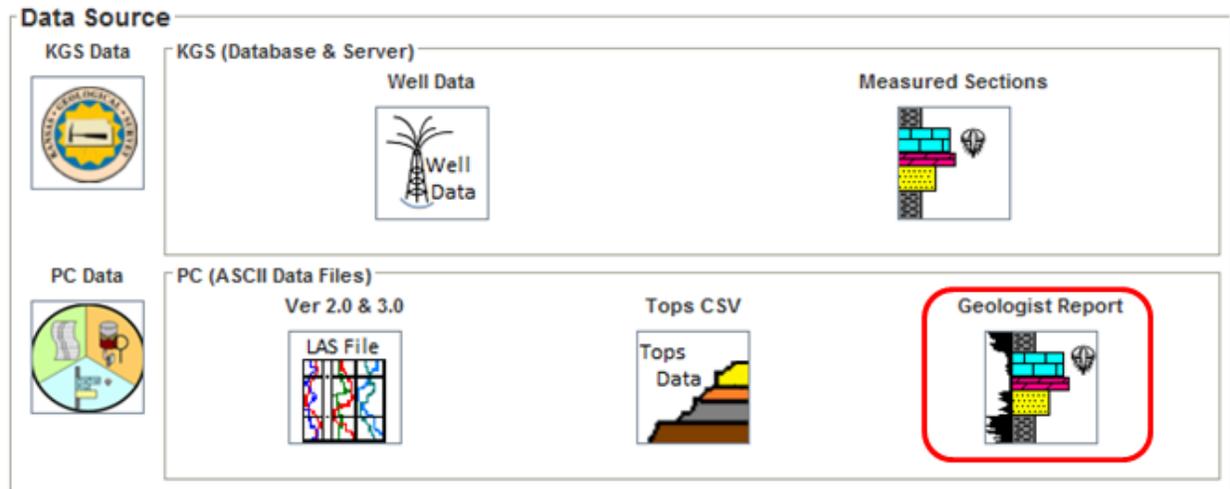
Column	File Column Label	Tops Data Name
1	Top	Depth Top
2	Name	Stratigraphic Name
3	Rank	Stratigraphic Unit Rank
4	System	System
5	Subsystem	Subsystem
6	Series	Series
7	Source	

When the user selects the “Load Data” Button on the “Map File Column Number to Region Column” Dialog the data is parsed into the Cross Section Program, where the Tops CSV file name is entered into the “PC ASCII Files:” Panel as well as the data type source.



Importing PC Data – Geologist Report (Cuttings/Core Descriptions, Measured Sections) ASCII Delimited File.

Some of the web apps will use the same input dialogs to import Geologist Report ASCII Delimited file. The Load Data Dialog is basically the same for most of the Web Apps, except they only load a subset of the total data types. In this example a Geologist Report ASCII Delimited file is being imported into the web app.



Left Click on the “Geologist Report” Icon Button in the Data Source Panel of the Load Data Dialog. This will display the “Select Comments/Remarks/Notes Delimited File from your PC” Dialog. This dialog allows the user to search their PC for the file of interest. In this example it is the Geologist Delimited file Wellington-KGS-1-32_geo.txt, highlighted below. Select the Open button to display the “Parse Comments/Remarks/Notes ASCII Text File” Dialog.

The Select Comments/Remarks/Notes Delimited File from your PC Dialog allows the user to import the geologist report into the web app. The data is parsed into the one of number of rock description data structures, i.e. Rock Color, Rock Lithology, Porosity, Sedimentary Structure, and General Fossils.

There are two sections to this dialog the Top controls how the depth data is found and interpreted. The “User defined” Depth assumes that the first two columns will be the start and stop depth followed by the text as this example below shows. The “Bedding Thickness” Depth assumes that there is one depth with the description. The user should take care to use a delimiter that does not appear in the description if the bedding thickness follows the bed descriptions.

The “Delimiters, i.e. ,;:()” text field has default ‘,’ by default, which for the example below, showed be changed to ‘;’ to match the depth data separation delimiter shown. And the “Start at Row” text field should be changed to 6 since the data starts at line 6. The default depth is in feet, but it is possible that a measured section would be measured in inches, note this setting is for all depths in the file. This panel allows the user to see all the data and to edit the Depth Delimiter, Starting point of the Data and Bedding Depth Start text fields to match the data and then select the “Parse Data” to parse the text into the rock data structures.

Parse Comments/Remarks/Notes ASCII Text File

Depth Position By:
 User Defined Bedding Thickness

Start Bedding at: Depth Data Units (will be converted to feet)
 Feet Inch Meter Centimeter

Delimiters, i.e. ,;(): Start at Row

Lease: Wellington KGS Well 1-32 (15-191-22591) ; operator: BEREXCO LLC; Field: Wellington
Location: T31S R1W, Sec. 32 ; NE SW NE NE ; 955 South, 877 West, from NE corner
Longitude: -97.4423481 ; Latitude: 37.3154639
County: Sumner
Total Depth: 3660 ; Elevation: 1259 GL
2340; 2344; Sh, gy, drk gy, frm
2344; 2352; LS, tan-buff, f-crypto xln, hard, dns, few pcs of drk frs, chrt.
2352; 2362; LS, tan, fxln, sctd foss, sctrd vuggy por, ns
2362; 2374; Sh, grn, gy drk gy, grn, silty, pyritic, gy silty, sctrd foss
2374; 2380; LS, buff, fxln, hrd dns, with LS, wht-tan, fxln, chky-sub chalky, dns
2380; 2394; Sh, grn, lt gn, gy, lt grn, soft, sticky, stringers of gy siltstone
2394; 2406; LS, tan, f-med xln, sctrd foss, sub chalky, hrd with LS, buff, fxln, hrd, dns
2406; Heebner Shale
2406; 2418; Sh, blk, carb, firm, pyritic
2418; 2422; LS, buff, f-med xln, foss, hrd, dns, ns
2422; 2434; SS, wht-clr, f grn, rndd-sub rndd, calc cement, tight, some clr ss with int xln, & vuggy poro, n s, stringers of Siltstone, gy, with LS, wht, fxln, soft, chalky
2434; 2450; LS, wht-tan, fxln, foss, pp & vuggy poro, ns, LS, wht, fxln, hrd, dns, stylonite, stringers of pyrite
2450; 2462; Sh, grn, gy, grn, silty, pyritic
2462; 2466; LS, tan, fxln, hrd, sctrd vuggy poro, ns
2466; 2474; Sh, grn, gy, with Siltstone grn
2474; 2478; LS, buff, f-crypt xln, hrd, dns
2478; 2488; Sh, gy-drk gy, frm
2488; 2502; LS, wht-tan, f-med xln, v foss, partly oolit, intxln, omoldic and vuggy poro, ns
2502; 2520; Sh, gy, drk gy, sctrd red, some stringers of grn-gy siltstone
2520; 2540; Sh, gy, grn, and lt grn, intrbdd with Ls, tan, f-med xln, foss, pp & vuggy poro, ns
2540; 2558; Sh, gy, drk gy, frm, stringers of lt grn-clr, vf grn SS with calc cement, tight
2558; 2562; LS, tan-buff, fxln, foss, hrd, dns, some drk fresh, chrt
2562; 2580; Sh, drk gy, gy, intr bdd with some grn, siltstone
2580; 2590; Sh, grn, gy sctrd red, with clr-lt grn siltstone, pyritic
2590; 2610; Sh, gy, sctrd grn with some intrbdd siltstone
2610; 2650; Sh, gy, drk gy and sctrd grn and red, some pcs of blk sh, gy Sh, with thin lysr of blk sh, pyritic, few pcs of LS, wht, f-med xln, foss, chalky, ns
2650; 2678; Sh, g, drk gy, AA, some lt grn siltstone
2680; latan Limestone
2678; 2684; LS, buff-brwn, f-med xln, foss, hrd, dns, ns
2684; 2686; sh
2686; 2688; LS, tan, fxln, hrd, dns with gy
2688; 2691; Sh
2691; Stalnaker Sandstone
2691; 2696; SS, wht, clr, lt grn, f grn, calc cement, tight
2696; 2704; Sh, grn gy, few pcs of blk, hrd, frm
2704; 2730; SS, wht-clr, f-med grain, sub rndd-ang, poorly srted, int xln & vuggy poro, partl glauc, some with wht calc cement, tight, ns
2730; 2746; SS, wht-clr, f-med grn, ang-sub rndd, int xln and vuggy poro, Sh, grn, lt grn, soft
2746; 2750; LS, tan, fxln, hrd, dns, sctrd foss, ns
2750; 2778; SS, clr-lt grn, f grn, poorly srted, tight, with some stringers of gy sh, SS, clr, med grn, well srted, sub rndd-ang, int xln & vugy poro, ns
2778; 2780; LS, wht, fxln, hrd, dns, sctrd foss, sub chalky
2780; 2808; SS, clr, med grn, rndd-sub rndd, well srted, int xln poro, partly glauc, ns

Parse Data Close Help

Geologist Report ASCII Delimited File Structure.

By Depth Range:

The Wellington KGS 1-32 Geologist Report Delimited file example has a more relaxed format. The well header information is at the top of the file with as many lines needed. The data starts immediately after the header section. The Geologist Report Example for the Wellington KGS 1-32 well is as follows,

```
Line 1 to Line 5: Well Header Information
Lease: Wellington KGS Well 1-32 ( 15-191-22591 ) ; operator: BEREXCO LLC; Field: Wellington
Location: T31S R1W, Sec. 32 ; NE SW NE NE ; 955 South, 877 West, from NE corner
Longitude: -97.4423481 ; Latitude: 37.3154639
County: Sumner
Total Depth: 3660 ; Elevation: 1259 GL
Line 6 Data Start
2340; 2344; Sh, gy, drk gy, frm
2344; 2352; LS, tan, fxln,scrt foss, scrtv vuggy por, ns
2352; 2362; LS, tan, fxln,scrt foss, scrtv vuggy por, ns
2362; 2374; Sh, grn, gy drk gy, grn, silty, pyritic, gy silty, scrtv foss
2374; 2380; LS, buff, fxln,hrd dns, with LS, wht-tan,fxln, chlky-sub chalky, dns
2380; 2394; Sh, grn, lt gn, gy, lt grn, soft, sticky, stringers of gy siltstone
2394; 2406; LS, tan, f-med xln, scrtv foss, sub chalky, hrd with LS, buff, fxln, hrd, dns
Line 13 Tops Pick Depth example, if there are no other tops sources then the geologist report will be parsed for tops.
2406; Heebner Shale
2406; 2418; Sh, blk, carb, firm, pyritic
2418; 2422; LS, buff, f-med xln, foss, hrd, dns, ns
2422; 2434; SS, wht-clr, f grn, rndd-sub rndd, calc cement, tight, some clr ss with int xln, & vuggy poro, ns.
2434; 2450; LS, wht-tan,fxln,foss,pp & vuggy poro, ns, LS, wht, fxln, hrd, dns, styolite, stringers of pyrite
2450; 2462; Sh, grn, gy, grn, silty, pyritic
2462; 2466; LS, tan, fxln, hrd, scrtv vuggy poro, ns
2466; 2474; Sh, grn, gy, with Siltstone grn
2474; 2478; LS, buff, f-crypt xln, hrd, dns
2478; 2488; Sh, gy-drk gy, frm
```

Figure: Partial contents of the Wellington-KGS-1-32_geo.txt File.

In this example the depth range information is separated by semicolons (;) and is in the front of each description, e.g. “2340; 2344; Sh, gy, dark gy, frm”. The depth range parse engine assumes that there will be two numbers at the beginning of each description. The semicolon is not necessarily unique in the line, but the program expects to find two number fields at the front of the line. The program will separate the description from the depth range using the delimiter ‘;’. Using an example line from above,

“2340; 2344; Sh, gy, dark gy, frm”

The parse engine will determine which part is the description and which is the depth information. The depths are then cleaned of any other non-numeric characters leaving the numbers, e.g. 2340 and 2344. The parse engine sets the starting depth and ending depths for the description and computes the thickness and adds to the cumulative total depth. The description is parsed later (Lithology, Rock Color, Porosity, Sedimentary Structure, Fossils and Fossil Genera/Species Names) when the user selects the “Parse Data” Button.

By Bedding Thickness:

The next example is a measured section done in Riley County, Kansas, see image below. Only the bedding thickness is available for each layer and is placed at the end of the description in parenthesis, e.g. “Shale, gray, red zone near top (10.8)”. The user must chose the “Bedding Thickness” radio button in the “Depth Position By” Panel for this type of example. The bedding

thickness parse engine assumes that the line can be divided in two strings. In this example the parenthesis is the unique delimiter separating the text from the bedding description. The program will separate the text from the bedding thickness using the delimiter ‘(’. Using the example above,

“Shale, gray, red zone near top (10.8)”

The parse engine will determine which part is the bedding description and which is the bedding thickness. The bedding thickness is then cleaned of any other non-numeric characters leaving the number, e.g. 10.8. The parse engine adds the thickness to the cumulative total depth and sets the starting depth and ending depth of the bed. The description is parsed later (Lithology, Rock Color, Porosity, Sedimentary Structure, and Fossils when the user selects the “Parse Data” Button.

Line 1 Location Information	C S line sec. 10, T. 6 S, R. 7 E.
Line 3 Data Start	Barneston limestone Feet
Note the Tops Picks Depth will be grouped with the next valid lithology description.	Florence limestone member Limestone, flinty (15)
	Matfield shale 62.45 feet
	Blue Springs shale member 41.15 feet
	Shale, mostly variegated, gray and platy in upper part (15)
	Limestone, red soft (1.6)
	Shale, gray, red zone near top (10.8)
	Limestone, yellow to gray, massive (1.85)
	Shale, green (0.4)
	Limestone, chocolate-color, weathers red (0.5)
	Shale, upper part green and purple, lower part gray (11)
	Kinney limestone member
	Limestone, light-gray massive, earthy in texture (1.3)
	Wymore shale member
	Shale, upper part gray, mostly red, lower 5 feet gray (20)
	Wreford limestone 32.5 feet
	Schroyer limestone member
	Limestone, gray, granular to crystalline, porous (2)
	Shale, gray (3)
	Limestone, gray flinty (3)

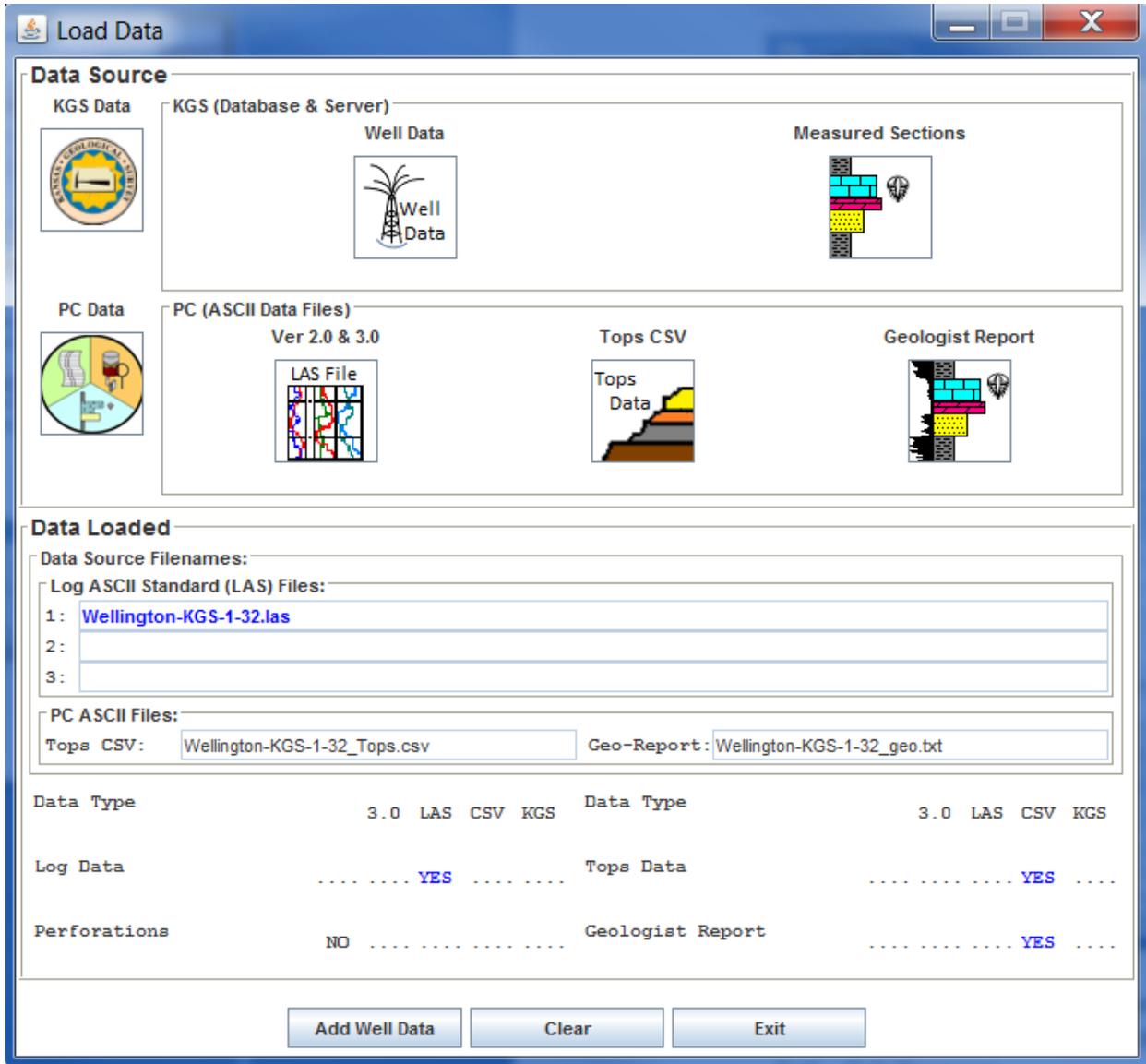
Figure: Partial contents of the Measured Section in Riley County, Kansas ASCII Text File.

The Measured Section Example can be downloaded from the server to the user’s PC. Note that downloading the file directly, web page will insert HTML into the text and change the structure of the document. The URL Links are as follows,

ASCII Text: http://www.kgs.ku.edu/Gemini/Tools/documentation/C_S_line_S10-T6S-R7E.txt

Zip File: http://www.kgs.ku.edu/Gemini/Tools/documentation/C_S_line_S10-T6S-R7E.zip

When the user selects the “Parse Data” Button on the “Parse Comments/Remarks/Notes ASCII Text File” Dialog the data is parsed into the Cross Section Program, where the Geologist Report Delimited file name is entered into the “PC ASCII Files:” Panel as well as the data type source.



Select the “Add Well Data” Button to transfer the well data to the Cross Section Data Structure.

Examples: Importing Well Data / Measured Sections into Cross Section

The cross section was create to allow the user to plot multiple wells/measured sections and plot versus depth. The user can datum the logs by tops, elevation or log depth (default). Like other GEMINI Tools web apps this program can load from two sources the user's PC and the Kansas Geological Survey (KGS) database and file server. This section will give 3 examples that will cover each of the import processes,

1. Import well data from Kansas Geological Survey Database and File Server, which will search for 3 wells that are part of the same Township, Range and Section.
2. Import measured section data from Kansas Geological Survey Measured Sections Database, which will search for 2 measured sections that are within the same Township and Range.
3. Import well data from the user's PC, this example will allow the user to import 3 wells from the user's PC to load Log ASCII Standard (LAS) version 2.0 and 3.0 files as well as Comma Separated Values (CSV) tops and Geologist Cuttings/Core Description ASCII delimited file.

The “**New Well**” button on the Cross Section Panel allows the user to import well/measured section data into the cross section web app. The user can import from data from each of the well sources or

Import Well Data from the Kansas Geological Survey's Database and File Server

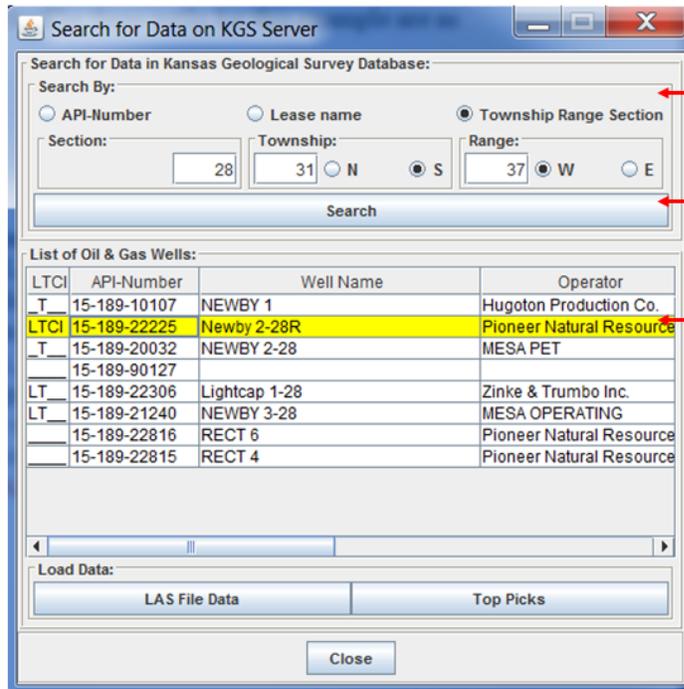
This example will focus on wells that are part of the same Township, Range and Section, i.e. Township 31 South, Range 37 West and Section 28. The three wells for this example are as follows,

1. Newby 2-28R (15-189-22225)
2. Lightcap 1-28 (15-189-22306)
3. Newby 3-28 (15-189-21240)

The user must load the well data for each well separately by clicking the “**New Well**” button for each well loading the Log & Tops Data with the “Load Data” dialog. Clicking the “Add Well Data” button at the bottom of the “Load Data” dialog will transfer the well data to the Cross Section Panel. The user can search for well data in the KGS Database and File Server using the “Search for Data on KGS Server” by API-Number, Partial Lease Name or by Township-Range Section. To create this cross section, the Township, Range and Section (TRS) of Newby 2-28R was used to find other wells that appear within the same TRS location. The details of loading well data from the KGS Database and File Server can be found by going to the [KGS \(Database & Server\) - Importing Well Data](#) Section ([page 7](#)) of this document for loading the Newby 2-28R well data example.

➤ **Newby 2-28R (15-189-22225)**

Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “Well Data” icon button to open the “Search for Data on KGS Server” dialog.



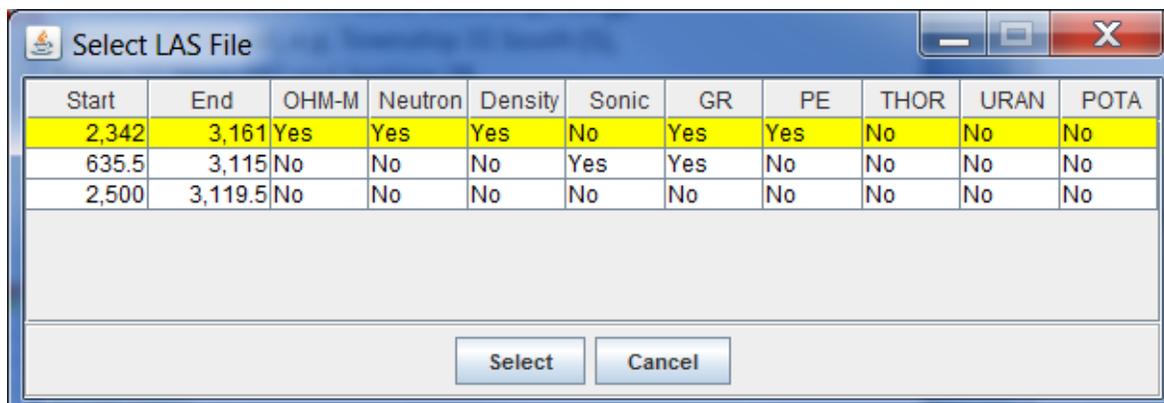
To find all wells with the same Township, Range Section of interest, e.g. Township 31 South (S), Range 37 West (W) and Section 28.

Select the “Search” Button to retrieve all wells in the KGS database that match this search criteria.

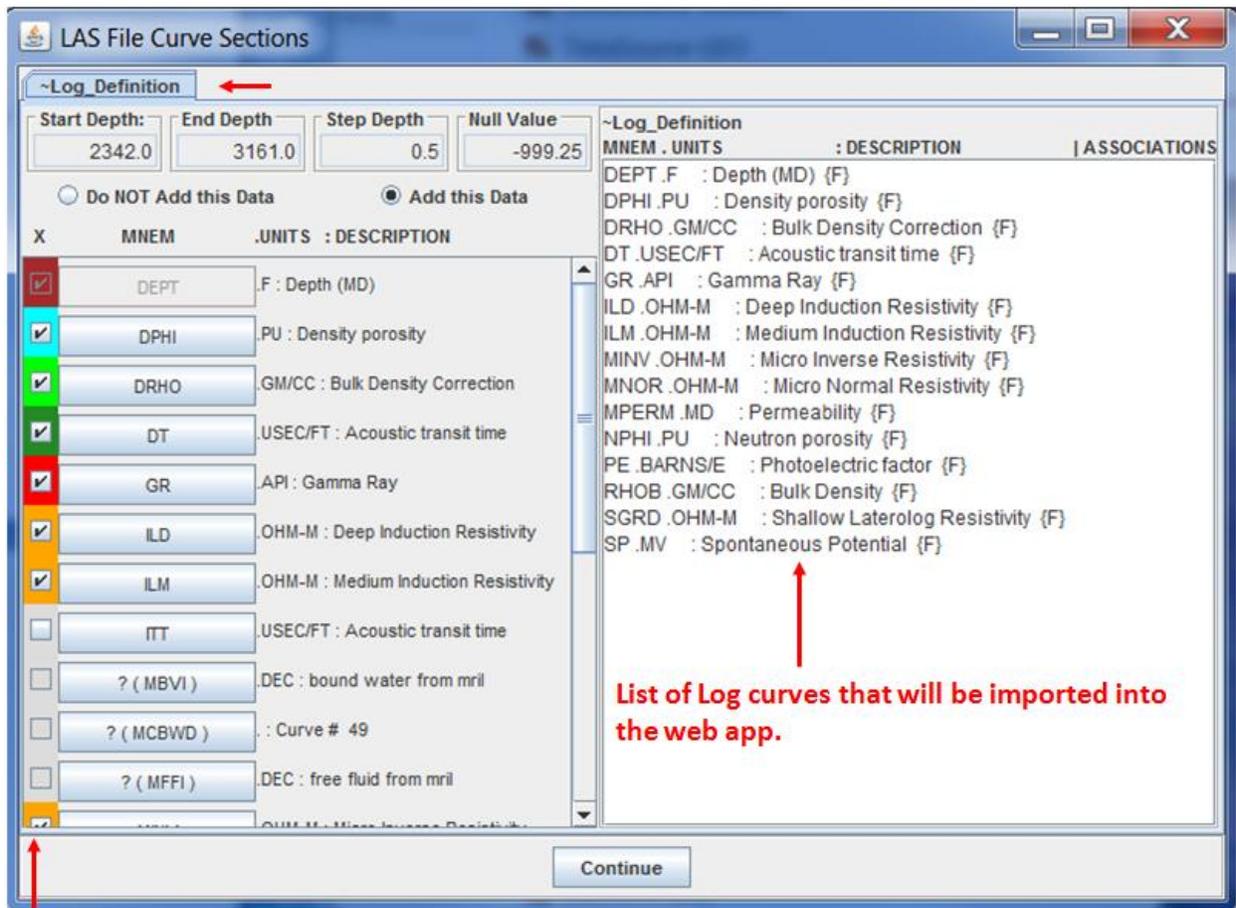
Highlight the Newby 2-28R well and notice that under the LTCI column this well has L=Log Data (LAS 2.0 Files), T=Tops Data, C=Core Data and I=Core Image Data.

Also notice that there are two other wells that have the same TRS location with L=Log Data and T=Tops Data, Lightcap 1-28 and NEWBY 3-28.

Click on the “LAS File Data” button to load the “Select LAS File” dialog.

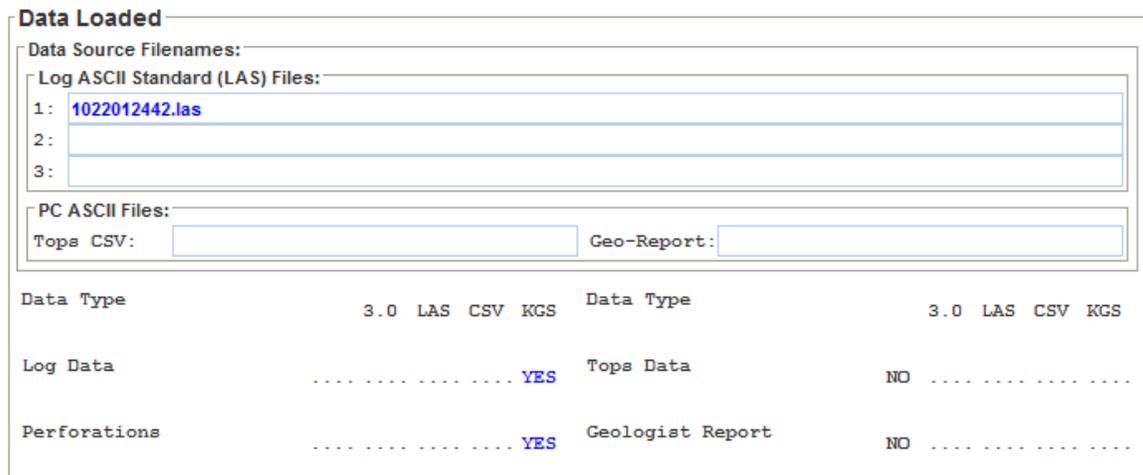


Highlight the first LAS File, notice that with this well the KGS Database has defined the log curve types that are part of the LAS version 2.0 files, i.e. it has Resistivity Logs (OHM-M), Neutron Porosity (Neutron), Bulk Density (Density), Acoustic Transit Time (Sonic), Gamma Ray (GR), and Photoelectric Factor (PE) Logs. Now click on the “Select” Button to display the “LAS File Curve Sections” dialog, which lists all the data sections in the LAS File. This example only has Log Data so only one panel will be displayed with a “~Log_Definition” tab.



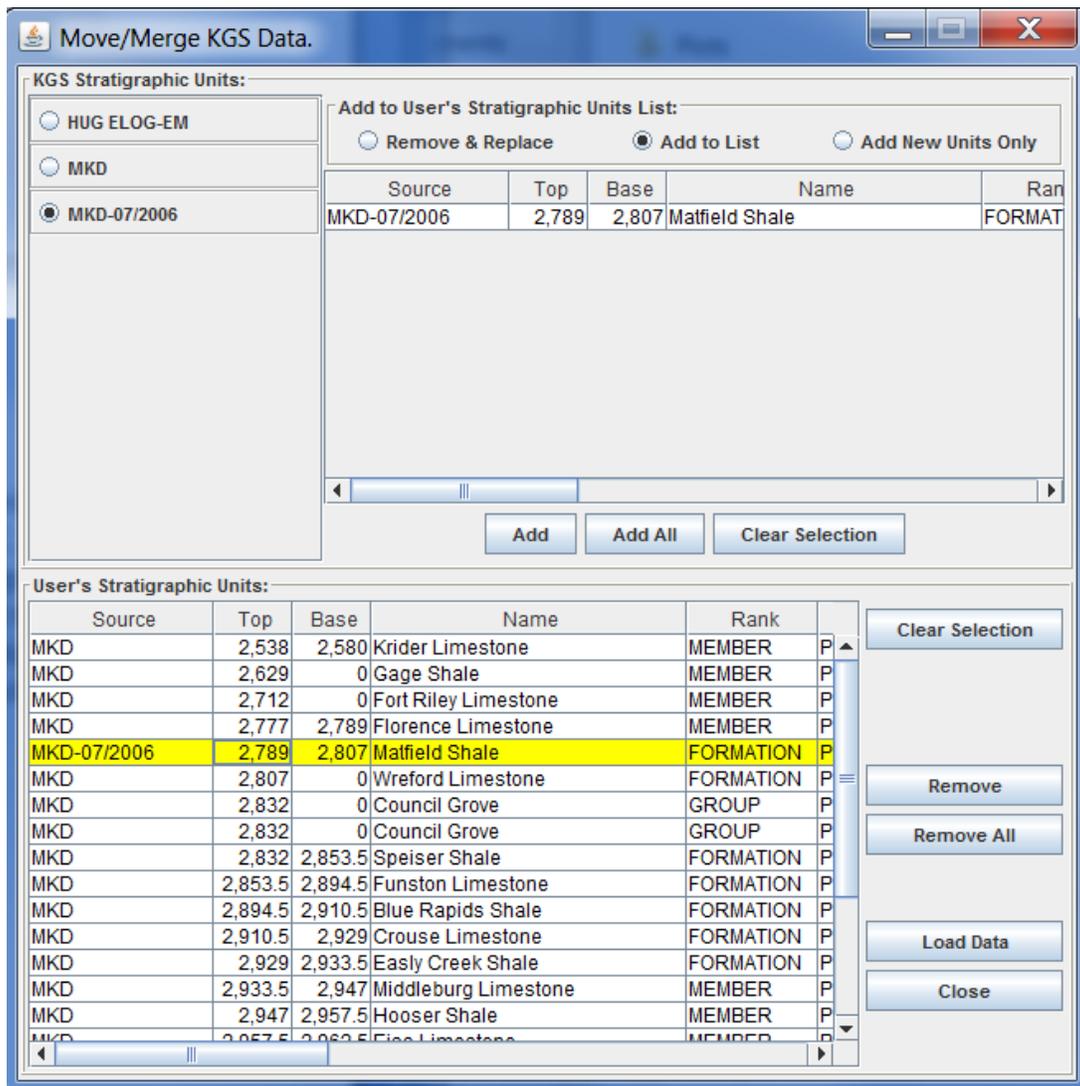
Check boxes color code identifies at a glance, which curve is selected and type of log curve, i.e. cyan – porosity type log curve, orange – resistivity type log curve, etc.

Click on the “Continue” button to read and parse the LAS file into the cross section web app. The user will notice that on the “Load Data” dialog the LAS file name “1022012442.las” is entered into the “Log ASCII Standard (LAS) Files” panel. And the Log Data and Perforations data Type are marked with a “YES” under the KGS Column in the Data Type Panel.



The perforations data will automatically load if the data is present in the Perforations Database Table for the selected well. The well header summary data is also automatically downloaded to the “Load Data” panel also.

Click on the “Top Picks” button to load the “Move/Merge KGS Data” dialog, which will display in the “KGS Stratigraphic Units” panel a list of Tops Sources, i.e., “HUG ELOG-EM”, “MKD” and “MKD-07/2006”. Load the both MKD Top sources by clicking on the “MKD” tops source and then in the “Add to User’s Stratigraphic Units List” radio buttons, select the “Add to List” radio button. Click on the “Add All” button to copy the list of tops to the “User’s Stratigraphic Units” table. Then Click on the “MKD-07/2006” tops source radio button and then click on the “Add All” button to copy the top to the “User’s Stratigraphic Units” table.



The MKD-07/2006 has only one top pick, but the MKD in the source name implies that it is add on to the MKD top picks.

Click on the “Load Data” button to import the tops data in the “User’s Stratigraphic Units” table to the “Load Data” panel. Notice that in the “Data Type” Panel the Tops Data has a “YES” in the KGS Column.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: 1022012442.las

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data			YES	Tops Data	.....			YES
Perforations			YES	Geologist Report	NO	.....	

Now select the “Close” button in the “Search for Data on KGS Server” dialog since all the data that can be imported for the Newby 2-28R has been imported. Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Newby 2-28R well data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
LT	Newby 2-28R	15-189-22225	GAS	37.317	-101.355	3,112	31S	37W	28	141217084100	Up

Down

Plot: Map Cross Section

Modify Well Header Information Data: Modify

Well List Actions: New Well Remove Remove All

Notice that in the LTG column identifies the data type that was imported from the KGS database and file server, i.e. L=Log Data and T=Tops Data. Notice that the “Cross Section” Plot button, Modify Well Header Information Data “Modify” button and the “Remove”, “Remove All”, “Up” and “Down” buttons are now enabled, because there is a well in the “Cross Section Well/Location List” table. The “Map” button will not enable until there is at least two wells in the table.

➤ **Lightcap 1-28 (15-189-22306)**

Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “Well Data” icon button to open the “Search for Data on KGS Server” dialog.

To find all wells with the same Township, Range Section of interest, e.g. Township 31 South (S), Range 37 West (W) and Section 28.

Select the “Search” Button to retrieve all wells in the KGS database that match this search criteria.

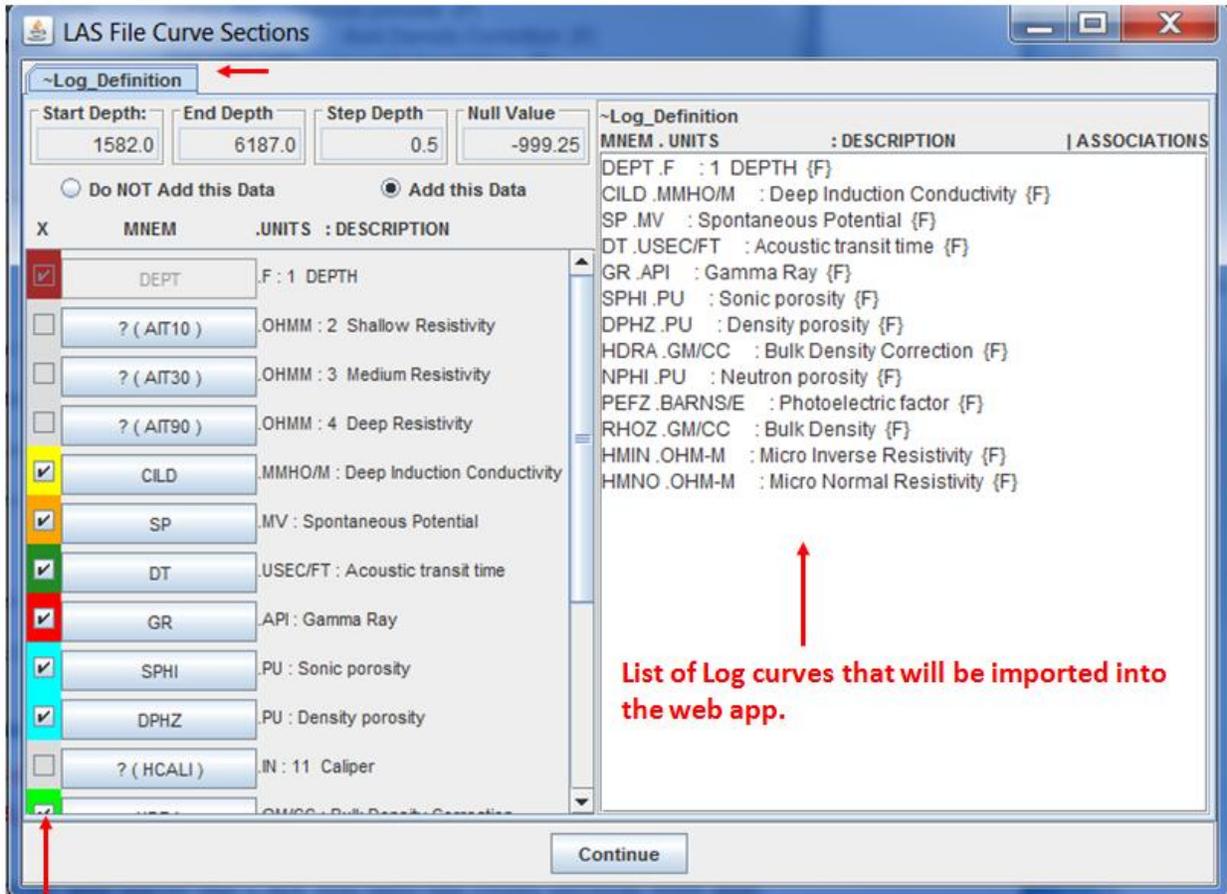
Highlight the Lightcap 1-28 well and notice that under the LTCI column this well has L=Log Data (LAS 2.0 Files) and T=Tops Data.

LTCI	API-Number	Well Name	Operator
T	15-189-10107	NEWBY 1	Hugoton Production Co.
LTCI	15-189-22225	Newby 2-28R	Pioneer Natural Resource
T	15-189-20032	NEWBY 2-28	MESA PET
	15-189-90127		
LT	15-189-22306	Lightcap 1-28	Zinke & Trumbo Inc.
LT	15-189-21240	NEWBY 3-28	MESA OPERATING
	15-189-22816	RECT 6	Pioneer Natural Resource
	15-189-22815	RECT 4	Pioneer Natural Resource

Click on the “LAS File Data” button to load the “Select LAS File” dialog.

Start	End	OHM-M	Neutron	Density	Sonic	GR	PE	THOR	URAN	POTA
1,582	6,187	Yes	Yes	Yes	Yes	Yes	No	No	No	No

Highlight the LAS File, notice that with this well the KGS Database has defined the log curve types that are part of the LAS version 2.0 files, i.e. it has Resistivity Logs (OHM-M), Neutron Porosity (Neutron), Bulk Density (Density), Acoustic Transit Time (Sonic), Gamma Ray (GR), and Photoelectric Factor (PE) Logs. Now click on the “Select” Button to display the “LAS File Curve Sections” dialog, which lists all the data sections in the LAS File. This example only has Log Data so only one panel will be displayed with a “~Log_Definition” tab.



Check boxes color code identifies at a glance, which curve is selected and type of log curve, i.e. cyan – porosity type log curve, orange – resistivity type log curve, etc.

Click on the “Continue” button to read and parse the LAS file into the cross section web app. The user will notice that on the “Load Data” dialog the LAS file name “1027928289.las” is entered into the “Log ASCII Standard (LAS) Files” panel. And the Log Data Type is marked with a “YES” under the KGS Column in the Data Type Panel.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: 1027928289.las

2:

3:

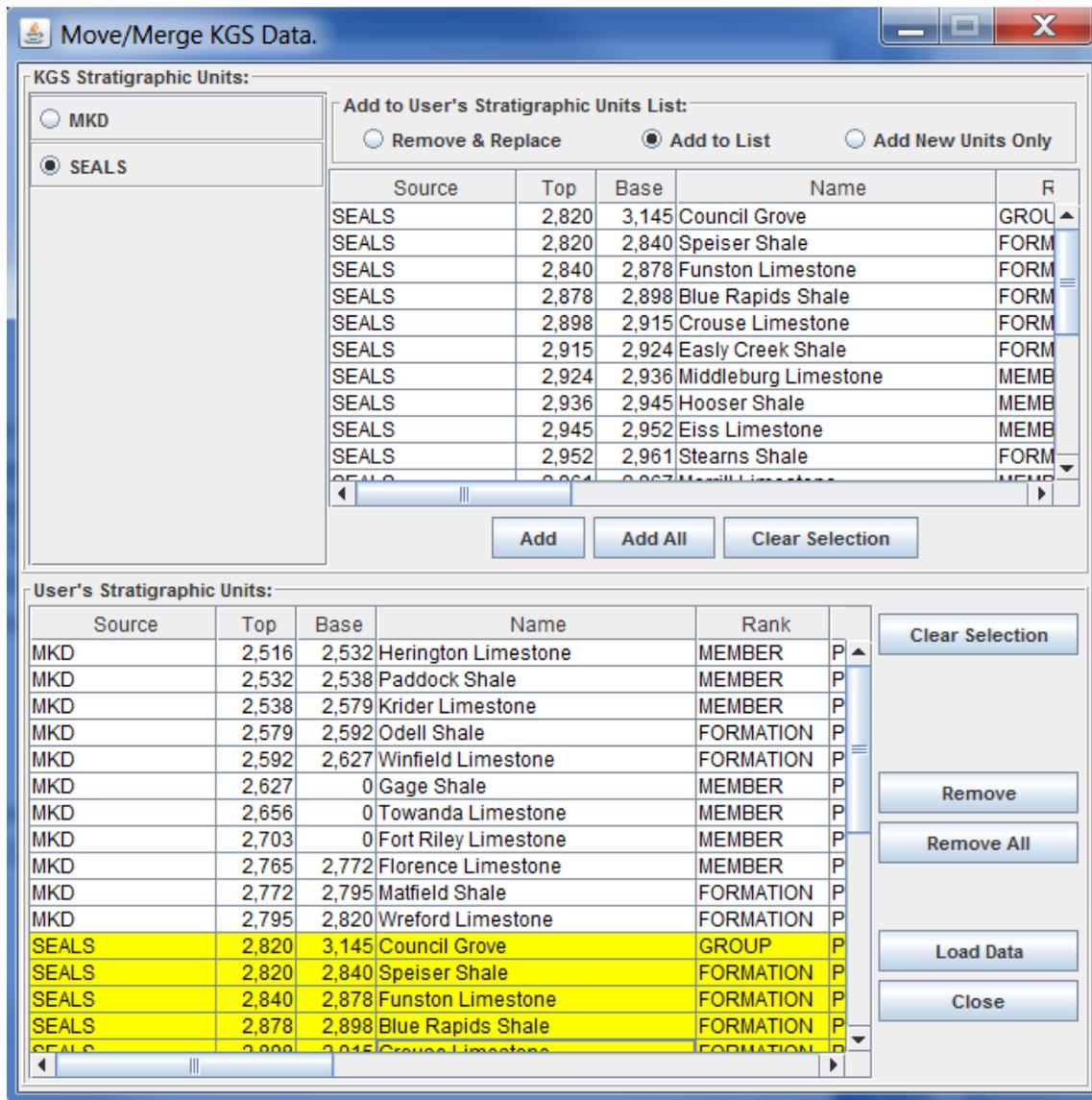
PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data	.....	.....	.....	YES	Tops Data	NO	.....	.....	.....
Perforations	NO	.....	.....	.....	Geologist Report	NO	.....	.....	.....

The perforations data will automatically load if the data is present in the Perforations Database Table for the selected well. The well header summary data is also automatically downloaded to the “Load Data” panel also.

Click on the “Top Picks” button to load the “Move/Merge KGS Data” dialog, which will display in the “KGS Stratigraphic Units” panel a list of Tops Sources, i.e., “MKD” and “SEALS”. Load the both Top sources by clicking on the “MKD” tops source and then in the “Add to User’s Stratigraphic Units List” radio buttons, select the “Add to List” radio button. Click on the “Add All” button to copy the list of tops to the “User’s Stratigraphic Units” table. Then Click on the “SEALS” tops source radio button and then click on the “Add All” button to copy all the tops to the “User’s Stratigraphic Units” table.



The “SEALS” source has tops that are picked below the “MKD” Source tops picks and should be included to import all the possible top picks to the Lightcap 1-28 Well.

Click on the “Load Data” button to import the tops data in the “User’s Stratigraphic Units” table to the “Load Data” panel. Notice that in the “Data Type” Panel the Tops Data has a “YES” in the KGS Column.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: 1027928289.las

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data	.....			YES	Tops Data	.....			YES
Perforations	NO	.....			Geologist Report	NO	.....	

Now select the “Close” button in the “Search for Data on KGS Server” dialog since all the data that can be imported for the Lightcap 1-28 has been imported. Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Lightcap 1-28 well data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
LT	Newby 2-28R	15-189-22225	GAS	37.317	-101.355	3,112	31S	37W	28	141217084100	Up
LT	Lightcap 1-28	15-189-22306	D&A	37.328	-101.346	3,102	31S	37W	28	141217092708	Down

Plot: Map Cross Section

Modify Well Header Information Data: Modify

Well List Actions: New Well Remove Remove All

Notice that in the LTG column identifies the data type that was imported from the KGS database and file server, i.e. L=Log Data and T=Tops Data. At this point notice that the “Map” button is now enabled, which allows the user to display a map of the two wells plotted to give a sense of the location.

➤ **Newby 3-28 (15-189-21240)**

Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “Well Data” icon button to open the “Search for Data on KGS Server” dialog.

To find all wells with the same Township, Range Section of interest, e.g. Township 31 South (S), Range 37 West (W) and Section 28.

Select the “Search” Button to retrieve all wells in the KGS database that match this search criteria.

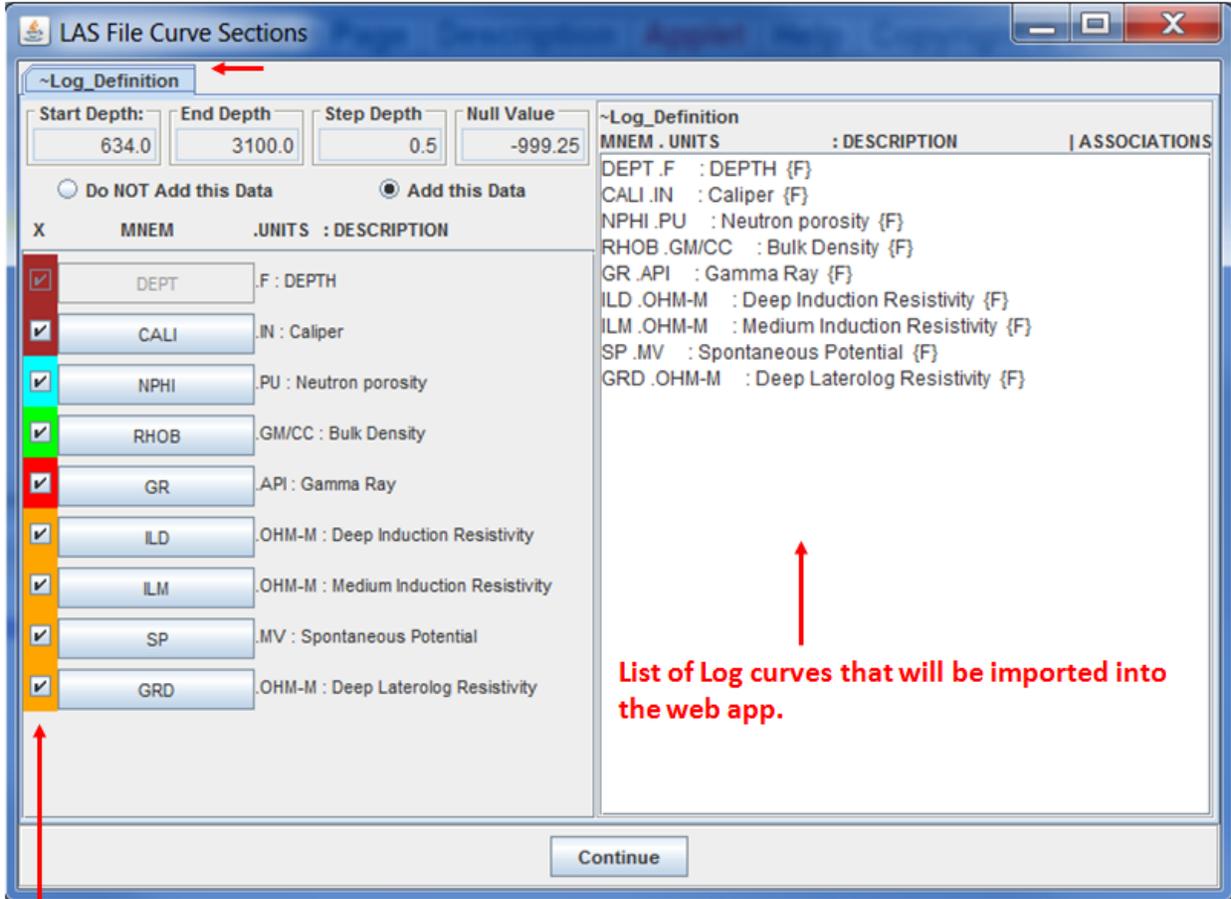
Highlight the NEWBY 3-28 well and notice that under the LTCI column this well has L=Log Data (LAS 2.0 Files) and T=Tops Data.

LTCI	API-Number	Well Name	Operator
T	15-189-10107	NEWBY 1	Hugoton Production Co.
LTCI	15-189-22225	Newby 2-28R	Pioneer Natural Resource
T	15-189-20032	NEWBY 2-28	MESA PET
	15-189-90127		
LT	15-189-22306	Lightcap 1-28	Zinke & Trumbo Inc.
LT	15-189-21240	NEWBY 3-28	MESA OPERATING
	15-189-22816	RECT 6	Pioneer Natural Resource
	15-189-22815	RECT 4	Pioneer Natural Resource

Click on the “LAS File Data” button to load the “Select LAS File” dialog.

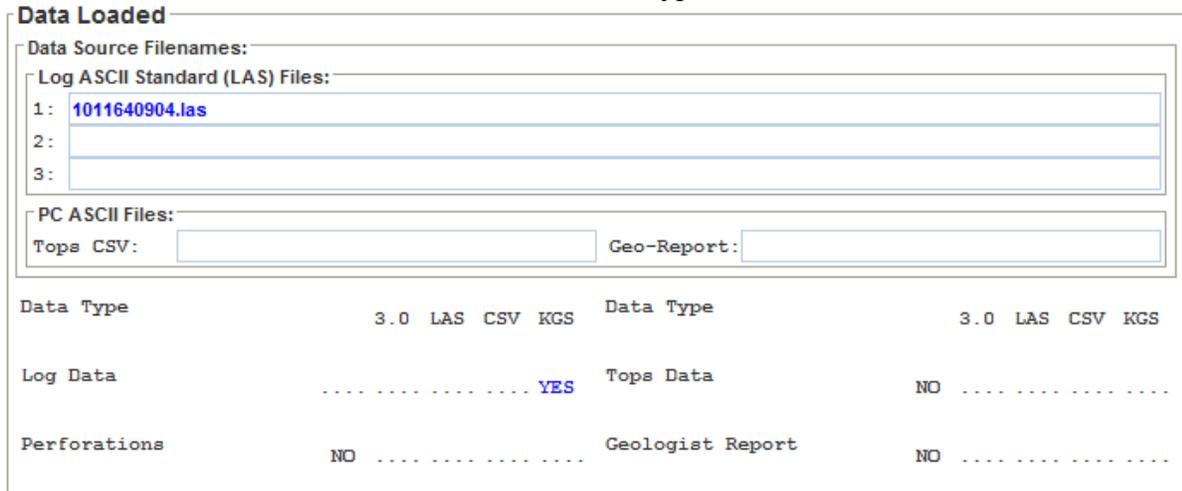
Start	End	OHM-M	Neutron	Density	Sonic	GR	PE	THOR	URAN	POTA
634	3,100	Yes	Yes	Yes	No	Yes	No	No	No	No

Highlight the LAS File, notice that with this well the KGS Database has defined the log curve types that are part of the LAS version 2.0 files, i.e. it has Resistivity Logs (OHM-M), Neutron Porosity (Neutron), Bulk Density (Density), Acoustic Transit Time (Sonic), and Gamma Ray (GR) Logs. Now click on the “Select” Button to display the “LAS File Curve Sections” dialog, which lists all the data sections in the LAS File. This example only has Log Data so only one panel will be displayed with a “~Log_Definition” tab.



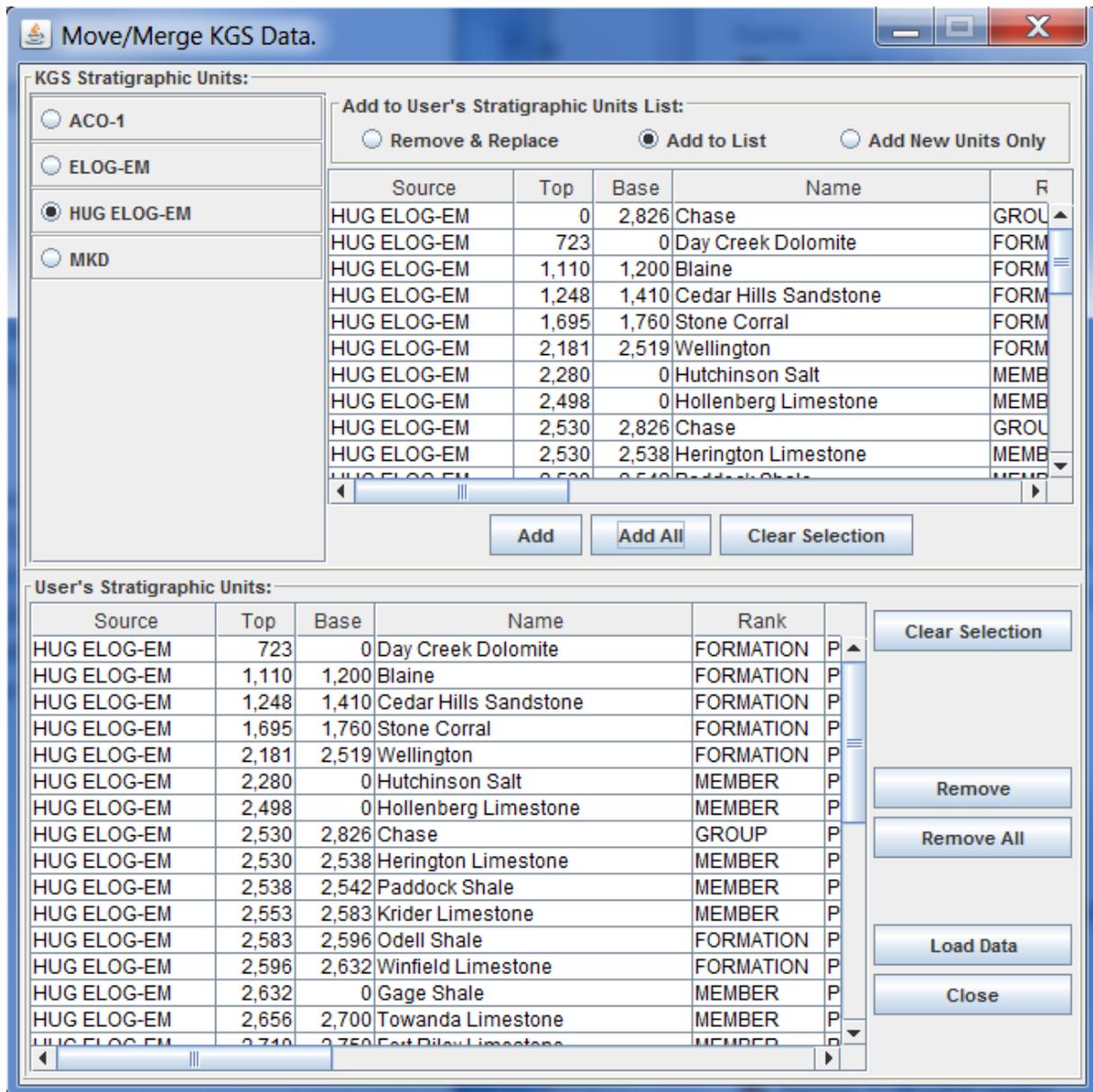
Check boxes color code identifies at a glance, which curve is selected and type of log curve, i.e. cyan – porosity type log curve, orange – resistivity type log curve, etc.

Click on the “Continue” button to read and parse the LAS file into the cross section web app. The user will notice that on the “Load Data” dialog the LAS file name “1011640904.las” is entered into the “Log ASCII Standard (LAS) Files” panel. And the Log Data Type is marked with a “YES” under the KGS Column in the Data Type Panel.



The perforations data will automatically load if the data is present in the Perforations Database Table for the selected well. The well header summary data is also automatically downloaded to the “Load Data” panel also.

Click on the “Top Picks” button to load the “Move/Merge KGS Data” dialog, which will display in the “KGS Stratigraphic Units” panel a list of Tops Sources, i.e., “ACO-1”, “ELOG-EM”, “HUG ELOG-EM” and “MKD”. Clicking on each source name radio button will show that only the “HUG ELOG-EM” tops source will have the necessary tops. Load by clicking on the “HUG ELOG-EM” tops source and then in the “Add to User’s Stratigraphic Units List” radio buttons, select the “Add to List” radio button. Click on the “Add All” button to copy the list of tops to the “User’s Stratigraphic Units” table.



Click on the “Load Data” button to import the tops data in the “User’s Stratigraphic Units” table to the “Load Data” panel. Notice that in the “Data Type” Panel the Tops Data has a “YES” in the KGS Column.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: 1011640904.las

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data	.....			YES	Tops Data	.....			YES
Perforations	NO	.....			Geologist Report	NO	.....	

Now select the “Close” button in the “Search for Data on KGS Server” dialog since all the data that can be imported for the Newby 3-28 has been imported. Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Newby 3-28 well data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
LT	Newby 2-28R	15-189-22225	GAS	37.317	-101.355	3,112 31S	37W	28		141217084100	Up
LT	Lightcap 1-28	15-189-22306	D&A	37.328	-101.346	3,102 31S	37W	28		141217092708	
LT	NEWBY 3-28	15-189-21240	GAS	37.326	-101.343	3,102 31S	37W	28		141217094829	Down

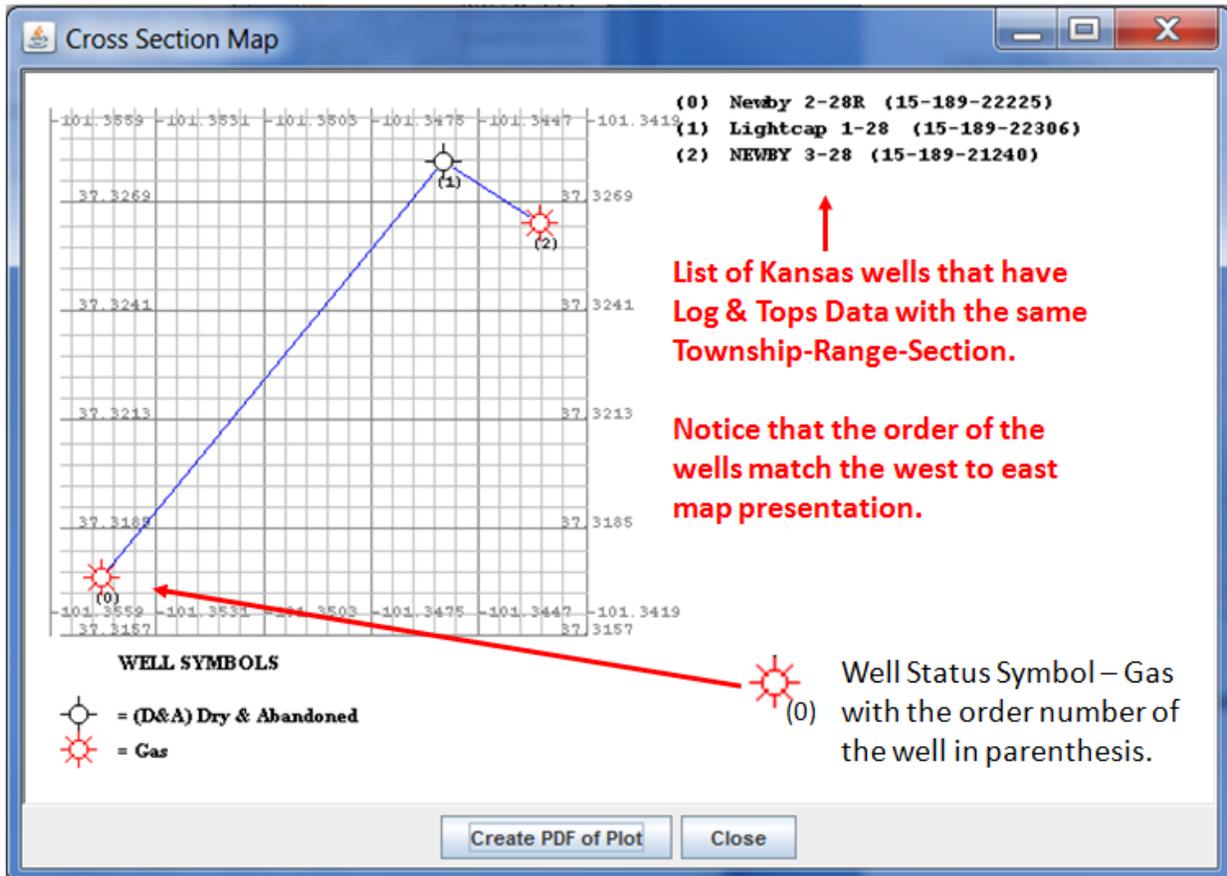
Plot:

Modify Well Header Information Data:

Well List Actions:

Now click on the “Map” button to display the map plot to view the selected wells. The well locations are plotted on latitude versus longitude map grid to help the user visualize the location of the well in relative 2-dimensional space and to also verify that the order of the wells follow a logical presentation. If the wells were out of order with respect to each other the user will see the blue cross section lines crossing. The user can correct any errors in the well order by clicking on the “Up” or “Down” buttons on the Cross Section Panel. As the user will see that the order of the wells are correct and no further action needs to be taken. The user can click on the “Create PDF of Plot” button to create a Portable Network Graphic (PNG) image of the cross section map. The user will see a search PC dialog that will allow the user to search their PC directory structure to save the PNG image. Once the image is saved a HTML web page will display with a “Create a PDF Document of this PNG Image” URL Link at the top of the page above the cross section

map image. Click on the link to launch the Create PDF (Portable Document Format) from Image Applet that will allow the user to convert the saved PNG image to a PDF document.



The user now can create a cross section plot of the wells that have been selected. Click on the “Cross Section” Plot button to display the cross section of the three wells. The image below illustrates the cross section of the three wells that have been imported into the Cross Section Web App. The Cross Section Plot Control plots all three wells in a depth profile. Since all three wells have litho-density log data, i.e. Gamma Ray (GR), Neutron Porosity (NPH), and Bulk Density (RHOB) and in the first two wells the Photoelectric Factor (PE) log curves. The plot below represents the cross section of 3 Kansas wells with the same Township Range and Sections, i.e. Township 31 South (S) – Range 37 West (W) and Section 28. The plot is plotted by elevation depth from 800’ down to 0’ at a 50 feet / inch scale.

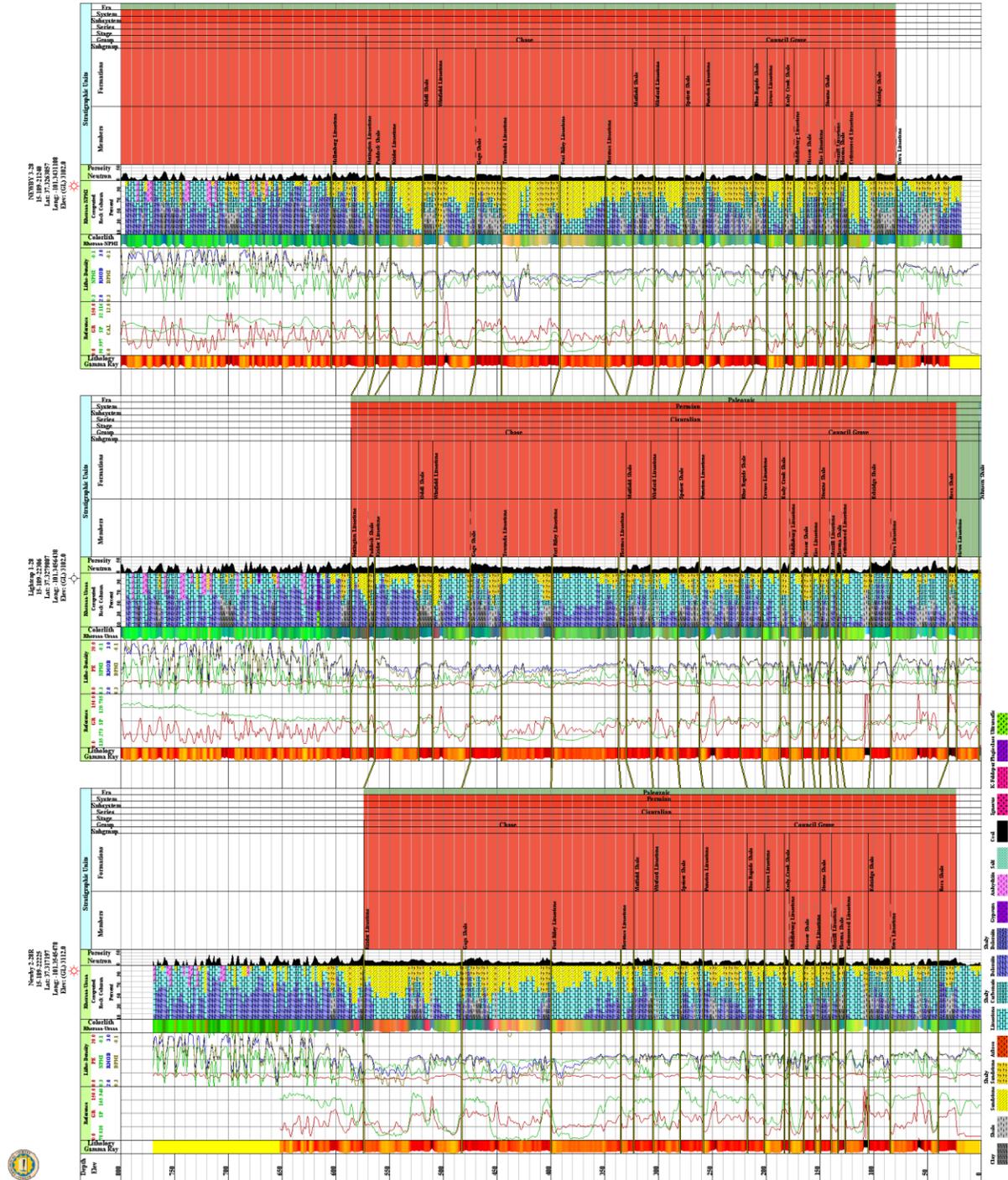


Figure: Cross Section of three Kansas wells in the same Township-Range-Section Location, i.e. Township 31S-Range 37W-Section 28 plotted by Elevation from 800 to 0 feet at 50 feet/inch scale.

Import Measured Sections from the Kansas Geological Survey's Database and File Server

This example will focus on wells that are part of the same Township and Range, i.e. Township 15 South and Range 4 East. The three wells for this example are as follows,

1. KGS Measured Section 3212
2. KGS Measured Section 3200

The user must load the measured section data for each section separately by clicking the “**New Well**” button for each measured section loading the geologist description data with the “Load Data” dialog. Clicking the “Add Well Data” button at the bottom of the “Load Data” dialog will transfer the measured section data to the Cross Section Panel. The user can search for measured section data in the KGS Database using the “Search for KGS Measured Sections” by Directions, by Township-Range Section or by Counties. To create this cross section, using the Counties radio button search in Dickinson County for KGS Measured Section 3212 was used to find other wells that appear within the same TRS location. The details of loading well data from the KGS Database can be found by going to the [KGS \(Database & Server\) - Importing Measured Sections Section \(page 23\)](#) of this document for loading the Measured Section 3212 “Center of eastern line” directions example.

➤ KGS Measured Section 3212 “Center of eastern line”

Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “Measured Sections” icon button to open the “Search for KGS Measured Sections” dialog.

To find all measured sections with the same Township, Range Section of interest, e.g. Township 15 South (S), Range 4 East (E) in Dickinson County.

Click the “Dickinson” Button to retrieve all measured sections in the KGS database that match this search criteria.

Highlight id 3212 “Center of eastern line” description.

Also notice that there is at least one more measured section with the same Township and Range as 3212, 3200, but it does not have any directions.

id	Directions	Town	Range	Sec	Latitude	Longiti
3014	W center NW 1/4 of section	11S	2E	12	39.112	-97
3027	SW corner of section	11S	3E	6	39.126	-97
3037	SE corner of section	12S	4E	34	38.965	-96
3066	2 1/2 mi. N of Chapman, center of eastern...	12S	4E	18	39.009	-97
3082		13S	3E	26	38.893	-97
3093	W side of the bridge of Turkey Creek, NE ...	14S	2E	3	38.864	-97
3115	3 1/2 mi. SW of Abilene, S side of Smoky ...	14S	2E	6	38.864	-97
3157	1 3/4 mi. E of Woodbine	14S	4E	36	38.79	-96
3198	Field quarry on W side of county road 2 mi...	14S	4E	20	38.82	-97
3200		15S	4E	29	38.718	-97
3212	Center of eastern line	15S	4E	24	38.732	-97
3232	Composite sample along eroded bank of ...	16S	1E	25	38.631	-97
3240	On west side of draw	16S	1E	25	38.631	-97

Click on the “Load Data” button to import the KGS Measured Section 3212 from the KGS Measured Section Database Table to the “Load Data” dialog. Notice that the Data Loaded Geologist Report Data Type is marked with a “YES” under the KGS Column in the Data Type Panel.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1:

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data	NO	.....	.....	.....	Tops Data	NO	.....	.....	.....
Perforations	NO	.....	.....	.....	Geologist Report	.....	.....	.....	YES

Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the 3212 measured section data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
TG	KGS Measured Section (3212)		LOC	38.732	-96.936	1,343	15S	4E	24	141217115040	Up

Down

Plot: Map Cross Section

Modify Well Header Information Data: Modify

Well List Actions: New Well Remove Remove All

Notice that in the LTG column identifies the data type that was imported from the KGS database and file server, i.e. T=Tops Data and G=Geologist Report. Notice that the “Cross Section” Plot button, Modify Well Header Information Data “Modify” button and the “Remove”, “Remove All”, “Up” and “Down” buttons are now enabled, because there is measured section in the “Cross Section Well/Location List” table. The “Map” button will not enable until there is at least two measured sections in the table. The measured section information in the “Cross Section Well/Location List” table seems to be complete, but the “Status” column identifies the measured section with a well location symbol, a default symbol when there is no status defined. The Cross Section Web App has an outcrop symbol that can be used to describe this as something other than a default Location Symbol. Click on the “Modify” button in the Cross Section Panel to display the “KGS Measured Section (3212)” dialog, which displays the header information

downloaded from the KGS Measured Section Database Table. Notice that the “Status” button has “LOC” displayed.

Click on the “LOC” Status button to change the status of the measured section.

Mnemonic	Description
LOC	Location
INTENT	Intent
D&A	Dry & Abandoned
SUS	Suspended
P&A	Plugged & Abandoned
EOR	Enhanced Oil Recovery
EOR-P&A	Enhanced Oil Recovery - Plugged & Abandoned
OIL	Oil
D&A-O	Dry & Abandoned - Oil Show
SUS-O	Suspended - Oil
OIL-P&A	Oil - Plugged & Abandoned
GAS	Gas
D&A-G	Dry & Abandoned - Gas Show
SUS-G	Suspended - Gas
GAS-P&A	Gas - Plugged & Abandoned
O&G	Oil & Gas
D&A-OG	Dry & Abandoned - Oil & Gas Show
SUS-OG	Suspended - Oil & Gas
O&G-P&A	Oil & Gas - Plugged & Abandoned
OTHER	Other
OTHER-P&A	Other - Plugged & Abandoned
INJ	Injection
INJ-P&A	Injection - Plugged & Abandoned
SWD	Salt Water Disposal
SWD-P&A	Salt Water Disposal - Plugged & Abandoned
CBM	Coal Bed Methane
CBM-P&A	Coal Bed Methane - Plugged & Abandoned
OUTCROP	Measured Section

Highlight the “OUTCROP” Measured Section Status. Click on the “Select” button to transfer the OUTCROP Mnemonic to the “Status” button label.

Click on the “Ok” button to move update the 3212 measured section in the Cross Section Panel.

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY
TG	KGS Measured Section (3212)		OUTCROP	38.732	-96.936	1.343	15S	4E	24	141217115040

Notice that the “Status” column has OUTCROP, which will plot a rectangle box at the top of the measured section in the cross section plot.

➤ **KGS Measured Section 3200**

Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “Measured Sections” icon button to open the “Search for KGS Measured Sections” dialog.

To find all measured sections with the same Township, Range Section of interest, e.g. Township 15 South (S), Range 4 East (E) in Dickinson County.

Click the “Dickinson” Button to retrieve all measured sections in the KGS database that match this search criteria.

Highlight id 3200 with no description.

id	Directions	Town	Range	Sec	Latitude	Longit
3014	W center NW 1/4 of section	11S	2E	12	39.112	-97
3027	SW corner of section	11S	3E	6	39.126	-97
3037	SE corner of section	12S	4E	34	38.965	-96
3066	2 1/2 mi. N of Chapman, center of eastern...	12S	4E	18	39.009	-97
3082		13S	3E	26	38.893	-97
3093	W side of the bridge of Turkey Creek, NE ...	14S	2E	3	38.864	-97
3115	3 1/2 mi. SW of Abilene, S side of Smoky ...	14S	2E	6	38.864	-97
3157	1 3/4 mi. E of Woodbine	14S	4E	36	38.79	-96
3198	Field quarry on W side of county road 2 mi...	14S	4E	20	38.82	-97
3200		15S	4E	29	38.718	-97
3212	Center of eastern line	15S	4E	24	38.732	-96
3232	Composite sample along eroded bank of ...	16S	1E	25	38.631	-97
3240	On west side of draw	16S	1E	25	38.631	-97

Click on the “Load Data” button to import the KGS Measured Section 3200 from the KGS Measured Section Database Table to the “Load Data” dialog. Notice that the Data Loaded Geologist Report Data Type is marked with a “YES” under the KGS Column in the Data Type Panel.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1:

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data	NO	.....	.....	.....	Tops Data	NO	.....	.....	.....
Perforations	NO	.....	.....	.....	Geologist Report	.....	.....	.....	YES

Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the 3200 measured section data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
TG	KGS Measured Section (3212)		OUTCROP	38.732	-96.936	1,343	15S	4E	24	141217115040	Up
TG	KGS Measured Section (3200)		LOC	38.718	-97.01	1,336	15S	4E	29	141217241722	Down

Plot: Map, Cross Section

Modify Well Header Information Data: Modify

Well List Actions: New Well, Remove, Remove All

Notice that in the LTG column identifies the data type that was imported from the KGS database and file server, i.e. T=Tops Data and G=Geologist Report. Notice that the “Cross Section” Plot button, Modify Well Header Information Data “Modify” button and the “Remove”, “Remove All”, “Up” and “Down” buttons are now enabled, because there is measured section in the “Cross Section Well/Location List” table. The “Map” button will not enable until there is at least two measured sections in the table. The measured section information in the “Cross Section Well/Location List” table seems to be complete, but the “Status” column identifies the measured section with a well location symbol, a default symbol when there is no status defined. The Cross Section Web App has an outcrop symbol that can be used to describe this as something other than a default Location Symbol. Click on the “Modify” button in the Cross Section Panel to display the “KGS Measured Section (3200)” dialog, which displays the header information downloaded from the KGS Measured Section Database Table. Notice that the “Status” button has “LOC” displayed.

KGS Measured Section (3200)

Show Initial Header Data Show KGS Well Header Data

Search KGS Database for Well Header Information

Identification:

KGS Primary Key: 3200 PC Primary Key:

API-Number: Status: LOC

Name: KGS Measured Section (3200)

Other Well Information:

Operator Name: Operator Code: 0

Field Name: Field Code: 0

Location Information:

State: Kansas County: DICKINSON

Location: 29-15S-4E

Ok Close

Click on the “LOC” Status button to change the status of the measured section.

Select Status of Data

Mnemonic	Description
LOC	Location
INTENT	Intent
D&A	Dry & Abandoned
SUS	Suspended
P&A	Plugged & Abandoned
EOR	Enhanced Oil Recovery
EOR-P&A	Enhanced Oil Recovery - Plugged & Abandoned
OIL	Oil
D&A-O	Dry & Abandoned - Oil Show
SUS-O	Suspended - Oil
OIL-P&A	Oil - Plugged & Abandoned
GAS	Gas
D&A-G	Dry & Abandoned - Gas Show
SUS-G	Suspended - Gas
GAS-P&A	Gas - Plugged & Abandoned
O&G	Oil & Gas
D&A-OG	Dry & Abandoned - Oil & Gas Show
SUS-OG	Suspended - Oil & Gas
O&G-P&A	Oil & Gas - Plugged & Abandoned
OTHER	Other
OTHER-P&A	Other - Plugged & Abandoned
INJ	Injection
INJ-P&A	Injection - Plugged & Abandoned
SWD	Salt Water Disposal
SWD-P&A	Salt Water Disposal - Plugged & Abandoned
CBM	Coal Bed Methane
CBM-P&A	Coal Bed Methane - Plugged & Abandoned
OUTCROP	Measured Section

Select Cancel

Highlight the “OUTCROP” Measured Section Status. Click on the “Select” button to transfer the OUTCROP Mnemonic to the “Status” button label.

Click on the “Ok” button to move update the 3200 measured section in the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY
TG	KGS Measured Section (3212)		OUTCROP	38.732	-96.936	1.343	15S	4E	24	141217115040
TG	KGS Measured Section (3200)		OUTCROP	38.718	-97.01	1.336	15S	4E	29	141217241722

Order

Up

Down

Plot

Map Cross Section

Modify Well Header Information Data

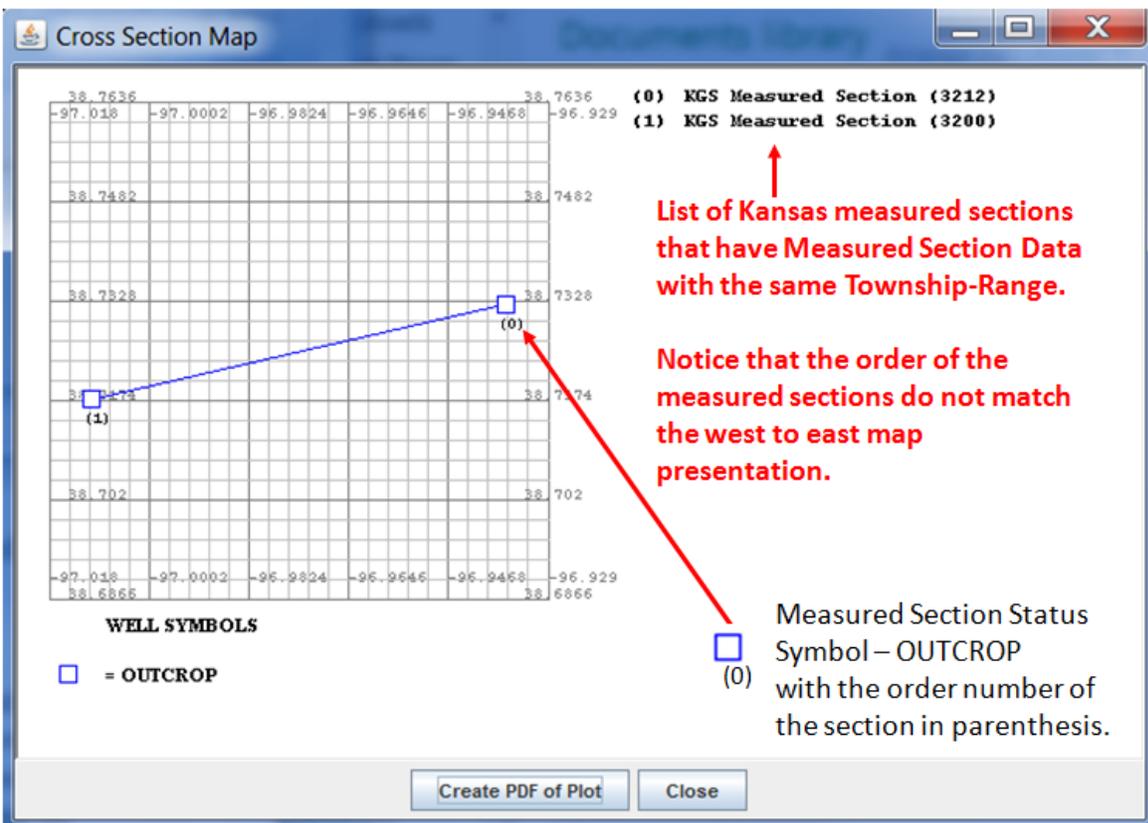
Modify

Well List Actions

New Well Remove Remove All

Notice that the “Status” column has OUTCROP, which will plot a rectangle box at the top of the measured section in the cross section plot.

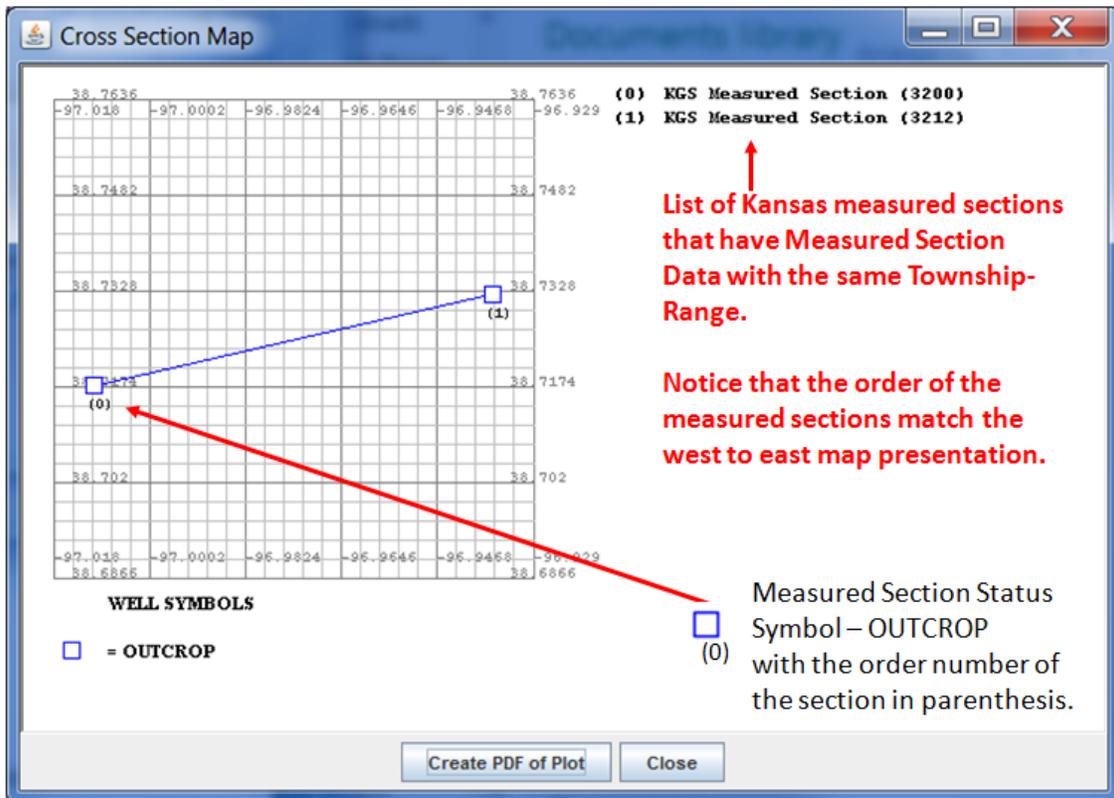
Now click on the “Map” button to display the map plot to view the selected measured sections. The measured sections locations are plotted on latitude versus longitude map grid to help the user visualize the location of the measured sections in relative 2-dimensional space and to also verify that the order of the wells follow a logical presentation. There are only two wells in this presentation so the only thing that would make the measures sections out of order is the west to east presentation, which does not follow from the order for this pair of measured sections.



Highlight the first measured section in the Cross Section panel and select the “Down” button to change the order of the measured sections on the Cross Section Map Plot.

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY
TG	KGS Measured Section (3200)		OUTCROP	38.718	-97.01	1,336	15S	4E	29	141217241722
TG	KGS Measured Section (3212)		OUTCROP	38.732	-96.936	1,343	15S	4E	24	141217115040

Also notice that the map has change the order in the cross section map plot.

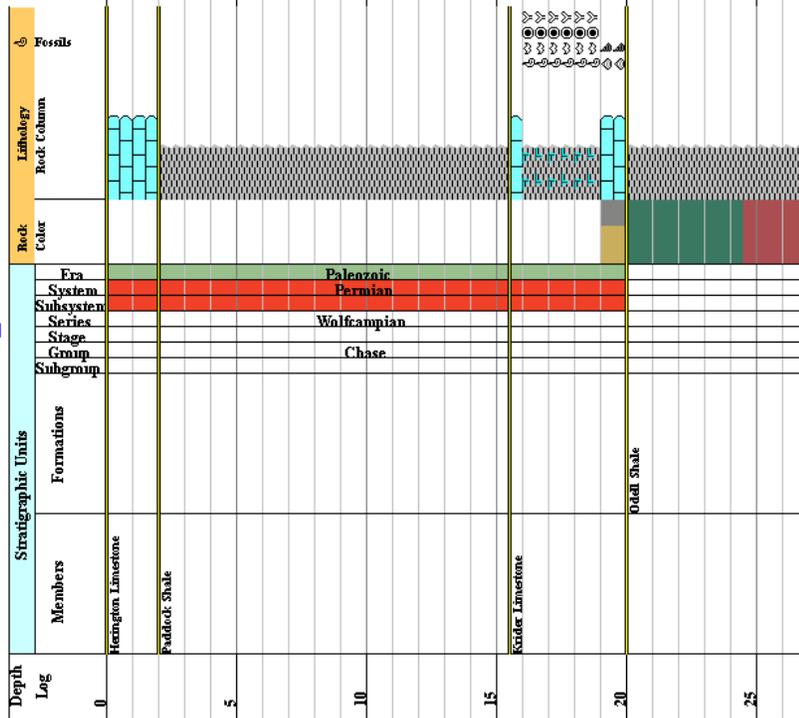


The user can click on the “Create PDF of Plot” button to create a Portable Network Graphic (PNG) image of the cross section map. The user will see a search PC dialog that will allow the user to search their PC directory structure to save the PNG image. Once the image is saved a HTML web page will display with a “Create a PDF Document of this PNG Image” URL Link at the top of the page above the cross section map image. Click on the link to launch the Create PDF (Portable Document Format) from Image Applet that will allow the user to convert the saved PNG image to a PDF document.



KGS Measured Section (3200)

Lat: 38.717838
 Long: -97.010376
 Elev: (GL) 1336.0



KGS Measured Section (3212)

Lat: 38.732338
 Long: -96.936421
 Elev: (GL) 1343.0

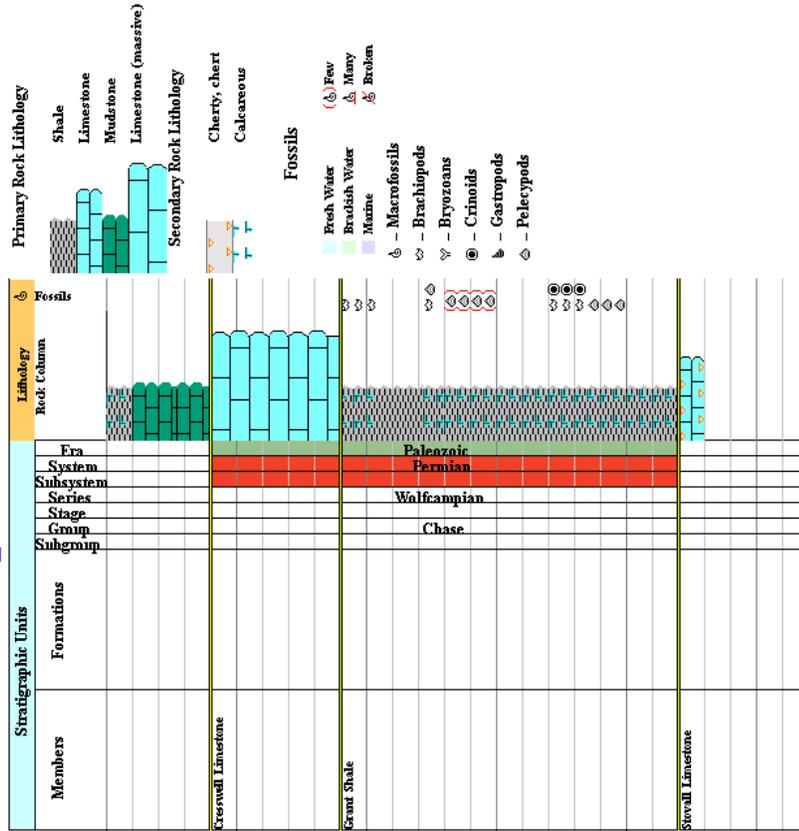


Figure: 2 KGS Measured Sections with the same Township and Range in Dickinson County, Kansas.

Importing Well Data from User's PC

Download either the ASCII Text Files directly or the Zip files extracting the contents into a directory. The problem with the ASCII Text Files being downloaded directly from a web page is that the web page will alter the contents so it does not retain the basic structure and add HTML text to the file. The preferred method if you have Zip or WinZip is to download the zip files to your PC and extract.

Well Data: Wellington KGS 1-32, Sumner County, Kansas

Type	ASCII Text Files
LAS 2.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington-KGS-1-32.las
Tops	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington-KGS-1-32_Tops.csv
Report	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington-KGS-1-32_geo.txt

Type	Zip Files
LAS 2.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington-KGS-1-32.zip
Tops	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington-KGS-1-32_Tops.zip
Report	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington-KGS-1-32_geo.zip

Well Data: Wellington KGS 1-28, Sumner County, Kansas

Type	ASCII Text Files
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington_KGS_1-28_LAS3.las

Type	Zip Files
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Wellington_KGS_1-28_LAS3.zip

Well Data: Meridith 3, Township 31 South, Range 1 West, Section 28, Sumner County, Kansas

Type	ASCII Text Files
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Meridith_3-T31S-R1W-sec28.las

Type	Zip Files
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Meridith_3-T31S-R1W-sec28.zip

This example will focus on well data that are on the user's PC. The three wells for this example are as follows,

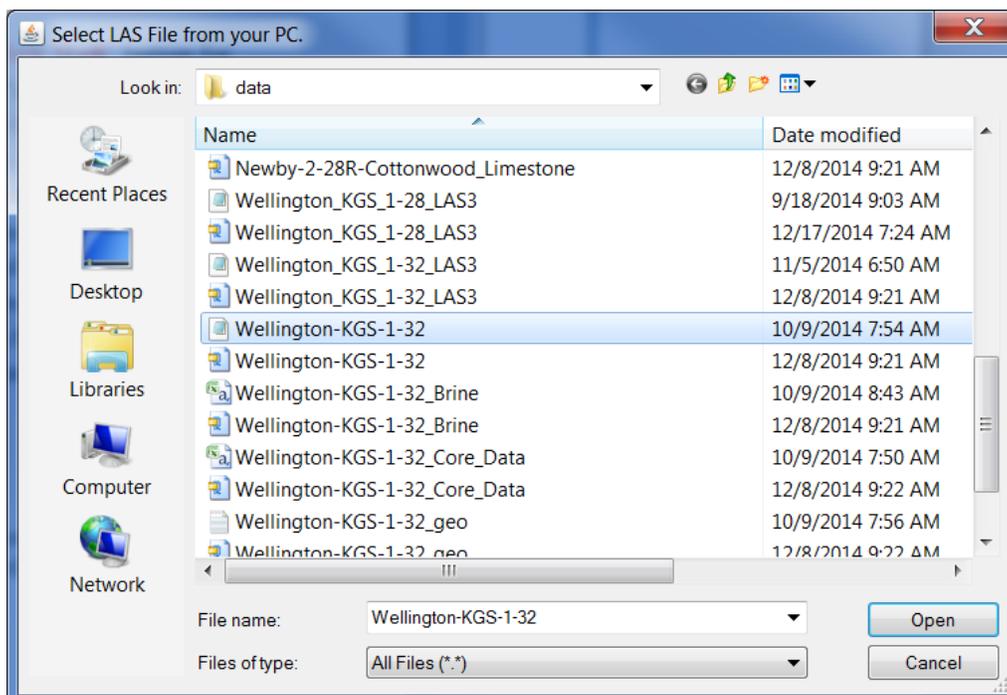
1. Wellington KGS 1-32 (15-191-22591)
2. Wellington KGS 1-28 (15-191-22590)
3. Meridith 3 (15-191-21556)

The user must load the well data for each well separately by clicking the “**New Well**” button for each well loading the well data with the “Load Data” dialog. Clicking the “Add Well Data” button at the bottom of the “Load Data” dialog will transfer the well data to the Cross Section Panel. The details of loading well data from the User’s PC can be found by going to the [Importing PC Data - Download Well Data to PC](#) Section (page 27) of this document for loading the Wellington KGS 1-32 well data example. The Wellington KGS 1-32 has three separate files the Log ASCII Standard (LAS) version 2.0 file, Tops Comma Separated Values (CSV) file and the Geologist Cuttings/Core Description ASCII Delimited file. The other two wells are Log ASCII Standard (LAS) version 3.0 Files with the same data types loaded in the individual files, i.e. the LAS 3.0 file will hold not only the log data, but also the tops, measured core data, geologist cuttings/core description, etc.

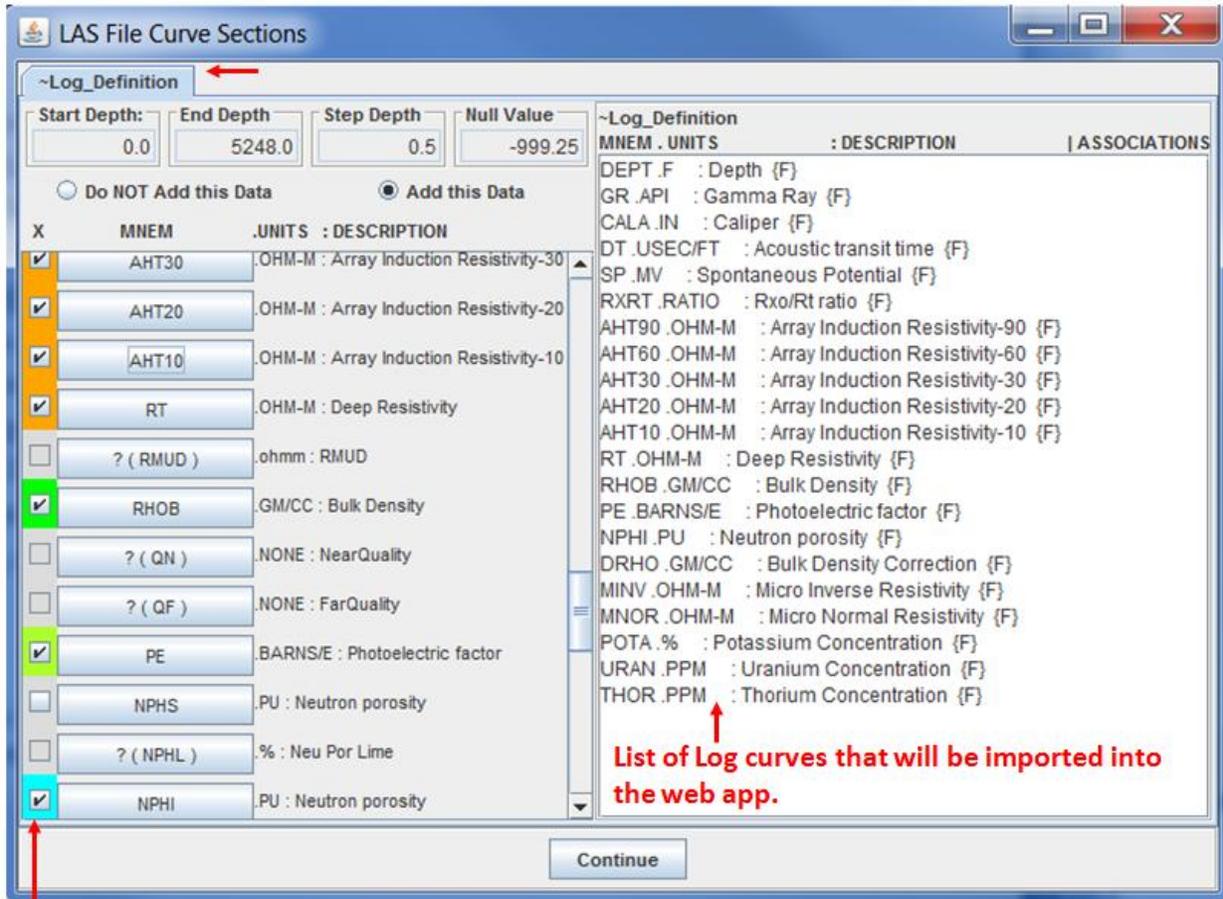
➤ **Wellington KGS 1-32**

○ **Import Log ASCII Standard (LAS) version 2.0 File**

Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “LAS version 2.0 & 3.0” icon button to open the “Select LAS File from your PC” dialog.

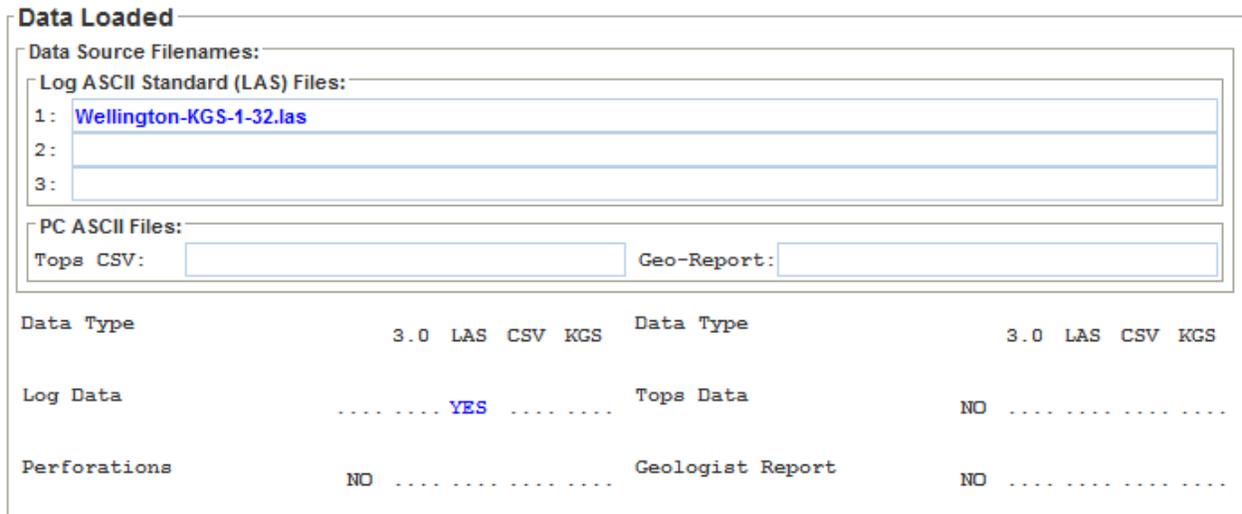


Highlight “Wellington-KGS-1-32” LAS File and click on the “Open” button to open the “LAS File Curve Sections” dialog, which lists all the data sections in the LAS File. This example only has Log Data so only one panel will be displayed with a “~Log_Definition” tab.



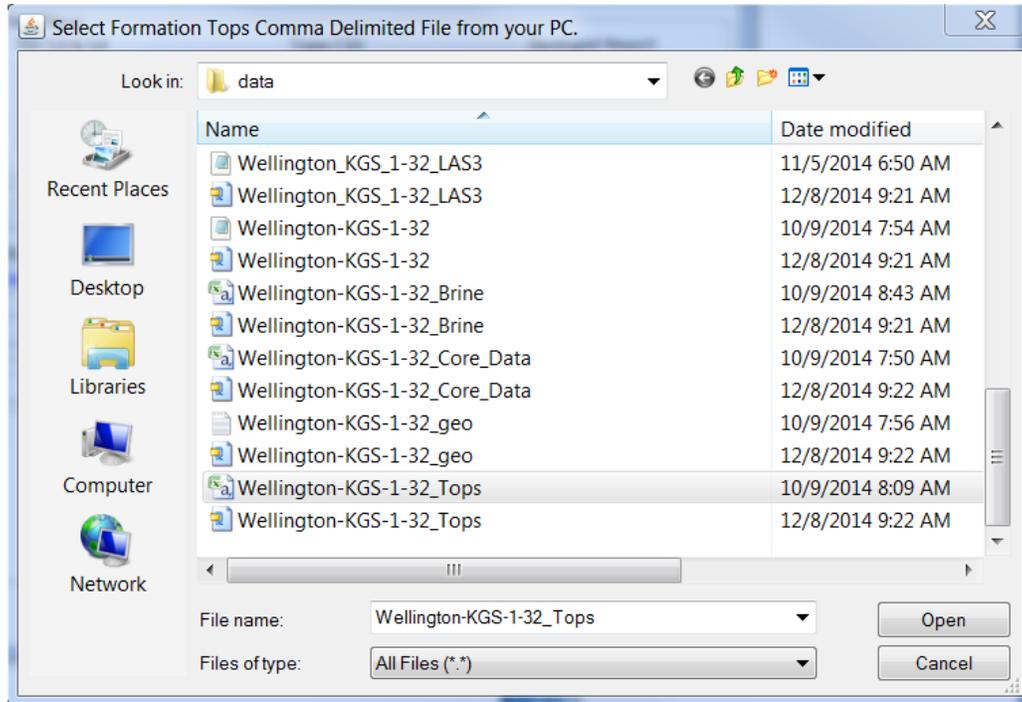
Check boxes color code identifies at a glance, which curve is selected and type of log curve, i.e. cyan – porosity type log curve, orange – resistivity type log curve, etc.

Click on the “Continue” button to read and parse the LAS file into the cross section web app. The user will notice that on the “Load Data” dialog the LAS file name “Wellington-KGS-1-32.las” is entered into the “Log ASCII Standard (LAS) Files” panel. And the Log Data Type is marked with a “YES” under the LAS Column in the Data Type Panel.



- **Import Tops Comma Separated Values (CSV) ASCII Delimited File**

The user now clicks on the “Tops CSV” icon button to open the “Select Formation Tops Comma Delimited File from your PC” dialog.



Highlight “Wellington-KGS-1-32_Tops” CSV File and click on the “Open” button to open the “Map File Column Number to Region Column” dialog, which will parse the Tops CSV file first two lines and map the column number (starting at 1, 2, 3 ...) of the data header to the Tops data structure variables. As the user sees the “File Column Number” column are matched to the Tops data structure variables.

The Wellington KGS 1-32 Tops CSV example has two introduction lines, the first line is the well header information and the second line is the actual column labels for the tops data, illustrated below,

```

Line 1 Well Header Info Wellington KGS 1-32, 15-191-22591, T31S R1W sec. 32, GL:1259, KB:1272
Line 2 Data Column Labels Top, Name, Rank, System, Subsystem, Series, source
Line 3 Data Start 620, Chase, GROUP, Permian, , Wolfcampian, PG
748, Towanda Limestone, MEMBER, Permian, , Wolfcampian, PG
1595, Wabaunsee, GROUP, Carboniferous, Pennsylvanian, Upper, PG
1622, Root Shale, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
1662, Stotler Limestone, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
1920, Severy Shale, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
1980, Topeka Limestone, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
2312, Lecompton Limestone, FORMATION, Carboniferous, Pennsylvanian, Upper, PG
2402, Heebner Shale, MEMBER, Carboniferous, Pennsylvanian, Upper, PG
2703, Stalnaker Sandstone, BED, Carboniferous, Pennsylvanian, Upper, PG
3039, Kansas City, GROUP, Carboniferous, Pennsylvanian, Upper, PG
3169, Stark Shale, MEMBER, Carboniferous, Pennsylvanian, Upper, PG

```

Figure: Partial Contents of the Wellington-KGS-1-32_Tops.csv File.

1st Line of Comma Delimited File:
Wellington KGS 1-32, 15-191-22591, T31S R1W sec. 32, GL:1259, KB:1272

2nd Line of Comma Delimited File:
Top, Name, Rank, System, Subsystem, Series, source

Formation Tops Columns:
Start Reading Data at Row Assume Row & Column Count is 1,2,3 ...

Region Column Name	File Column Number
Depth Top	<input type="text" value="1"/>
Depth Base	<input type="text" value="0"/>
Stratigraphic Unit Rank [SYSTEM, GROUP, etc.]	<input type="text" value="3"/>
Stratigraphic Name	<input type="text" value="2"/>
Alternate Name	<input type="text" value="0"/>
Era	<input type="text" value="0"/>
System	<input type="text" value="4"/>
Subsystem	<input type="text" value="5"/>
Series	<input type="text" value="6"/>
Subseries { Pennsylvanian & Mississippian Series }	<input type="text" value="0"/>
Stage	<input type="text" value="0"/>
Group	<input type="text" value="0"/>
Subgroup	<input type="text" value="0"/>
Formation	<input type="text" value="0"/>
Start Age (Ma)	<input type="text" value="0"/>
End Age (Ma)	<input type="text" value="0"/>

The “Map File Column Number to Region Column” Dialog allows the user to map the data in the Tops CSV File to the web app data structure variables. The program first reads the first and second line of the CSV File looking for the data column headers. The lines are each parsed to single out the data column headers and to match those headers to the tops data structure. The program then assigns the column number to the Region Column Name starting at column 1,2,3, ... if the file column name used matches the expected region column name.

The Wellington KGS 1-32 Tops CSV File example above line 2 has only the Top, Tops Name, Rank, System, Subsystem, Series and Source as the column name variables. The program was able to map each of the column headers to the tops data structure, except Source, i.e.

Column	File Column Label	Tops Data Name
1	Top	Depth Top
2	Name	Stratigraphic Name
3	Rank	Stratigraphic Unit Rank
4	System	System
5	Subsystem	Subsystem
6	Series	Series
7	Source	

When the user selects the “Load Data” button on the “Map File Column Number to Region Column” Dialog the data is parsed into the Cross Section Program, where the Tops CSV file name is entered into the “PC ASCII Files:” Panel as well as the data type source.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: Wellington-KGS-1-32.las

2:

3:

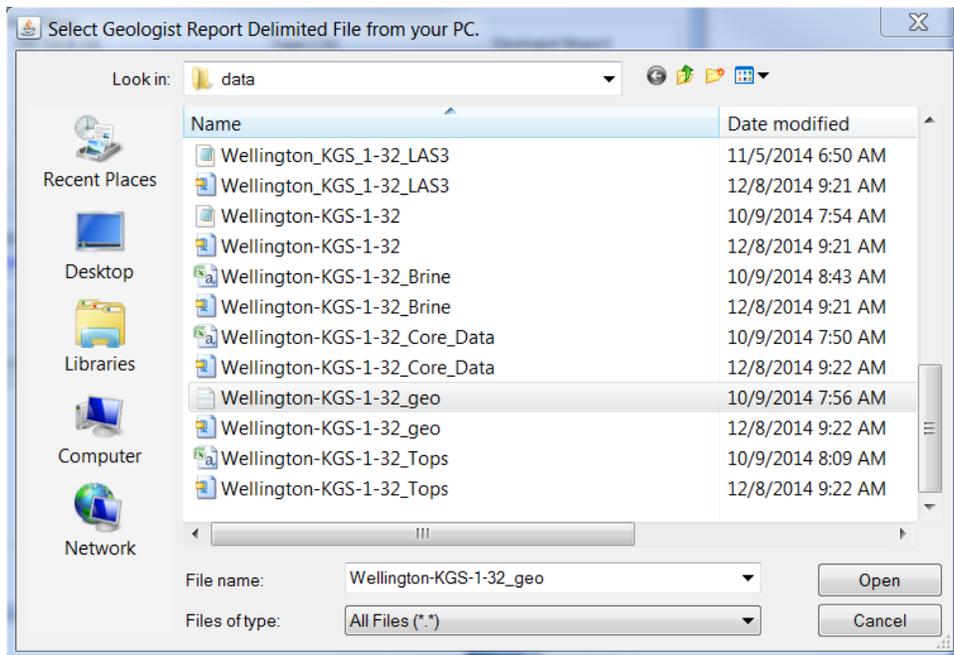
PC ASCII Files:

Tops CSV: Wellington-KGS-1-32_Tops.csv Geo-Report:

Data Type	3.0 LAS CSV KGS	Data Type	3.0 LAS CSV KGS
Log Data	..... YES	Tops Data	..... YES
Perforations	NO	Geologist Report	NO

○ **Import Geologist Report ASCII Delimited File**

The user now clicks on the “Geologist Report” icon button to open the “Select Geologist Report Delimited File from your PC” dialog.



This dialog allows the user to search their PC for the file of interest. In this example it is the Geologist Delimited file Wellington-KGS-1-32_geo.txt, highlighted above. Select the Open button to display the “Parse Comments/Remarks/Notes ASCII Text File” Dialog.



The Select Comments/Remarks/Notes Delimited File from your PC Dialog allows the user to import the geologist report into the web app. The data is parsed into the one of number of rock description data structures, i.e. Rock Color, Rock Lithology, Porosity, Sedimentary Structure, and General Fossils.

There are two sections to this dialog the Top controls how the depth data is found and interpreted. The “User defined” Depth assumes that the first two columns will be the start and stop depth followed by the text as this example below shows. The “Bedding Thickness” Depth assumes that there is one depth with the description. The user should take care to use a delimiter that does not appear in the description if the bedding thickness follows the bed descriptions.

The “Delimiters, i.e. ‘,;():’ text field has ‘,’ by default, which for the example below, showed

be changed to ‘;’ to match the depth data separation delimiter shown. And the “Start at Row” text field should be changed to 6 since the data starts at line 6. The default depth is in feet, but it is

possible that a measured section would be measured in inches, note this setting is for all depths in the file. This panel allows the user to see all the data and to edit the Depth Delimiter, Starting point of the Data and Bedding Depth Start text fields to match the data and then select the “Parse Data” to parse the text into the rock data structures.

The Wellington KGS 1-32 Geologist Report Delimited file example has a more relaxed format. The well header information is at the top of the file with as many lines needed. The data starts immediately after the header section. The Geologist Report Example for the Wellington KGS 1-32 well is as follows,

Line 1 to Line 5: Well Header Information	Lease: Wellington KGS Well 1-32 (15-191-22591) ; operator: BEREXCO LLC; Field: Wellington Location: T31S R1W, Sec. 32 : NE SW NE NE ; 955 South, 877 West, from NE corner Longitude: -97.4423481 ; Latitude: 37.3154639 County: Sumner
Line 6 Data Start	Total Depth: 3660 ; Elevation: 1259 GL 2340; 2344; Sh, gy, drk gy, frm 2344; 2352; LS, tan-buff, f-crypto xln, hard, dns, few pcs of drk frs, chrt. 2352; 2362; LS, tan, fxln,scrt foss, scrted vuggy por, ns 2362; 2374; Sh, grn, gy drk gy, grn, silty, pyritic, gy silty, scrted foss 2374; 2380; LS, buff, fxln,hrd dns, with LS, wht-tan,fxln, chlky-sub chalky, dns 2380; 2394; Sh, grn, lt gn, gy, lt grn, soft, sticky, stringers of gy siltstone 2394; 2406; LS, tan, f-med xln, scrted foss, sub chalky, hrd with LS, buff, fxln, hrd, dns 2406; Heebner Shale
Line 13 Tops Pick Depth example, if there are no other tops sources then the geologist report will be parsed for tops.	2406; 2418; Sh, blk, carb, firm, pyritic 2418; 2422; LS, buff, f-med xln, foss, hrd, dns, ns 2422; 2434; SS, wht-clr, f grn, rndd-sub rndd, calc cement, tight, some clr ss with int xln, & vuggy poro, ns, 2434; 2450; LS, wht-tan,fxln,foss,pp & vuggy poro, ns, LS, wht, fxln, hrd, dns, styolite, stringers of pyrite 2450; 2462; Sh, grn, gy, grn, silty, pyritic 2462; 2466; LS, tan, fxln, hrd, scrted vuggy poro, ns 2466; 2474; Sh, grn, gy, with Siltstone grn 2474; 2478; LS, buff, f-crypt xln, hrd, dns 2478; 2488; Sh, gy-drk gy, frm

Figure: Partial contents of the Wellington-KGS-1-32_geo.txt File.

In this example the depth range information is separated by semicolons (;) and is in the front of each description, e.g. “2340; 2344; Sh, gy, dark gy, frm”. The depth range parse engine assumes that there will be two numbers at the beginning of each description. The semicolon is not necessarily unique in the line, but the program expects to find two number fields at the front of the line. The program will separate the description from the depth range using the delimiter ‘;’. Using an example line from above,

“2340; 2344; Sh, gy, dark gy, frm”

The parse engine will determine which part is the description and which is the depth information. The depths are then cleaned of any other non-numeric characters leaving the numbers, e.g. 2340 and 2344. The parse engine sets the starting depth and ending depths for the description and computes the thickness and adds to the cumulative total depth. The description is parsed later (Lithology, Rock Color, Porosity, Sedimentary Structure, and Fossils) when the user selects the “Parse Data” Button.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: Wellington-KGS-1-32.las

2:

3:

PC ASCII Files:

Tops CSV: Wellington-KGS-1-32_Tops.csv Geo-Report: Wellington-KGS-1-32_geo.txt

Data Type	3.0 LAS CSV KGS	Data Type	3.0 LAS CSV KGS
Log Data	..... YES	Tops Data	..... YES
Perforations	NO	Geologist Report	..... YES

Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Wellington KGS 1-32 well data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
LTG	WELLINGTON KGS #1-32	15-191-22591		0	0	0	31S	1W	0	141217130438	Up

Down

Plot: Map Cross Section

Modify Well Header Information Data: Modify

Well List Actions: New Well Remove Remove All

Notice that in the LTG column identifies the data type that was imported from the KGS database and file server, i.e. L=Log Data and T=Tops Data. Notice that the “Cross Section” Plot button, Modify Well Header Information Data “Modify” button and the “Remove”, “Remove All”, “Up” and “Down” buttons are now enabled, because there is a well in the “Cross Section Well/Location List” table. The “Map” button will not enable until there is at least two wells in the table.

Notice also that the Status, Latitude, Longitude and Elevation columns are missing data. Highlight the Wellington KGS #1-32 row and click on the “Modify” button to display the “Edit Header Information” dialog displaying the well header information data. The user can manually enter the fields if they have access to the data or if this is a Kansas Well search the KGS Database for the well header information by clicking on the “Search KGS Database for Well Header Information” button at the top of the “Edit Header Information” dialog, which will display the “Search for Data on KGS Server” dialog. This dialog allows the user to search by API-Number, Partial Lease Name or by Township Range Section. Since the API-Number is

known, enter the API-Number in the “Enter API-Number” text field and select the “Search” button to search the KGS Database for the well data.

Search KGS Database for Well Header Information Button

Displays a “Search for Data on KGS Server” Dialog that allows the user to .

Identification Panel

KGS & PC Primary KEY – Identification Numbers for the well

API-Number – API Number of Well
Well Status - Status, i.e. OIL, GAS, etc.

Name – Lease Name & Number

Other Well Information Panel

Operator Name & KGS Database KEY
Field Name & KGS Database KEY

Location Information Panel

State Name
County Name

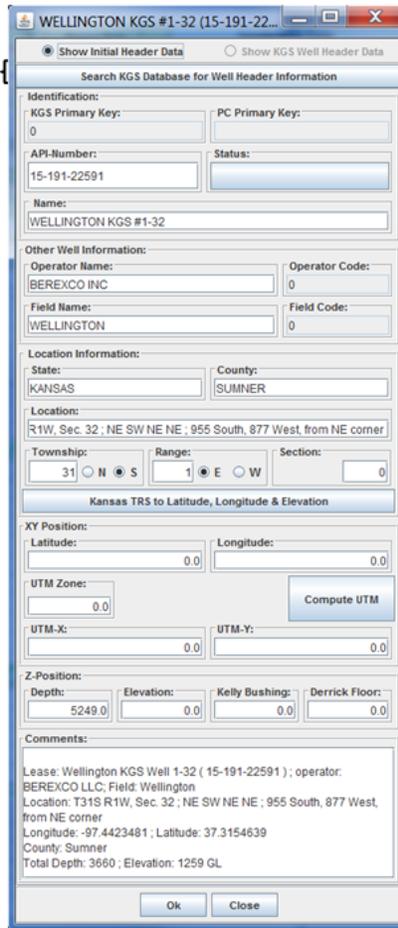
Location
Township Range Section

XY Position

Latitude
Longitude
UTM Zone
UTM X Position
UTM Y Position

Z-Position

Depth – Total Depth of Well
Elevation – by Ground Level
Elevation – by Kelly Bushing
Elevation – by Derrick Floor
Comments – User Comments, not saved to the LAS version 3.0.



Header Information Source Buttons:

- **Show Initial Header Data** – Shows the Header Information initially loaded into Program.
- **Show KGS Well Header Data** – Shows the Header Information loaded from KGS Database.

Buttons:

Status – Displays “Select Status of Data” Dialog, user searches for the well status list for status of well.

Kansas TRS to Latitude, Longitude & Elevation – The buttons calls a KGS database routine to compute the Latitude, Longitude and Elevation from the Township, Range and Section.

Compute UTM – This button calls a UTM Java Math Package to convert Latitude & Longitude into UTM X, Y Coordinates.

OK – Transfer Data Values to Program

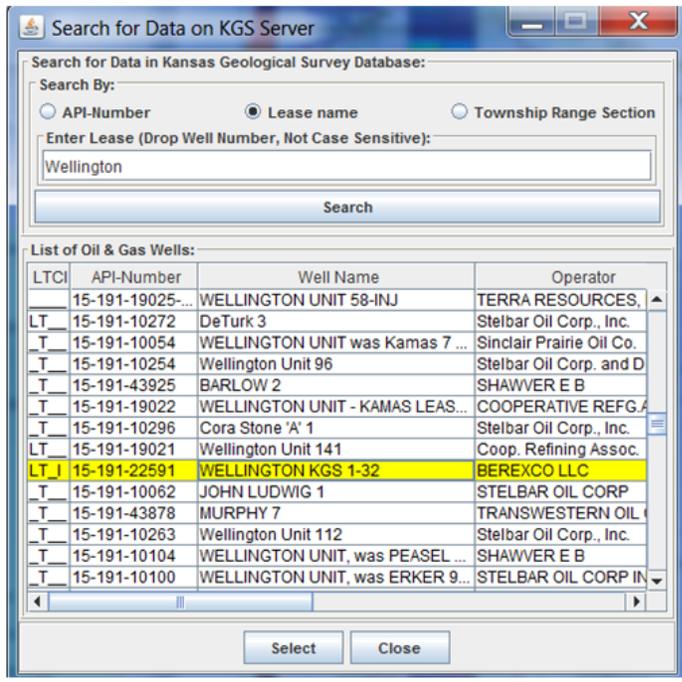
Close – Close this Dialog

NOTE: Initially the Basic Header information is loaded from the LAS version 2.0 file and other fields like Comments, Location are loaded from the Geologist Report Header Section.

The Header Information Dialog displays the contents of the header information data structure. The user can edit the fields and select the “Ok” Button to transfer the information back to the Profile Program and any summary information will be updated in the Profile Control and Plot.

As this example illustrates there are missing fields in the header information data. The user can select the “Search KGS Database for Well Header Information” Button, which will display a “Search for Data on KGS Server” Dialog that will allow the user to build a query that will download all wells that match the query.

This will display the “Search for Data on KGS Server” Dialog, see image below. This dialog allows the user to search the KGS database for well header data. In this example, the well of interest will be the Wellington KGS 1-32.

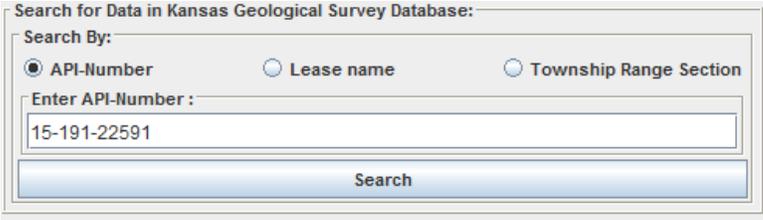


- Search for Well Header Data in KGS Database Search By:**
- **API-Number** – The user can search the KGS Database for well data by API-Number. The Format for the API is SS-CCC-99999 where
 - SS – Two Digit State Code
 - CCC – Three Digit County Code
 - 99999 – 5 Digit Well Number
 - **Lease Name** – The user can search for well data by lease partial phrase, i.e. “Wellington”, which will look for all wells with the phrase “Wellington” in the lease name.
 - **Township-Range-Section** – Search for a list of Wells by a specific area.
- List of Kansas wells that match the search criteria
- Load Well Header Buttons
- Select – Download the header information for the well selected.
 - Close – Close this dialog

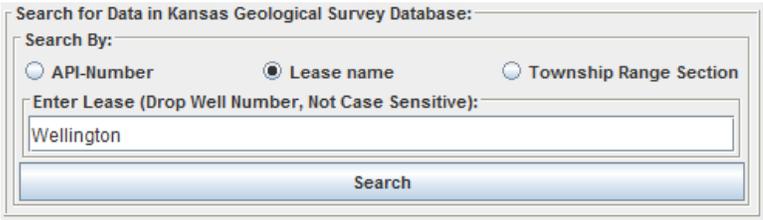
NOTE: LTCI Column in Table: L-LAS Files; T-Formation Tops; C-Measured Core Data; I-Core Images

As the Summary image suggests there are 3 methods for searching for the well header information within this dialog,

- By API-Number – KGS has a specific format for the API-Number, i.e.SS-CCC-99999 where SS is the state code for Kansas 15, CCC is the county code for Wellington KGS 1-32 it is 191 for Sumner County and the 5-Digit Well Number for the Wellington KGS 1-32 is 22591.



- By Partial Lease Name – The stored procedure used to retrieve the well header information allows the user to enter a partial phrase, in this example Wellington. The program places a ‘%’ in front and back of the phrase and sends the request to the Database, i.e. “%Wellington%”.

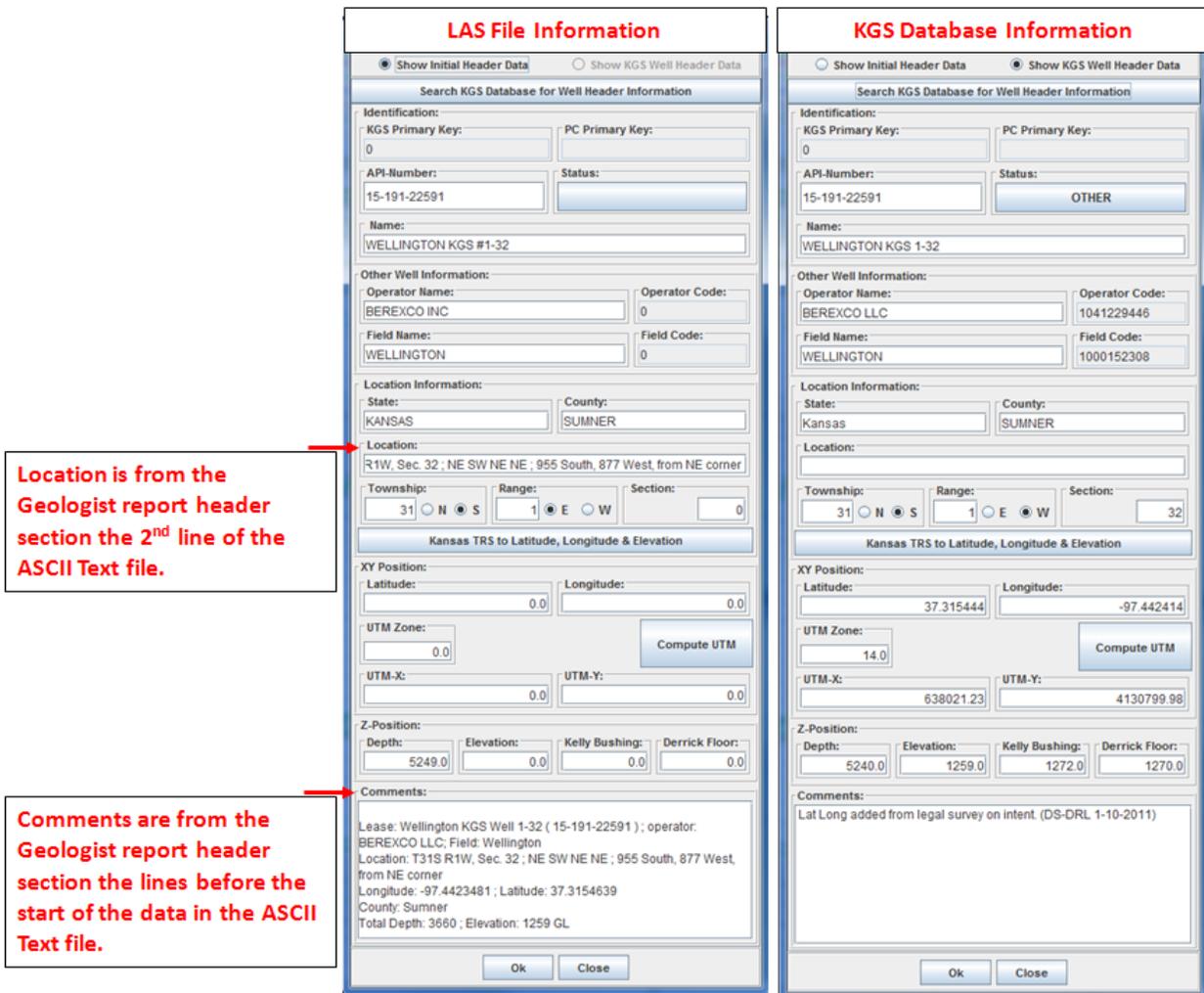


- By Township Range Section – This search is by location in Kansas, this search also allows the user to enter just the Township and Range to search for wells, e.g. to look for the Wellington KGS 1-32, enter Township as 31 set the S (South) Radio button and Range as 1 set the E (East) Radio button.

The user only needs to enter the above data and select the “Search” Button to display the list of Wells in the Kansas Database that match the search criteria. In the image below the Lease Name “Wellington” is entered to search for all wells in Kansas with the Phrase Wellington in it. The user searches through the list until they find the well of interest. In this example it is the Wellington KGS 1-32, which is highlighted.

LTCl	API-Number	Well Name	Operator
	15-191-19025-...	WELLINGTON UNIT 58-INJ	TERRA RESOURCES,
LT	15-191-10272	DeTurk 3	Stelbar Oil Corp., Inc.
T	15-191-10054	WELLINGTON UNIT was Kamas 7 ...	Sinclair Prairie Oil Co.
T	15-191-10254	Wellington Unit 96	Stelbar Oil Corp. and D
T	15-191-43925	BARLOW 2	SHAWVER E B
T	15-191-19022	WELLINGTON UNIT - KAMAS LEAS...	COOPERATIVE REFGA
T	15-191-10296	Cora Stone 'A' 1	Stelbar Oil Corp., Inc.
LT	15-191-19021	Wellington Unit 141	Coop. Refining Assoc.
LT	15-191-22591	WELLINGTON KGS 1-32	BEREXCO LLC
T	15-191-10062	JOHN LUDWIG 1	STELBAR OIL CORP
T	15-191-43878	MURPHY 7	TRANSWESTERN OIL
T	15-191-10263	Wellington Unit 112	Stelbar Oil Corp., Inc.
T	15-191-10104	WELLINGTON UNIT, was PEASEL ...	SHAWVER E B
T	15-191-10100	WELLINGTON UNIT, was ERKER 9...	STELBAR OIL CORP IN

The user clicks on the “Select” button to transfer the header information to the Edit Header Information Dialog.



Location is from the Geologist report header section the 2nd line of the ASCII Text file.

Comments are from the Geologist report header section the lines before the start of the data in the ASCII Text file.

The “Show KGS Well Header Data” radio button will become enabled if the KGS well header information has been downloaded. The user can move between the initial header information by selecting the “Show Initial Header Data” radio button the KGS well header information by selecting the “Show KGS Well Header Data” radio button.

There a number of buttons on the panel that will allow the user to change or compute data in the header information. The “Kansas TRS to Latitude, Longitude & Elevation” Button computes the latitude, longitude and elevation from the township, range and section by making an Oracle PL/SQL Stored Procedure, e.g.

http://chasm.kgs.ku.edu/ords/igstrat.TRS2LL_pkg.getXML?iTownship=31&sTownship=S&iRange=1&sRange=E&iSection=32

The call will return a XML with the latitude, longitude and ground level elevation.

```

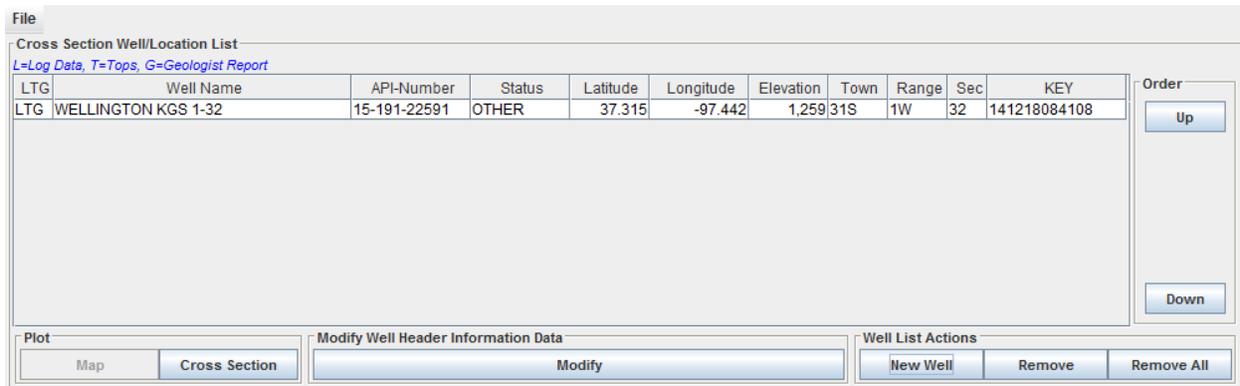
<?xml version="1.0"?>
<!DOCTYPE headers [
<!ELEMENT headers (data*)>
<!ATTLIST headers records CDATA #IMPLIED>
<!ELEMENT data (info*,
                other?,
                loc?,
                xy?,
                z?,
                comments?,
                misc?,
                cnt?)>
<!ELEMENT info EMPTY>
<!ATTLIST info kid CDATA #IMPLIED
               well_kid CDATA #IMPLIED
               key CDATA #IMPLIED
               type CDATA #IMPLIED
               api CDATA #IMPLIED
               name CDATA #IMPLIED
               status CDATA #IMPLIED
               error CDATA #IMPLIED>
<!ELEMENT other EMPTY>
<!ATTLIST other operator CDATA #IMPLIED
               oper_kid CDATA #IMPLIED
               field CDATA #IMPLIED
               field_kid CDATA #IMPLIED>
<!ELEMENT loc EMPTY>
<!ATTLIST loc state CDATA #IMPLIED
               state_cd CDATA #IMPLIED
               county CDATA #IMPLIED
               county_cd CDATA #IMPLIED
               loc CDATA #IMPLIED
               town CDATA #IMPLIED
               town_dir CDATA #IMPLIED
               range CDATA #IMPLIED
               range_dir CDATA #IMPLIED
               section CDATA #IMPLIED>
<!ELEMENT xy EMPTY>
<!ATTLIST xy latitude CDATA #IMPLIED
             longitude CDATA #IMPLIED
             zone CDATA #IMPLIED
             utm_x CDATA #IMPLIED
             utm_y CDATA #IMPLIED>
<!ELEMENT z EMPTY>
<!ATTLIST z depth CDATA #IMPLIED
            gl CDATA #IMPLIED
            kb CDATA #IMPLIED
            df CDATA #IMPLIED>
<!ELEMENT comments (#PCDATA)>
<!ELEMENT misc EMPTY>
<!ATTLIST misc user CDATA #IMPLIED
               access CDATA #IMPLIED
               source CDATA #IMPLIED
               date CDATA #IMPLIED>
<!ELEMENT cnt EMPTY>
<!ATTLIST cnt las CDATA #IMPLIED
              tops CDATA #IMPLIED
              core CDATA #IMPLIED
              images CDATA #IMPLIED]>
<headers records="1">
  <data>
    <loc town="31" town_dir="S" range="1" range_dir="E" section="32" />
    <xy latitude="37.311703" longitude="-97.339619" />
    <z gl="1277" />
  </data>
</headers>

```

The “UTM” Button will compute the UTM XY coordinates from the latitude & longitude. The analysis uses A Working Manual by John P. Snyder, U.S. Geological Survey Professional Paper 1395, USG Printing Office, Washington, DC, 1987

(http://pubs.er.usgs.gov/djvu/PP/PP_1395.pdf).

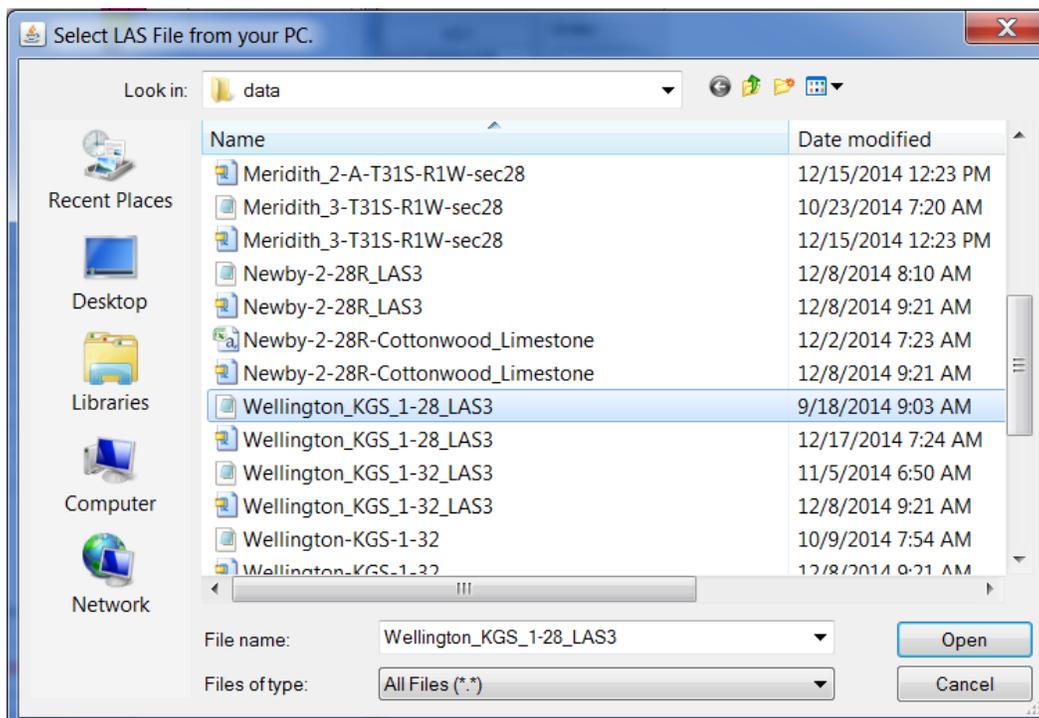
Select the “Ok” button to update the Wellington KGS 1-32 Header Information in the Cross Section Panel.



➤ **Wellington KGS 1-28**

- **Import Log ASCII Standard (LAS) version 3.0 File**

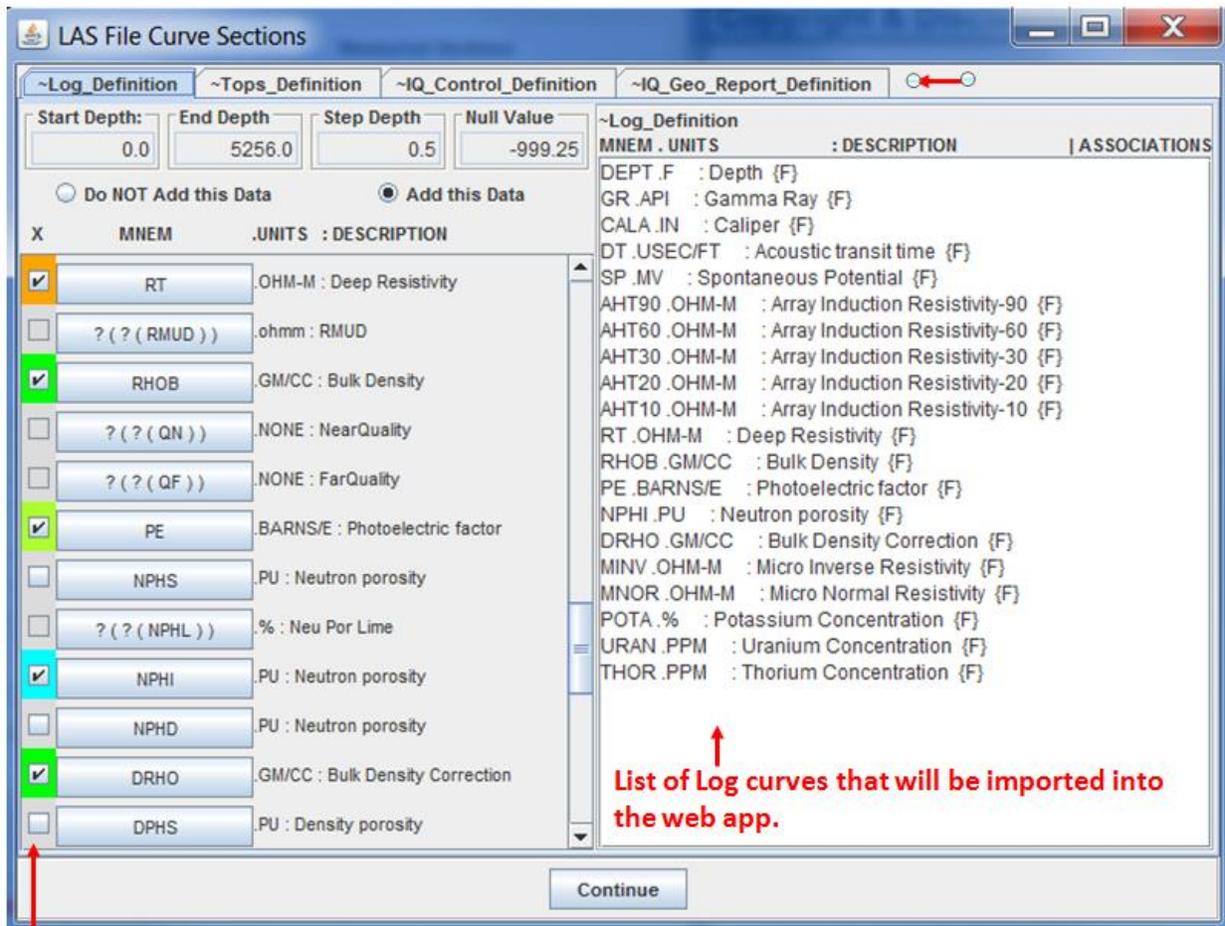
Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “LAS version 2.0 & 3.0” icon button to open the “Select LAS File from your PC” dialog.



Highlight “Wellington-KGS-1-28” LAS File and click on the “Open” button to open the “LAS File Curve Sections” dialog, which lists all the data sections in the LAS File. This example contains Log Data, Tops Data and Geologist Description Data so there will be multiple tabbed panels displayed i.e.

- “~Log_Definition” tab – holds the LAS File Log Data Section
- “~Tops_Definition” tab – holds the Top Picks Data Section
- “~IQ_Control_Definition” tab – holds the Profile Plot Control Data Section, which allows the user to automatically re-plot the profile plot to pre-selected values, i.e. the selected Log Curves that were not originally defined in the LAS version 2.0 file.
- “~IQ_Geo_Report_Definition” tab – holds the Geologist Cuttings/Core Description Data Section.

Notice the last two panels have “~IQ_” before the description. These data sections are “user” defined sections, outlined in the Canadian Well Logging Society LAS 3 File Structure Document, http://www.cwls.org/wp-content/uploads/2014/09/LAS_3_File_Structure.pdf .



Check boxes color code identifies at a glance, which curve is selected and type of log curve, i.e. cyan – porosity type log curve, orange – resistivity type log curve, etc.

Click on the “Continue” button to read and parse the LAS file into the cross section web app. The user will notice that on the “Load Data” dialog the LAS file name “Wellington_KGS_1-28_LAS3.las” is entered into the “Log ASCII Standard (LAS) Files” panel. And the Log, Tops and Geologist Report Data Types are marked with a “YES” under the 3.0 Column in the Data Type Panel.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: Wellington_KGS_1-28_LAS3.las

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0 LAS CSV KGS	Data Type	3.0 LAS CSV KGS
Log Data	.... YES	Tops Data	.... YES
Perforations	NO	Geologist Report	.... YES

Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Wellington KGS 1-28 well data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY
LTG	WELLINGTON KGS 1-32	15-191-22591	OTHER	37.315	-97.442	1,259	31S	1W	32	141218084108
LTG	WELLINGTON KGS 1-28	15-191-22590	OTHER	37.319	-97.433	1,270	31S	1W	28	141218085013

Order

Up

Down

Plot

Map Cross Section

Modify Well Header Information Data

Modify

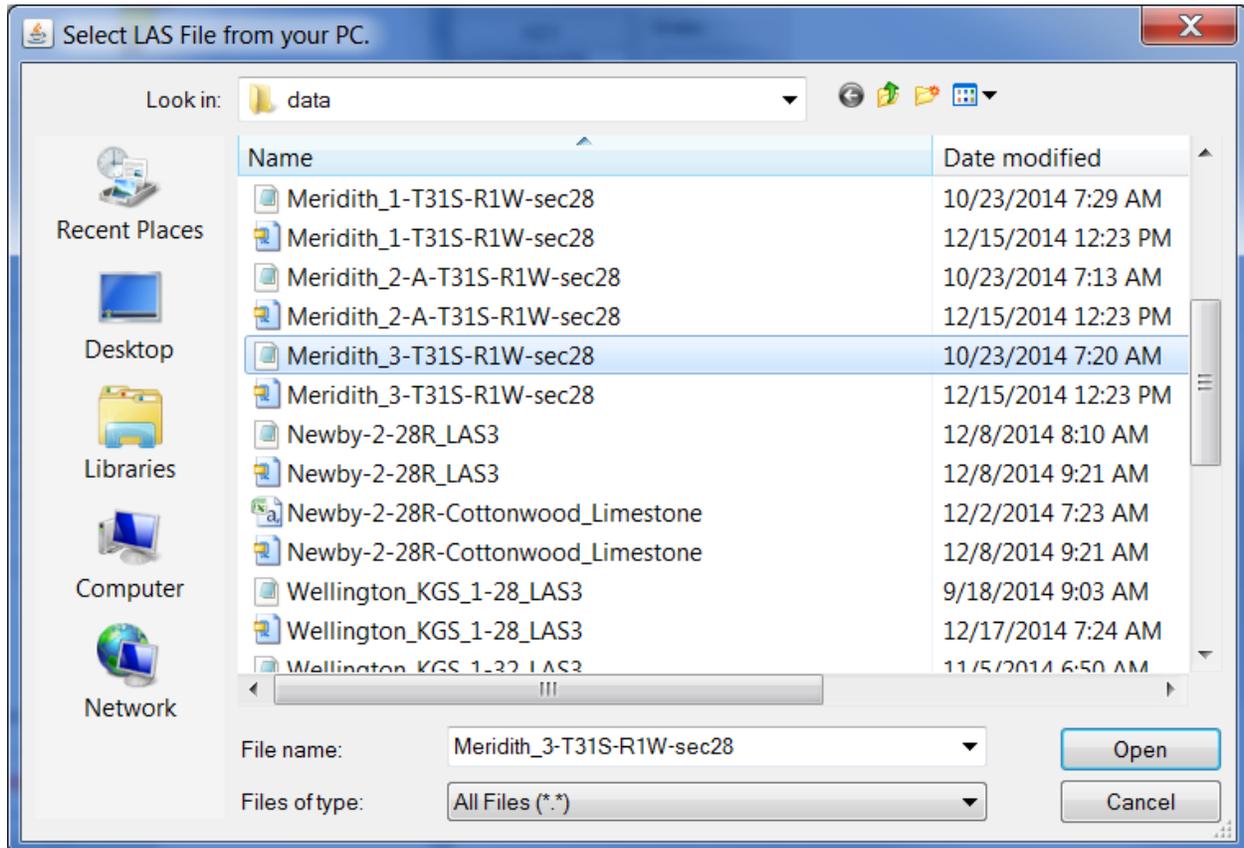
Well List Actions

New Well Remove Remove All

Notice that in the LTG column identifies the data type that was imported from the KGS database and file server, i.e. L=Log Data, T=Tops Data and G=Geologist Report Data. At this point notice that the “Map” button is now enabled, which allows the user to display a map of the two wells plotted to give a sense of the location.

- **Meridith 3 (15-191-21556)**
 - **Import Log ASCII Standard (LAS) version 3.0 File**

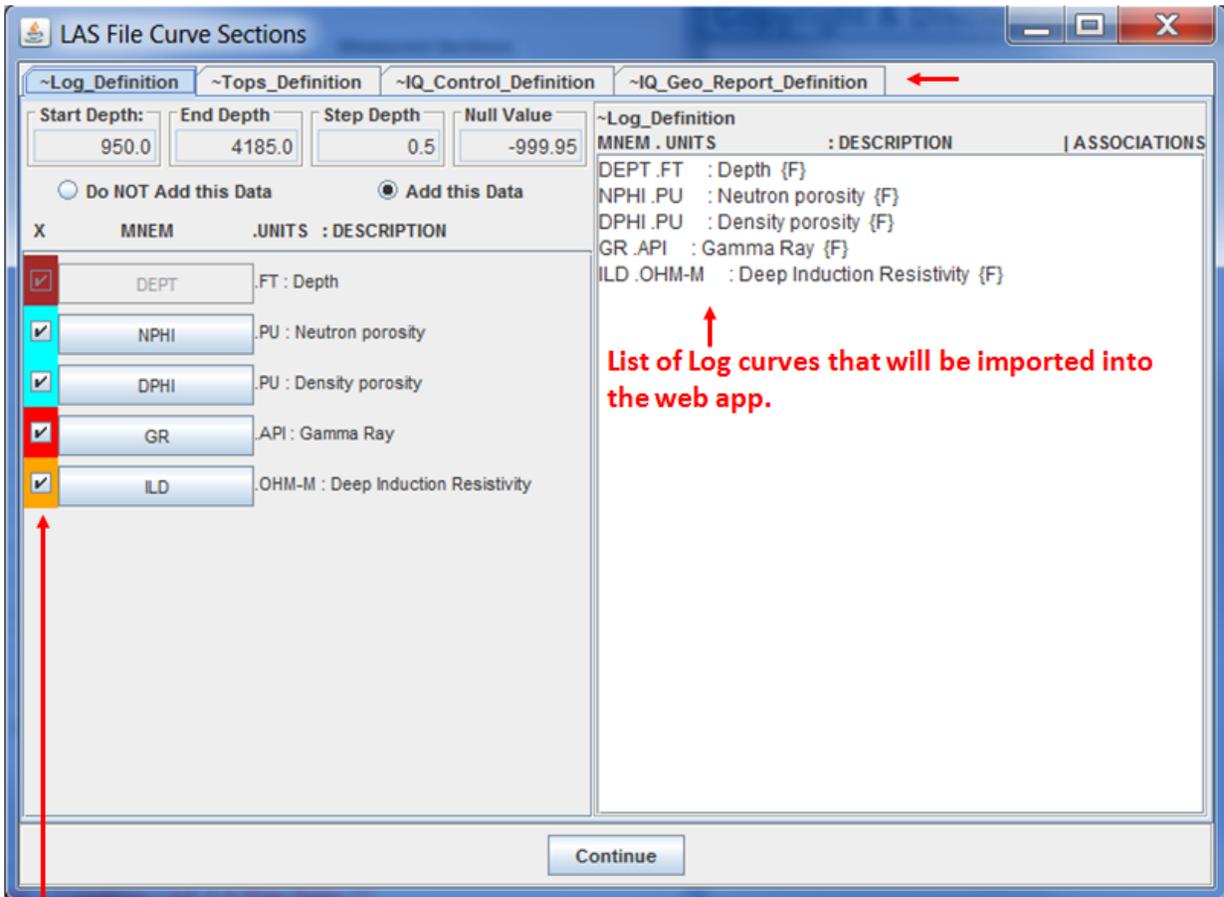
Click on the “**New Well**” button on the Cross Section Panel to open the “Load Data” dialog. The user then clicks on the “LAS version 2.0 & 3.0” icon button to open the “Select LAS File from your PC” dialog.



Highlight “Meridith_3-T31S-R1W-sec28” LAS File and click on the “Open” button to open the “LAS File Curve Sections” dialog, which lists all the data sections in the LAS File. This example contains Log Data, Tops Data and Geologist Description Data so there will be multiple tabbed panels displayed i.e.

- “~Log_Definition” tab – holds the LAS File Log Data Section
- “~Tops_Definition” tab – holds the Top Picks Data Section
- “~IQ_Control_Definition” tab – holds the Profile Plot Control Data Section, which allows the user to automatically re-plot the profile plot to pre-selected values, i.e. the selected Log Curves that were not originally defined in the LAS version 2.0 file.
- “~IQ_Geo_Report_Definition” tab – holds the Geologist Cuttings/Core Description Data Section.

Notice the last two panels have “~IQ_” before the description. These data sections are “user” defined sections, outlined in the Canadian Well Logging Society LAS 3 File Structure Document, http://www.cwls.org/wp-content/uploads/2014/09/LAS_3_File_Structure.pdf .



Check boxes color code identifies at a glance, which curve is selected and type of log curve, i.e. cyan – porosity type log curve, orange – resistivity type log curve, etc.

Click on the “Continue” button to read and parse the LAS file into the cross section web app. The user will notice that on the “Load Data” dialog the LAS file name “Meridith_3-T31S-R1W-sec28.las” is entered into the “Log ASCII Standard (LAS) Files” panel. And the Log, Tops and Geologist Report Data Types are marked with a “YES” under the 3.0 Column in the Data Type Panel.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1: Meridith_3-T31S-R1W-sec28.las

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type 3.0 LAS CSV KGS Data Type 3.0 LAS CSV KGS

Log Data YES Tops Data YES

Perforations NO Geologist Report YES

Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Meridith 3 well data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY
LTG	WELLINGTON KGS 1-32	15-191-22591	OTHER	37.315	-97.442	1,259	31S	1W	32	141218084108
LTG	WELLINGTON KGS 1-28	15-191-22590	OTHER	37.319	-97.433	1,270	31S	1W	28	141218085013
LTG	Meridith 3	15-191-21556	OIL-P&A	37.326	-97.426	1,260	31S	1W	28	141218085256

Order

Up

Down

Plot

Map Cross Section

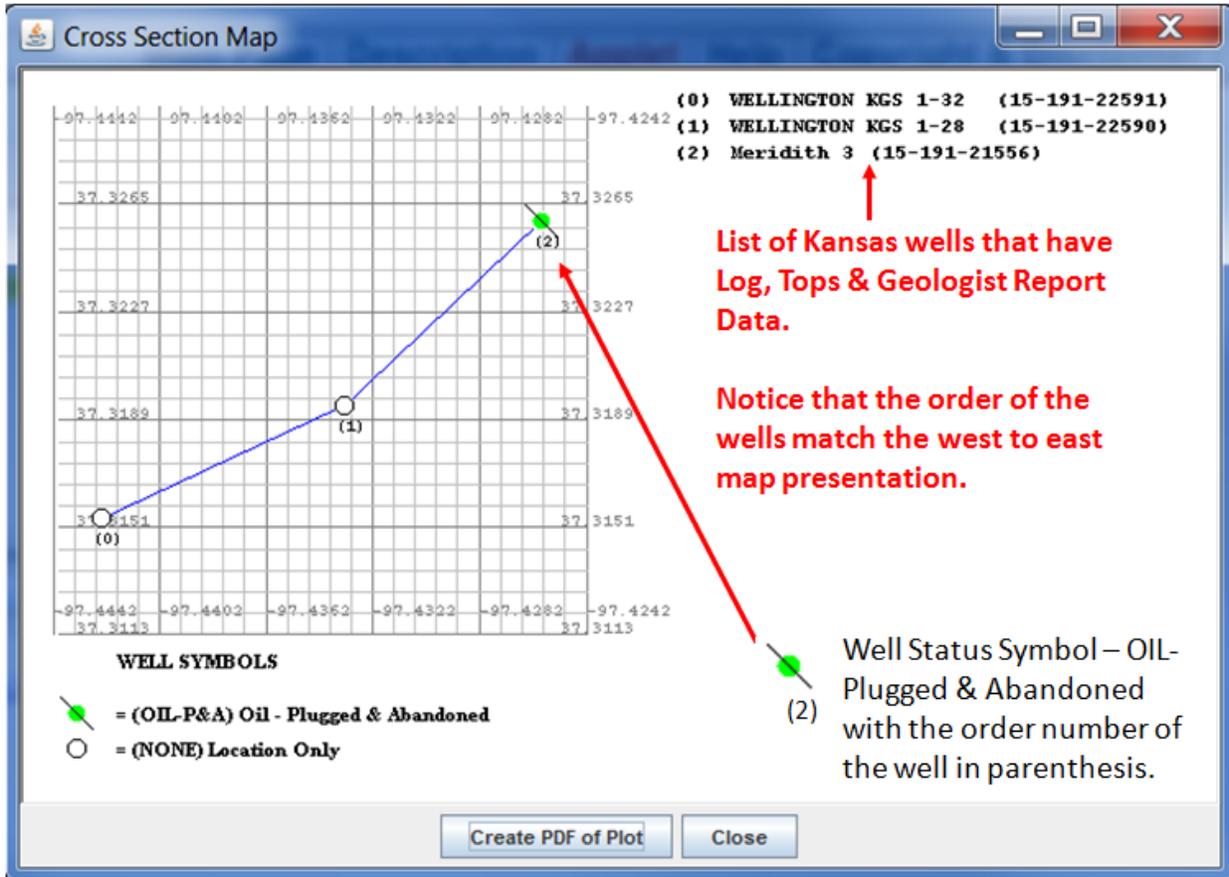
Modify Well Header Information Data

Modify

Well List Actions

New Well Remove Remove All

Now click on the “Map” button to display the map plot to view the selected wells. The well locations are plotted on latitude versus longitude map grid to help the user visualize the location of the well in relative 2-dimensional space and to also verify that the order of the wells follow a logical presentation. If the wells were out of order with respect to each other the user will see the blue cross section lines crossing. The user can correct any errors in the well order by clicking on the “Up” or “Down” buttons on the Cross Section Panel. As the user will see that the order of the wells are correct and no further action needs to be taken. The user can click on the “Create PDF of Plot” button to create a Portable Network Graphic (PNG) image of the cross section map. The user will see a search PC dialog that will allow the user to search their PC directory structure to save the PNG image. Once the image is saved a HTML web page will display with a “Create a PDF Document of this PNG Image” URL Link at the top of the page above the cross section map image. Click on the link to launch the Create PDF (Portable Document Format) from Image Applet that will allow the user to convert the saved PNG image to a PDF document.



The user now can create a cross section plot of the wells that have been selected. Click on the “Cross Section” Plot button to display the cross section of the three wells. The image below illustrates the cross section of the three wells that have been imported into the Cross Section Web App. The Cross Section Plot Control plots all three wells in a depth profile. Since all three wells have litho-density log data, i.e. Gamma Ray (GR), Neutron Porosity (NPH), and Bulk Density (RHOB) and in the first two wells the Photoelectric Factor (PE) log curves. The plot below represents the cross section of 3 wells imported from the user’s PC. The plot is plotted by elevation depth from -900’ down to -3000’ at a 100 feet / inch scale.

Cross Section Plot Control Dialog

The “Cross Section Plot Control” dialog allows the user to change the presentation of the Cross Section Plot, by depth range, by depth scale, by data type, by log type, or add, modify or delete tops data through Tops Data Entry dialog.

Menu Option Buttons →

File – Menu Option

The file menu option allows the user to,

- Create PNG Image of Plot – Create a Portable Network Graphics (PNG) Image, which will launch a web page with the image with a link to run a Portable Network Document (PDF) Applet to save the PNG Image as an PDF Document.
- Exit – Exit the Cross Section Plot

Depth Scale – Menu Option

The depth scale menu option allows the user to change the scale (feet / inch) of the Cross Section Plot Data.

Depth Scale & Range Panel

Displays the selected Depth Scale and allows the user to change the starting & ending depth of the cross section plot data.

Datum Panel

The user can present the well/location cross section plot by Log Depth, by Horizon or by Elevation.

Individual Well Control Tabs

Header Information Panel

Well header information summary of well. Each panel displays the same control information.

Type of LAS Track to Display Panel

Primary Log Tracks Width
Single (100 pixels) Expanded (200 pixels)

Default Track Order Panel

User is presented with available data track selections. The user has the option to turn on or off data depending on the available data and the desired presentation.

Plot Track Type Panel

Quickly set the Default Track Order Panel Buttons depending on the type of data.

Log Data Type Panel

Quickly set the Default Track Order Panel Buttons for the “LAS File Curve Data” Section depending on the log data available.

Memory Usage Panel

The memory usage bars allow the user to see how much memory is used

Stratigraphic Units Plot Track – The user can left click the mouse on the stratigraphic units plot track to display the “Enter Horizon Data” Dialog with the “Stratigraphic Units” Data Entry Panel displayed. This panel assists the user in adding, modifying or deleting tops from the profile plot. This dialog has two buttons to set the Stratigraphic Units for a top, i.e.

- ICS (International Commission on Stratigraphy) Chart Button displays the accepted stratigraphic units.
- 1968 Kansas Chart Button displays the Accepted Kansas stratigraphic units.

The user can click on each well/measured section stratigraphic units plot track to modify the tops for the selected well/measured section. The user will need to keep track of which well/measured section tops they are modifying.

Adding & Modifying Tops

To begin the example uses the measured section ASCII delimited text file. The Measured_Section-Sec_24-T12S-R18E.txt File should be downloaded to your PC. As an option the Measured_Section-Sec_24-T12S-R18E_las.las is the Log ASCII Standard (LAS) version 3.0 generated with extended Horizon Data Sections, i.e. Tops, Sequence Stratigraphy, Depositional Environment, Measured Section, and the Bio-Stratigraphy Data.

Download either the ASCII Text Files directly or the Zip files extracting the contents into a directory. The problem with the ASCII Text Files being downloaded directly from a web page is that the web page will alter the contents so it does not retain the basic structure and add HTML text to the file. The preferred method if you have Zip or WinZip is to download the zip files to your PC and extract.

Measured Section: Strata southeast of Lecompton Kansas, Douglas County, Kansas

Type	ASCII Text Files
Measured Section	http://www.kgs.ku.edu/Gemini/Tools/documentation/Measured_Section-Sec_24-T12S-R18E.txt
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Measured_Section-Sec_24-T12S-R18E_las.las

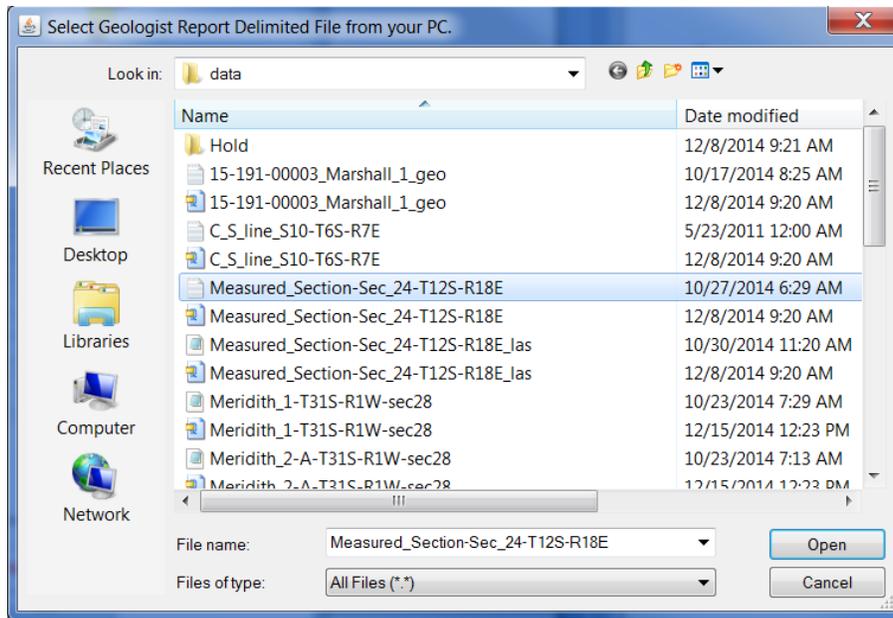
Type	Zip Files
Measured Section	http://www.kgs.ku.edu/Gemini/Tools/documentation/Measured_Section-Sec_24-T12S-R18E.zip
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/Measured_Section-Sec_24-T12S-R18E_las.zip

This example will focus on 1 measured section ASCII data file that is on the user's PC to illustrate modifying the tops data on the Stratigraphic Units Plot Track. The program is designed so the user can modify the tops on each well/measured section Stratigraphic Units Plot Track by left mouse click on the plot track. This will display the "Enter Horizon Data" dialog with the "Stratigraphic Units" panel displayed.

The details of loading a measured section data from the User's PC can be found by going to the [Importing PC Data – Geologist Report \(Cuttings/Core Descriptions, Measured Sections\) ASCII Delimited File](#) Section (page 43) of this document for loading the Wellington KGS 1-32 Geologist Report cuttings/core description example.

- **Measured Section – Kansas Turnpike 6 Miles West of West Lawrence Interchange**
 - **Import Measured Section ASCII Delimited File**

The user now clicks on the "Geologist Report" icon button to open the "Select Geologist Report Delimited File from your PC" dialog.



This dialog allows the user to search their PC for the file of interest. In this example it is the Geologist Delimited file Measured_Section-Sec_24-T12S-R18E.txt, highlighted above. Select the Open button to display the “Parse Comments/Remarks/Notes ASCII Text File” Dialog.

Depth Position By:
 User Defined Bedding Thickness

Start Bedding at: 0.0 **Depth Data Units (will be converted to feet)**
 Feet Inch Meter Centimeter

Delimiters, i.e., ;:' **Start at Row** 4

Annotations:

- Select the “Bedding Thickness” radio button, which tells program that there is only on depth reference to parse not 2.
- Delimiter separating text from bed thickness.
- Data Starts at Line 4
- Data Starts at Line 4
- Measured Section Headers Section, identifies the location of the measured section and who created it.
- Bed thickness separated from text by a '|', e.g. “18b. shale (King Hill), gray unfossiliferous | 2.5”, notice the 18b. shale (King Hill), gray unfossiliferous is the description of the bed and the '|' separates the description from the thickness of 2.5.

Text Area Content:

```

Kansas Turnpike 6 Miles West of West Lawrence interchange, NW NW Sec 24 T12S R18E
Strata below Doniphan Shale Measured at Exposure 0.3 Mile East of Stop 2;
Measured by R.C.Moore from Figure 16 in Bulletin 169 Paleogeological Aspects of Kansas Pennsylvani
an and Permian Cyclotheims
Avoca Limestone
19. Limestone (Avoca), bluish-gray, weathers brown, medium fine grained hard, massive; large fusulini
ds common, crinoid columnals, brachiopods, moderatley large incrusting algae ( Ottonosia ), and som
e clams ( Myalina ) {^A-Avoca type marine assemblage } | 0.5+
King Hill Shale
18a. earthy limestone (King Hill), gray, limestone weathering "punky" yellow-brown, contains small irreg
ular calcite filled spaces; unfossiliferous | 2.5
18b. shale (King Hill), gray unfossiliferous | 2.5
17. Shale (King Hill), gray, weathers tan, clayey, laminated | 3
Beil Limestone
16a. Limestone (Beil), very shaly, bluish gray, weathers brownish, medium to thin bedded; highly fossilif
erous ("B" - Beil type assemblage fusulinids, brachiopods, bryozoans, corals, crinoid fragments, mollus
ks ) ("B"-Beil type marine assemblage) | 4.3
16b. Limestone (Beil), bluish gray, weathers brownish, medium to thin bedded; highly fossiliferous ("B"
-Beil type assemblage fusulinids, brachiopods, bryozoans, corals, crinoid fragments, mollusks ) ("B"-B
eil type marine assemblage) | 4.3
Queen Hill Shale
15a Shale (Queen Hill), bluish-gray | 1.5
15b Shale (Queen Hill), black and fissile, with two thin streaks of hard black shale in middle; black shal
e with conodonts ("H"-Heebner type marine assemblage Phosphate) | 2.0

```

Buttons: Parse Data Close Help

The parse engine sets the starting depth and ending depths for the description and computes the thickness and adds to the cumulative total depth. When the user selects the “Parse Date” the description is parsed (Lithology, Rock Color, Porosity, Sedimentary Structure, and Fossils) and the filename is entered into the “PC ASCII Files: Geo-Report” text field and both the Tops Data and Geologist Report Data Type rows are marked with a “YES” in the CSV Column.

Data Loaded

Data Source Filenames:

Log ASCII Standard (LAS) Files:

1:

2:

3:

PC ASCII Files:

Tops CSV: Geo-Report:

Data Type	3.0	LAS	CSV	KGS	Data Type	3.0	LAS	CSV	KGS
Log Data	NO	.....	.....	.....	Tops Data	.....	.....	YES	.....
Perforations	NO	.....	.....	.....	Geologist Report	.....	.....	YES	.....

Now click on the “Add Well Data” button in the “Load Data” dialog to transfer the Measured Section data to the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
TG			LOC	0	0	00	0	0	0	141218242512	Up

Down

Plot: Map Cross Section

Modify Well Header Information Data: Modify

Well List Actions: New Well Remove Remove All

Since there is really no information being displayed for the measured section in the Cross Section Panel. Highlight the measured section row and click on the “Modify” button to display the “Edit Header Information” dialog. Since the Header Information is in the Measured Section ASCII Text file. Open the file in any text editor.

Headers Information

Show Initial Header Data Show KGS Well Header Data

Search KGS Database for Well Header Information

Identification:

KGS Primary Key: 0 PC Primary Key:

API-Number: Status: **OUTCROP**

Name: Kansas Turnpike 6 Miles West of West Lawrence interchange

Other Well Information:

Operator Name: Operator Code: 0

Field Name: Field Code: 0

Location Information:

State: Kansas County: Douglas

Location: Sec 24-Township 12S Range 18E, NW NW

Township: 12 N S Range: 18 E W Section: 24

Kansas TRS to Latitude, Longitude & Elevation

XY Position:

Latitude: 38.993153 Longitude: -95.363003

UTM Zone: 15.0 **Compute UTM**

UTM-X: 295346.25 UTM-Y: 4318465.11

Z-Position:

Depth: 0.0 Elevation: 1001.0 Kelly Bushing: 0.0 Derrick Floor: 0.0

Comments:

Ok Close

Set the Status button to OUTCROP

Set the location description as the Name of the measured section.

Set the Location of the Measured Section, State, County and Location.

Enter the Township, Range and Section for the Measured Section and click on the "Kansas TRS to Latitude, Longitude & Elevation" so KGS ORACLE stored procedure can compute the Latitude, Longitude and Elevation for this measured section.

Once there is a Latitude & Longitude then select the "Compute UTM", which will compute the UTM X-Y position from the Latitude & Longitude of the measured section.

Select the "Ok" button to update the measured section headers information in the Cross Section Panel.

File

Cross Section Well/Location List

L=Log Data, T=Tops, G=Geologist Report

LTG	Well Name	API-Number	Status	Latitude	Longitude	Elevation	Town	Range	Sec	KEY	Order
TG	Kansas Turnpike 6 Miles West of West La...		OUTCROP	38.993	-95.363	1,001	12S	18E	24	141218242512	Up

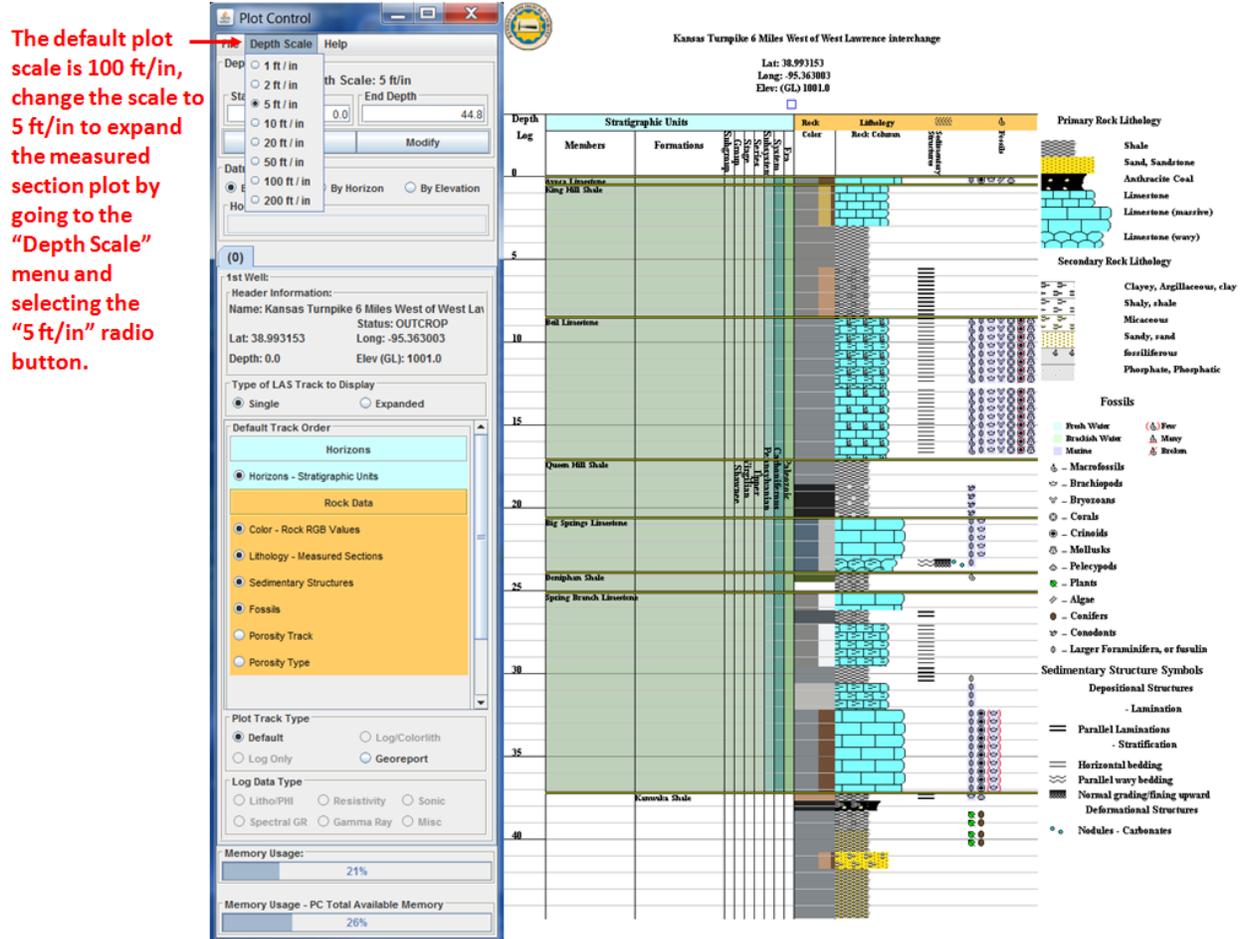
Down

Plot: Map Cross Section

Modify Well Header Information Data: Modify

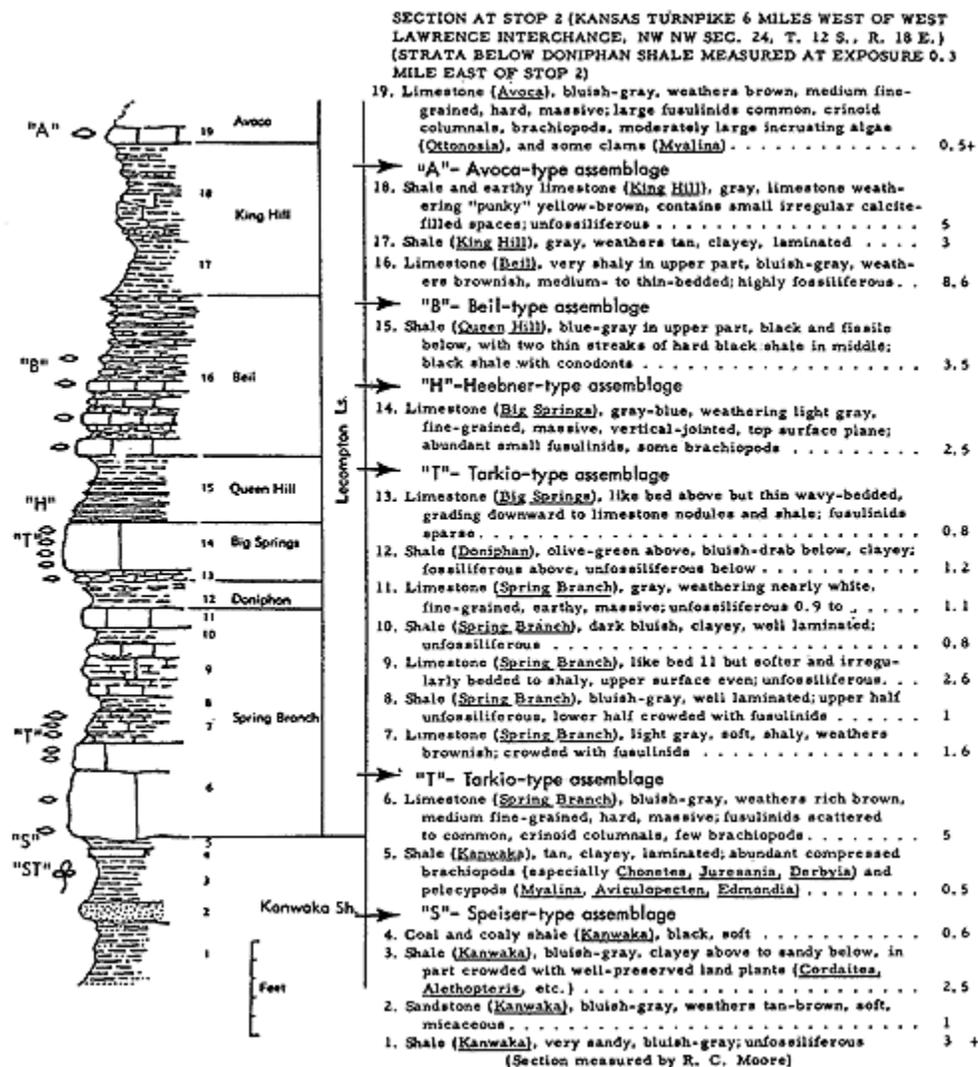
Well List Actions: New Well Remove Remove All

Now click on the “Cross Section” Plot button to display the Cross Section Plot. Note there only one measured section, but the cross section will work with one up to and including 4 wells/measured sections. You will need to change the Depth Scale from 100 ft/in (default) to 5 ft/in to see the measured section.



This example will only require the ASCII Delimited File Measured Section (Measured_Section-Sec_24-T12S-R18E.txt) File to be loaded into the Load Data Dialog. The purpose of this exercise is to show how to enter data into the Stratigraphic Units Tops Data Entry Panel.

The measured section is from the Bulletin 169: Paleocological Aspects of Kansas Pennsylvanian and Permian Cyclothems, by Raymond C. Moore, University of Kansas, Lawrence, Kansas, <http://www.kgs.ku.edu/Publications/Bulletins/169/Moore/>.



Paleoecological Aspects of Kansas Pennsylvanian and Permian Cyclothems, by Raymond C. Moore, "Figure 16--Typical section of uppermost Kanwaka Shale and most of Lecompton Limestone southeast of Lecompton, Kansas, showing stratigraphic occurrence of some ecosystems ("A," Avoca-type; "B," Beil-type; "H," Heebner-type; "S," Speiser-type; "ST," Stranger-type; "T," Tarkio-type)"

Some of the beds were modified to expand the implied sub-beds, i.e. Bed 16. "Limestone (Beil), very shaly in upper part, bluish-gray ..." implies that the upper half is shaly, so 2 beds were created to represent this one bed description. As you noticed in the text the tops are in parenthesis within each bed description. The text file was also modified to automatically load the tops by placing the top above the first bed to mention it, i.e. Bed 12 has Doniphan in parenthesis; Doniphan Shale was placed just above this bed. Some generic fossils were also added to Bed 16 to illustrate the type of Beil-type fossils and for the Heebner Shale Phosphatic are also added to the lithology.

Enter Horizon Data - Stratigraphic Units Panel

The Stratigraphic Units Panel allows the user to Add, Modify or Remove Stratigraphic Units. There are two files that are used to assist in mapping Stratigraphic Units to a specific top name.

- The 2010 International Commission on Stratigraphy Stratigraphic Units and RGB color for the Stratigraphic Units XML File (<http://www.kgs.ku.edu/software/gemini/data/ISC.xml>) are used to display the tops in the Stratigraphics Plot Track by Age (RGB Color).
- The Kansas Geological Survey (KGS) Stratigraphic Succession in Kansas, edited by D.E. Zeller, December 1968, updated 2012 (<http://www.kgs.ku.edu/software/gemini/data/kansas.xml>) will help map the Kansas Top Names to Stratigraphic Units, System, Sub-System, Series, etc. and to map the top depth of one top pick to the base depth of another top pick.

Starting Depth & Ending Depth of Stratigraphic Name

Confidence Level of the tops selection.

International Commission on Stratigraphic Units. User selects the ICS Chart button to display Standard Units.

Stratigraphic Unit Rank radio buttons, defines & sets the location of the unit on the Stratigraphic Unit Plot Track.

Stratigraphic Name belongs to section. Allows the user to place a member, bed, etc. with a formation, group, etc.

Stratigraphic Name & Alternate Name

Add/Modify – Move data to Table.

Clear – Clear all text fields.

“Stratigraphic Units Selected” Table.

List of Stratigraphic Units (Tops).

Table Buttons

Modify – Modify the Stratigraphic Units Data.

Remove – Remove Stratigraphic Unit from table.

Remove All – Clear all content Units from the table.

Top	Base	Name	Level	Eon	Era
0	0	Avoca Limestone	Poor	Phanerozoic	Paleozoic
0.5	0	King Hill Shale	Poor	Phanerozoic	Paleozoic
8.5	0	Beil Limestone	Poor	Phanerozoic	Paleozoic
17.1	0	Queen Hill Shale	Poor	Phanerozoic	Paleozoic
20.6	0	Big Springs Limestone	Poor	Phanerozoic	Paleozoic
23.9	0	Doniphan Shale	Poor	Phanerozoic	Paleozoic
25.1	0	Spring Branch Limestone	Poor	Phanerozoic	Paleozoic
37.2	0	Kanwaka Shale	Poor	Phanerozoic	Paleozoic

The KGS Stratigraphic Succession of Kansas edited by D. E. Zeller, Dec. 1968, updated 2012 (http://www.kgs.ku.edu/PRS/Ozark/TYPE_LOG/Stratigraphic/index.html).

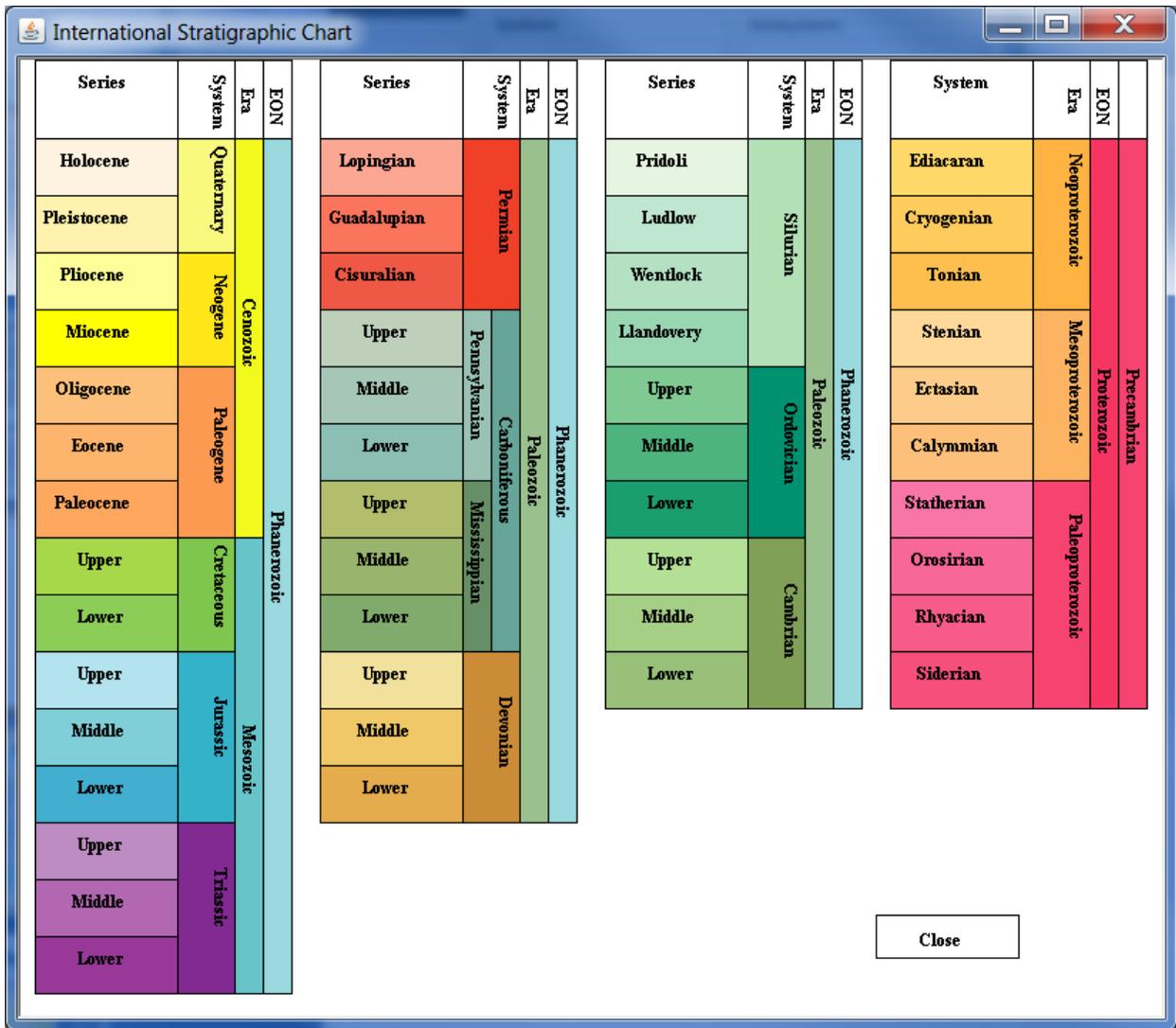


Figure: The 2010 International Commission on Stratigraphy Stratigraphic Units and RGB colors for the Stratigraphic Units.

Add Lecompton Formation to the Stratigraphic Units List

This first example is to add a Lecompton Formation, which is part of the KGS Stratigraphic Succession in Kansas. First place the mouse in the Stratigraphic Units Plot Track and left click with the mouse to display the “Enter Horizon Data” Dialog with the “Stratigraphic Units” Panel.

Left mouse click on the Stratigraphic Units Plot Track to display the “Enter Horizon Data” Dialog with the “Stratigraphic Units” Panel will be displayed with the list of tops.

The image shows a software interface for geological data entry. On the left is the 'Enter Horizon Data' dialog box, and on the right is a stratigraphic column plot.

Enter Horizon Data Dialog - Stratigraphic Units Panel:

- Starting Depth: 7.1, Ending Depth: 7.0
- Confidence: Excellent (selected), Fair, Good, Poor
- Rank: Unknown (selected), Era, System, Subsystem, Series, Subseries, Stage, Eon, Super Group, Group, Subgroup, Formation, Member, Bed
- Stratigraphic Name: [Empty]
- Alternate Name: [Empty]
- Begin Age (Ma): 0.0, End Age (Ma): 0.0
- Buttons: Add, Clear, Modify, Remove, Remove All, Cancel, Help

Stratigraphic Units Selected Table:

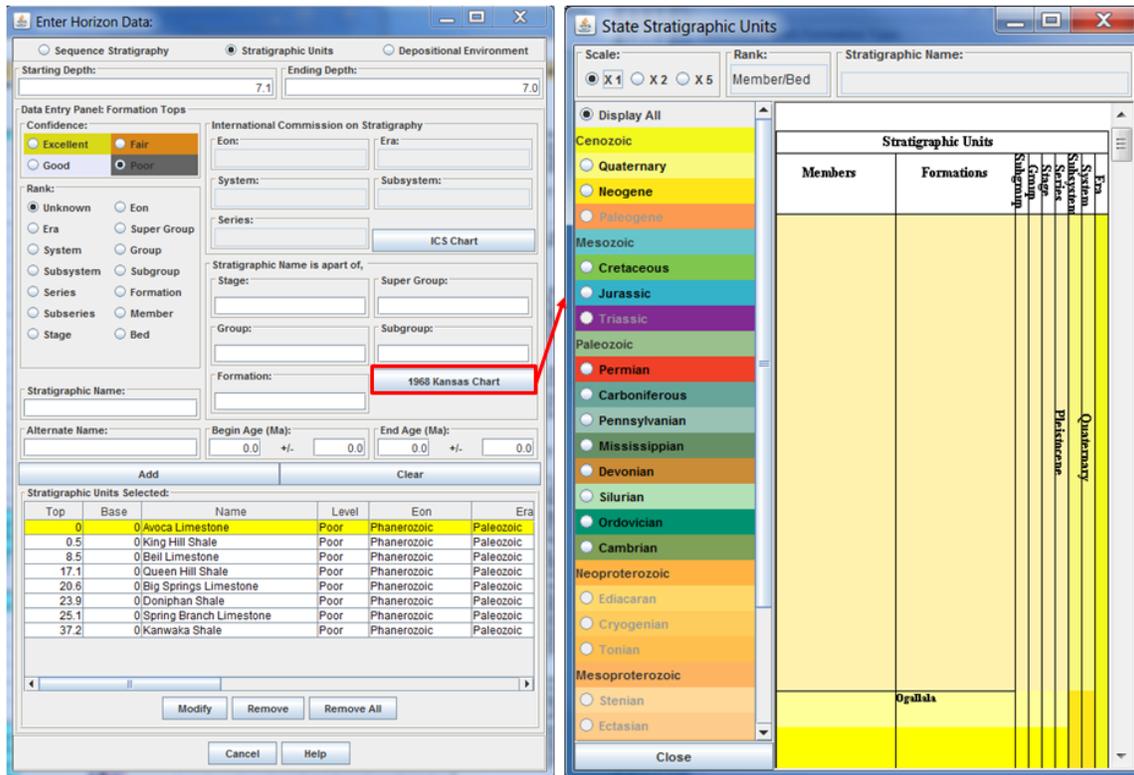
Top	Base	Name	Level	Eon	Era
0	0	Avoca Limestone	Poor	Phanerozoic	Paleozoic
0.5	0	King Hill Shale	Poor	Phanerozoic	Paleozoic
8.5	0	Bell Limestone	Poor	Phanerozoic	Paleozoic
17.1	0	Queen Hill Shale	Poor	Phanerozoic	Paleozoic
20.6	0	Big Springs Limestone	Poor	Phanerozoic	Paleozoic
23.9	0	Doniphan Shale	Poor	Phanerozoic	Paleozoic
25.1	0	Spring Branch Limestone	Poor	Phanerozoic	Paleozoic
37.2	0	Kanwaka Shale	Poor	Phanerozoic	Paleozoic

Stratigraphic Column Plot:

- Depth: 45.0
- Members: Avoca Limestone, King Hill Shale, Bell Limestone, Queen Hill Shale, Big Springs Limestone, Doniphan Shale, Spring Branch Limestone, Kanwaka Shale
- Formations: Lecompton Limestone Formation (highlighted in green)
- Rock Color: [Color swatches]
- Rock Column: [Rock column data]
- Primary Rock Lithology: Shale, Sand, Sandstone, Anthracite Coal, Limestone, Limestone (massive), Limestone (wooly)
- Secondary Rock Lithology: Clays, Argillaceous, clay, Shaly, shale, Micaceous, Sandy, sand, fossiliferous, Phosphate, Phosphatic

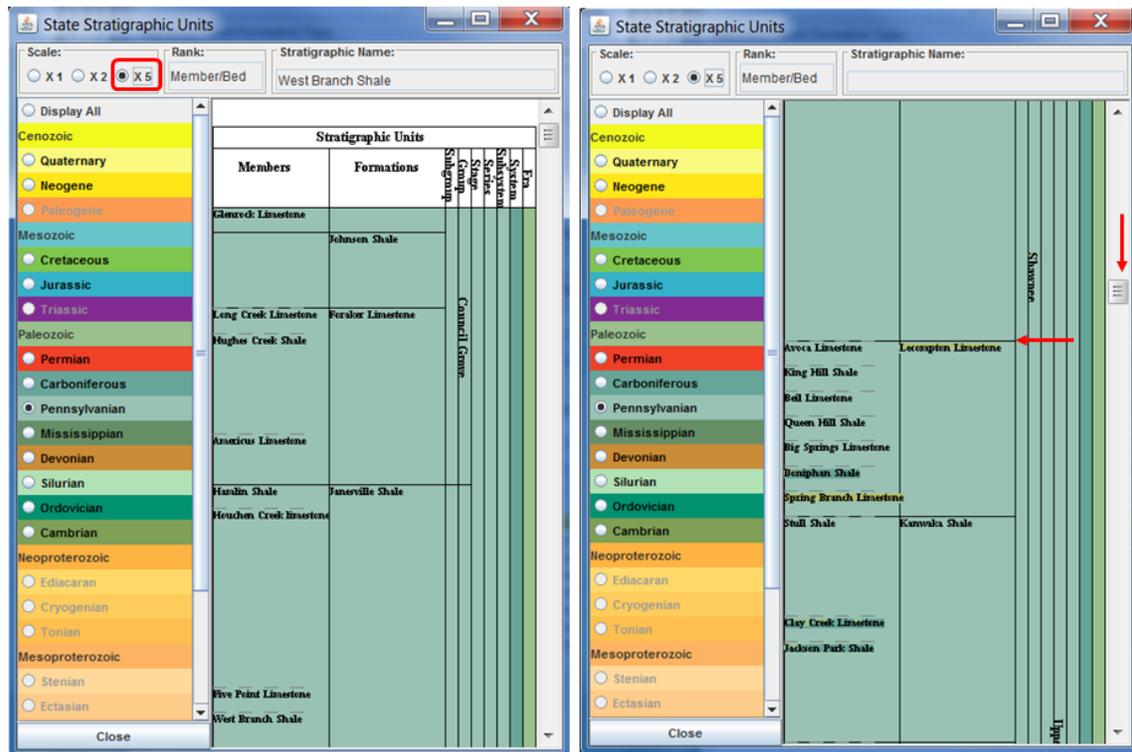
For this example all tops from Avoca Limestone to Spring Branch Limestone belongs to the Lecompton Limestone Formation. The user can manually enter the tops with as much information as they wish to display. If the stratigraphic unit is part of the Kansas Stratigraphic Units List all necessary fields can be loaded by using the “1968 Kansas Chart” button to display the list of Kansas Stratigraphic Units.

Click on the “1968 Kansas Chart” Button to display the State Stratigraphic Units Dialog.

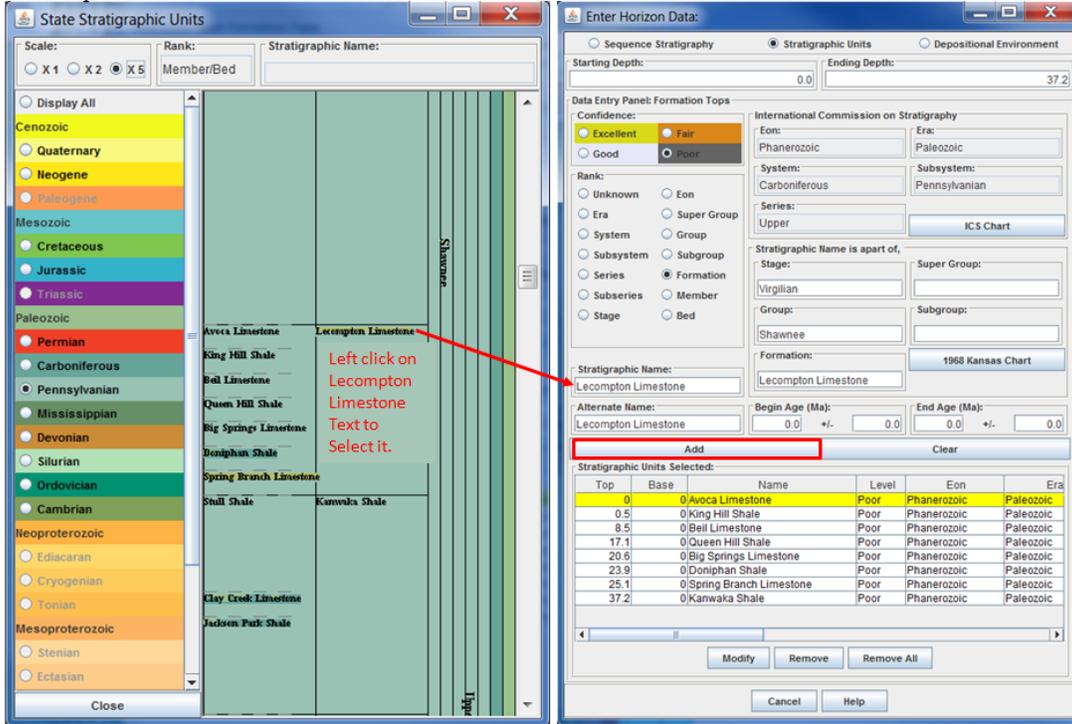


Change the Scale to X5, select the “Pennsylvanian” radio button.

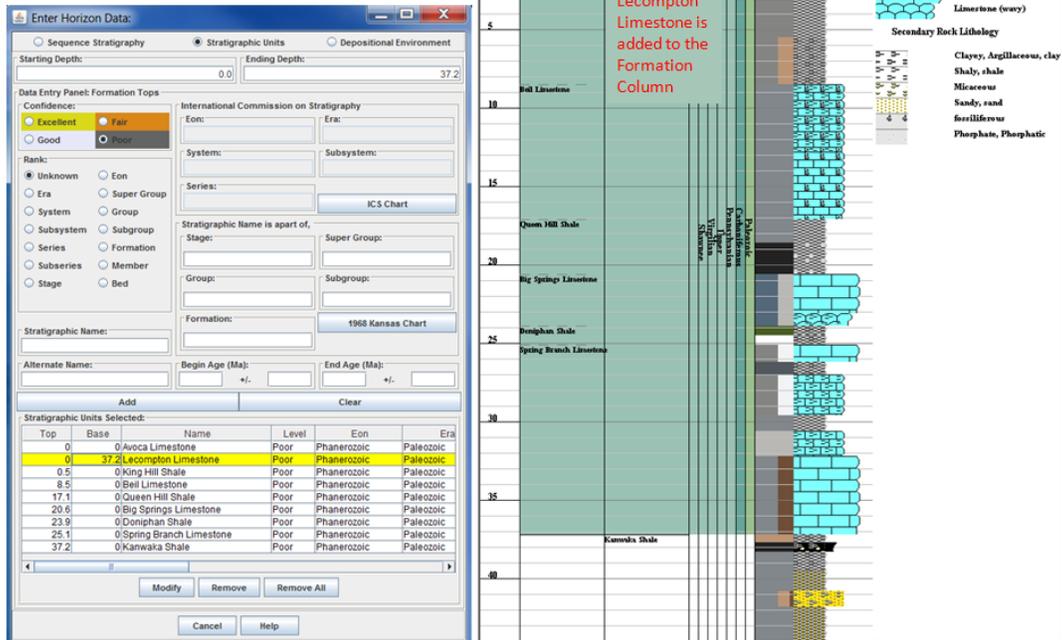
Scroll down to the Lecompton Limestone Formation.



Left mouse click on the Lecompton Limestone text to transfer all the Stratigraphic Units to the “Stratigraphic Units” Panel on the “Enter Horizon Data” Dialog. Select the “Add” Button to move Lecompton Limestone into the table.



Notice that the Lecompton Limestone is added to the Formations Column of the Stratigraphic Units Plot Track. Lecompton Limestone was added to the “Stratigraphic Units Selected” table, see the highlighted top in the table.



Add Unknown Bed (SG-A Bed) to the Stratigraphic Units List

This second example is to add an unknown bed (SG-A Bed) to the Stratigraphic Units List, which is not part of the KGS Stratigraphic Succession in Kansas. Bed 6 “Limestone (Spring Branch), bluish gray, weathers rich Brown...” has Fusulinid fossils and implies a change in sea level to deeper waters. This example will enter the basic information to the Depth Range text fields, the Stratigraphic Name text field and setting the Rank as a BED. The Stratigraphic Units will be provided by the International Commission on Stratigraphy Dialog by selecting the “ICS Chart” Button. The “International Stratigraphic Chart” Dialog displays the stratigraphic units as a series of colored boxes, each stratigraphic unit is has the recommended RGB (Red-Green-Blue) Color defined by the International Commission on Stratigraphy. The user only needs to click the colored box to select all the stratigraphic data associated with the selected stratigraphic unit and transfer the data back to the “Stratigraphic Units” Panel in the “Enter Horizon Data” Dialog.

- (1) Add SG-A to the “Stratigraphic Name” Text field.
- (2) Select the Bed Radio Button in the Rank Panel
- (3) Set the Starting Depth to 32.2 and the Ending Depth to 37.2 for the Bed 6. Limestone Depth Range.
- (4) Click on the “ICS Chart” Button to display the International Stratigraphic Chart Dialog.

The image displays two screenshots from a software application. The left screenshot shows the "Enter Horizon Data" dialog box. The "Stratigraphic Units" tab is selected. The "Starting Depth" is set to 32.2 and the "Ending Depth" is set to 37.2. The "Rank" is set to "Bed". The "Stratigraphic Name" is "SG-A". The "ICS Chart" button is highlighted with a red box. The right screenshot shows the "International Stratigraphic Chart" dialog box. The "Upper" series box under the "Pennsylvanian" system is highlighted with a red box. A red arrow points from the "ICS Chart" button in the left screenshot to the "Upper" series box in the right screenshot.

- (5) Left mouse click in the Upper Series Color Box under the Pennsylvanian System to transfer the Upper Pennsylvanian Stratigraphic Units Data to the “Stratigraphic Units” Panel on the “Enter Horizon Data” Dialog.

Enter Horizon Data:

Sequence Stratigraphy Stratigraphic Units Depositional Environment

Starting Depth: 32.2 Ending Depth: 37.2

Data Entry Panel: Formation Tops

Confidence: Excellent Fair Good Poor

Rank: Unknown Eon Era Super Group System Group Subsystem Subgroup Series Formation Subseries Member Stage Bed

International Commission on Stratigraphy

Eon: Phanerozoic Era: Paleozoic

System: Carboniferous Subsystem: Pennsylvanian

Series: Upper ICS Chart

Stratigraphic Name is apart of, Stage: Super Group:

Group: Subgroup: 1968 Kansas Chart

Formation: 1968 Kansas Chart

Stratigraphic Name: SG-A

Alternate Name: SG-A Begin Age (Ma): +/- End Age (Ma): +/-

Add Clear

Top	Base	Name	Level	Eon	Era
0	0	Avoca Limestone	Poor	Phanerozoic	Paleozoic
0	37.2	Lecompton Limestone	Poor	Phanerozoic	Paleozoic
0.5	0	King Hill Shale	Poor	Phanerozoic	Paleozoic
8.5	0	Beil Limestone	Poor	Phanerozoic	Paleozoic
17.1	0	Queen Hill Shale	Poor	Phanerozoic	Paleozoic
20.6	0	Big Springs Limestone	Poor	Phanerozoic	Paleozoic
23.9	0	Doniphan Shale	Poor	Phanerozoic	Paleozoic
25.1	0	Spring Branch Limestone	Poor	Phanerozoic	Paleozoic
37.2	0	Kanwaka Shale	Poor	Phanerozoic	Paleozoic

Modify Remove Remove All

Cancel Help

Notice that the Stratigraphic Units Data from the ICS Chart is transferred to the "International Commission on Stratigraphy" Panel.

Now Select the "Add" Button to transfer the Stratigraphic Units Data for the SG-A Bed to the "Stratigraphic Units Selected" Table.

Notice that the SG-A Bed is added to the Members Column of the Stratigraphic Units Plot Track. SG-A Bed was added to the "Stratigraphic Units Selected" table, see the highlighted top in the table.

Enter Horizon Data:

Sequence Stratigraphy Stratigraphic Units Depositional Environment

Starting Depth: 32.2 Ending Depth: 37.2

Data Entry Panel: Formation Tops

Confidence: Excellent Fair Good Poor

Rank: Unknown Eon Era Super Group System Group Subsystem Subgroup Series Formation Subseries Member Stage Bed

International Commission on Stratigraphy

Eon: Phanerozoic Era: Paleozoic

System: Carboniferous Subsystem: Pennsylvanian

Series: Upper ICS Chart

Stratigraphic Name is apart of, Stage: Super Group:

Group: Subgroup: 1968 Kansas Chart

Formation: 1968 Kansas Chart

Stratigraphic Name: SG-A

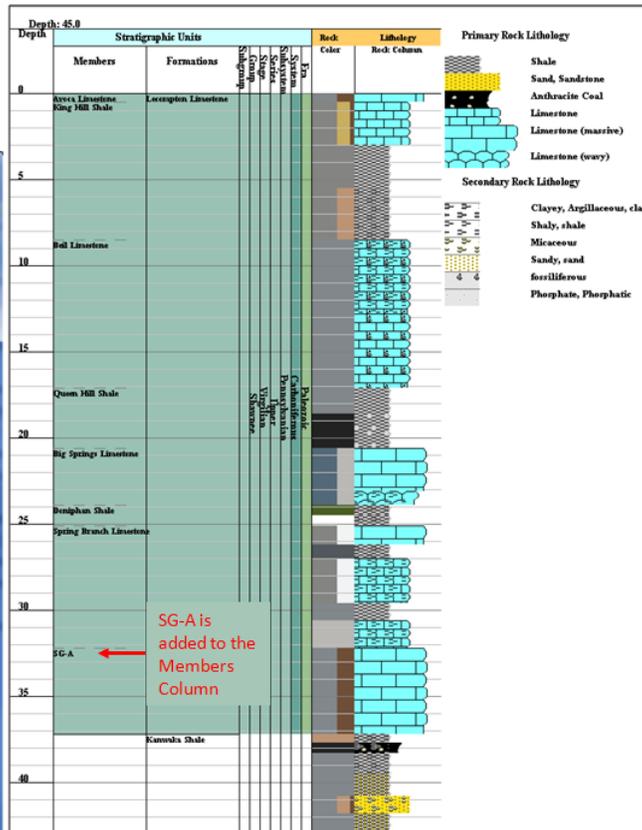
Alternate Name: SG-A Begin Age (Ma): +/- End Age (Ma): +/-

Add Clear

Top	Base	Name	Level	Eon	Era
0	0	Avoca Limestone	Poor	Phanerozoic	Paleozoic
0	37.2	Lecompton Limestone	Poor	Phanerozoic	Paleozoic
0.5	0	King Hill Shale	Poor	Phanerozoic	Paleozoic
8.5	0	Beil Limestone	Poor	Phanerozoic	Paleozoic
17.1	0	Queen Hill Shale	Poor	Phanerozoic	Paleozoic
20.6	0	Big Springs Limestone	Poor	Phanerozoic	Paleozoic
23.9	0	Doniphan Shale	Poor	Phanerozoic	Paleozoic
25.1	0	Spring Branch Limestone	Poor	Phanerozoic	Paleozoic
32.2	37.2	SG-A	Poor	Phanerozoic	Paleozoic
37.2	0	Kanwaka Shale	Poor	Phanerozoic	Paleozoic

Modify Remove Remove All

Cancel Help



Modify data for the Kanwaka Shale Formation in the Stratigraphic Units List

This third example is to modify the Kanwaka Shale Formation Data to include an ending depth and to add some other missing terms.

Highlight the Kanwaka Shale, select the “Modify” Button.

The screenshot shows the 'Enter Horizon Data' dialog box with the 'Stratigraphic Units' tab selected. The 'Starting Depth' is 32.2 and the 'Ending Depth' is 37.2. The 'Data Entry Panel: Formation Tops' shows 'Confidence' set to 'Fair' and 'Rank' set to 'Formation'. The 'Stratigraphic Name' is 'Kanwaka Shale'. The 'Stratigraphic Units Selected' table is as follows:

Top	Base	Name	Level	Eon	Era
0	0	Avoca Limestone	Poor	Phanerozoic	Paleozoic
0	37.2	Lecompton Limestone	Poor	Phanerozoic	Paleozoic
0.5	0	King Hill Shale	Poor	Phanerozoic	Paleozoic
8.5	0	Bell Limestone	Poor	Phanerozoic	Paleozoic
17.1	0	Queen Hill Shale	Poor	Phanerozoic	Paleozoic
20.6	0	Big Springs Limestone	Poor	Phanerozoic	Paleozoic
23.9	0	Doniphan Shale	Poor	Phanerozoic	Paleozoic
25.1	0	Spring Branch Limestone	Poor	Phanerozoic	Paleozoic
32.2	37.2	SG-A	Poor	Phanerozoic	Paleozoic
37.2	0	Kanwaka Shale	Poor	Phanerozoic	Paleozoic

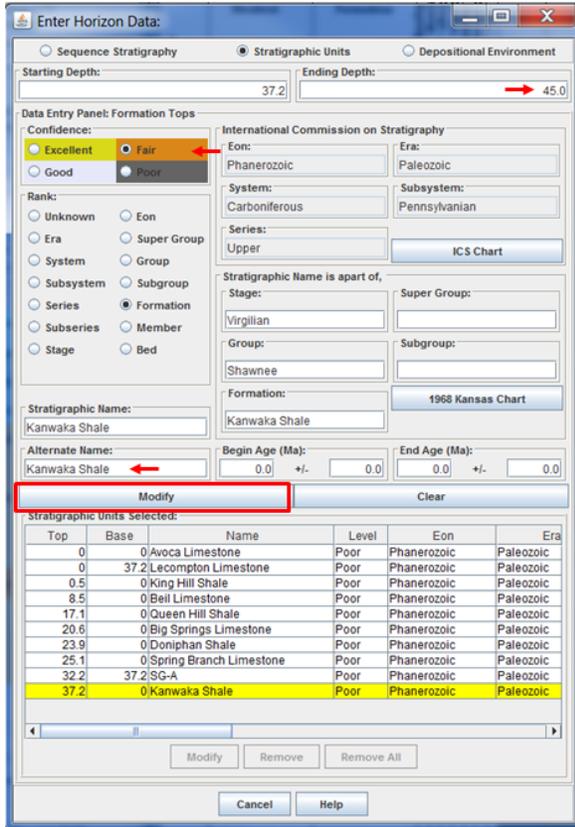
The 'Modify' button is highlighted with a red box.

Notice the Stratigraphic Units Data are loaded into the Stratigraphic Units Panel Fields.

The screenshot shows the 'Enter Horizon Data' dialog box with the 'Stratigraphic Units' tab selected. The 'Starting Depth' is 37.2 and the 'Ending Depth' is 0.0. The 'Data Entry Panel: Formation Tops' shows 'Confidence' set to 'Fair' and 'Rank' set to 'Formation'. The 'Stratigraphic Name' is 'Kanwaka Shale'. The 'Stratigraphic Units Selected' table is as follows:

Top	Base	Name	Level	Eon	Era
0	0	Avoca Limestone	Poor	Phanerozoic	Paleozoic
0	37.2	Lecompton Limestone	Poor	Phanerozoic	Paleozoic
0.5	0	King Hill Shale	Poor	Phanerozoic	Paleozoic
8.5	0	Bell Limestone	Poor	Phanerozoic	Paleozoic
17.1	0	Queen Hill Shale	Poor	Phanerozoic	Paleozoic
20.6	0	Big Springs Limestone	Poor	Phanerozoic	Paleozoic
23.9	0	Doniphan Shale	Poor	Phanerozoic	Paleozoic
25.1	0	Spring Branch Limestone	Poor	Phanerozoic	Paleozoic
32.2	37.2	SG-A	Poor	Phanerozoic	Paleozoic
37.2	0	Kanwaka Shale	Poor	Phanerozoic	Paleozoic

The 'Modify' button is highlighted with a red box.



Change the Ending Depth to 45.0, which is the ending depth of the measured sections.

Change the Confidence from Poor to Fair. This will appear in the Level column of the "Stratigraphic Units Selected" Table.

Add Kanwaka Shale to the "Alternate Name" text field.

Now Select the "Modify" Button to save the changes and modify the contents of the "Kanwaka Shale" Stratigraphic Units in the "Stratigraphic Units Selected" table.

Notice that the Kanwaka Shale Formation has been modified to extend the ending depth to 45.0'. This also extends the Upper Pennsylvanian Color all the way down to the end of the measured section.

