# Digitize Electric Log Well (E-Log) Image Applet

**by John R. Victorine**

## Introduction

The Digitizer web app has 2 sources for importing well data, 1) the user's PC or 2) the Kansas Geological Survey (KGS) Server & ORACLE Database. The electric well log image digitizer tool was created to provide a simple method to digitize small sections of well log images into a digitize Log ASCII Standard (LAS) File. The user may only be interested in a short stratigraphic section for a specific study, i.e., to do a PfEFFER Analysis over a depth range and needs to digitize 100 to 200 feet from a Resistivity well log and a Neutron-Density well log. This program allows the user to digitize the well log curves over the depth range needed and to save that data in a LAS version 2.0 format. The program allows the user to import a PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file.

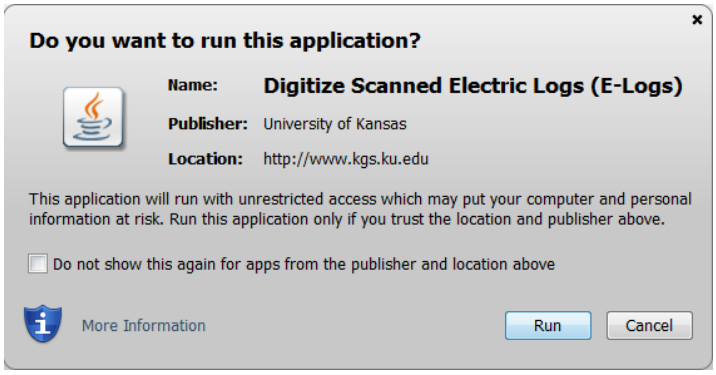
**NOTE:** The program cannot handle the complete well log image, only small image captures in the above image formats.

This web application was primarily created to digitize small sections of scanned well log images, but the web application will do the following,

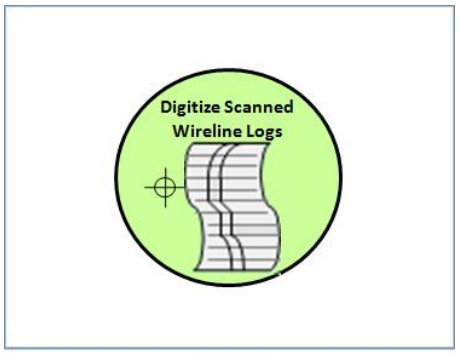
- **DIGITIZER** - Digitize multiple image sections from multiple logs and be able to merge the data into one LAS 2.0 file.
    - Digitize Linear Curves
    - Digitize Logarithmic Curves, i.e. Resistivity, Permeability Log tracks
- **MERGE** - Merge multiple LAS files into one LAS 2.0 File.
    - User will be able to select the curves from each file they wish to merge into the new file.
    - The user will be able to select the depth range they wish to save, by just setting the START, STOP values.
    - The program will capture all the curves in the files even the curves that are not in the "KGS Standardize Mnemonics" List. **Note:** Only numeric data.
- **SPLIT** - The program will split the log data from a LAS 3.0 file and create one LAS 2.0 file.
- **CORRECT** - To read in a LAS file that has a bad data section, digitize the section and merge the data back into the LAS 2.0 file.

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.

To access the Digitizer Applet (http://www.kgs.ku.edu/software/DEWL/applet.html) go to 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.




This 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 read Log ASCII Standard (LAS) either version 2.0 or version 3.0 file and to write a LAS 2.0 File to your PC to save the digitizer 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 Digitizer "Enter" Panel illustrated below,




Enter

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## Digitize LAS Image File Control Dialog

Click the "Digitize Scanned Wireline Logs - Enter" Icon Button, which will show the "Digitize LAS Image File" dialog. The dialog below displays an example of the Shamar 1 well header information data loaded. The icon buttons in the Data Source Panel assists the user in loading well data into the Digitizer Applet.

Save Data – Floppy Disc Icon
Clear all Data – Erase Page Icon
Close Session – Closed Book Icon

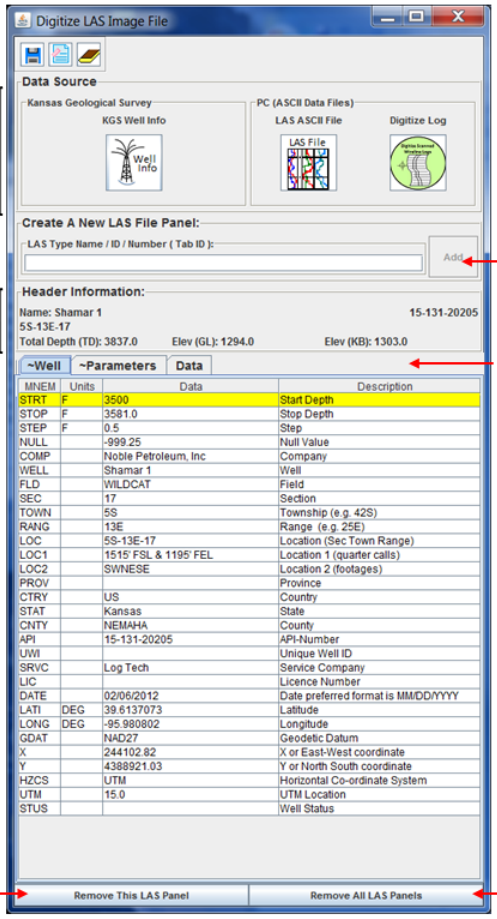
**Data Source Panel**
**Kansas Geological Survey Panel**
• Load Well Information Data.

**Header Information Panel**
Summary of Well Information Data

**~Well Information Section**
The well information section holds the data that will appear in the ~W (Well Information) Section of the Log ASCII Standard (LAS) File. It holds the Well Specific Information, i.e. Well Name, Company, Location, etc. It also holds the Start, Stop, Step and Null Value.

**~Parameters Section**
The parameters section holds information about the bore hole, elevation, resistivity, temperature, etc.

User can remove selected Data Tab from dialog




**Data Source Panel**
**PC (ASCII Data Files) Panel**
• Load Log ASCII Standard (LAS) ver. 2.0 & 3.0 Files
• Digitize Scanned Electric Well Log Image Files for Log Data

Create a New Curve & ASCII Data Panel

**~Data ... Tabs**
Each tab holds the ~Curve Information & ~ASCII Data Section of the Log ASCII Standard (LAS) File. Since this program was designed to merge the log data into one file, there can be many "Data" Tabs, but each must have a unique label, i.e. Data 1, Data 2, etc.

This way the user can digitize each electric log separately and then merge the data into one LAS File.

User can remove all Data Tabs from dialog

### Data Source Panel

The Data Source Panel provides two methods of importing data into the Profile Web App. The Kansas Geological Survey (KGS) Database and the user's PC, a Digitizer is also provided to convert an Electric Log Image to digital data. A number of icon buttons are provided to assist the user in importing the specific data type of interest.


**Kansas Well Information**
This button allows the user to access well information stored in the Kansas database.


**Log ASCII Standard (LAS) File Read**
This version will read 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.

**Digitizer**
This button allows the user to digitize the Electric Log Image. The Electric Log Image must be a PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file.

## Control Dialog Data Entry Panels

The Data Entry Panels were designed to emulate the Log ASCII Standard (LAS) version 2.0 File sections, which is ultimately the purpose of this web app. The LAS (Log ASCII Standard) is rapidly becoming the accepted industry standard for electronic transmission of digital wire line logs. Earlier digital formats were commonly coded in binary (such as LIS) and so required specialized software to read them. The LAS standard was introduced by the Canadian Well Logging Society (http://www.cwls.org/) in 1989 to standardize the organization of digital log curve information for personal computer users. It did this very successfully and the standard became popular worldwide. Version 1.2 was the first version and followed in September 1992 by version 2.0 to address some inconsistencies. A more versatile version LAS 3.0 was released in 1999 however at present LAS 2.0 remains the dominant product. LAS 3.0 clarifies several of the poorly defined specifications of LAS 2.0 and provides expanded data storage capabilities, but has seen limited implementation.

The sections defined for the LAS 2.0 standard are as follows (http://www.cwls.org/wp-content/uploads/2014/09/LAS_20_Update_Jan2014.pdf):

"~V" (also known as "~VERSION INFORMATION SECTION") is a required section; has formatting requirements; must be the first section; identifies the version number and whether data is in "wrapped" or "un-wrapped" mode. The following are considered required fields in the ~Version information section for the LAS version 2.0 standard,

~Version Information

| Mnemonics | .Units | Value | : Description |
|---|---|---|---|
| VERS | . | 2.0 | : CWLS log ASCII Standard -VERSION 2.0 |
| WRAP | . | NO | : One line per depth step |

"**~W**" (also known as "WELL INFORMATION SECTION") is a required section; has formatting requirements; is preferably the second section; contains information on the well name, location, and start and stop values of the data in this file. The following are considered required fields int the ~Well Information Section for the LAS version 2.0 standard,

~W(Well Information)

| Mnemonics | .Units | Value | : Description |
|---|---|---|---|
| STRT | .F | nnnn.nn | : Start Depth |
| STOP | .F | nnnn.nn | : Stop Depth |
| STEP | .F | nnnn.nn | : Step Depth |
| NULL | . | nnnn.nn | : Null Value; Common Null Value is -999.25. |
| COMP | . | aaaaaaaaaaaaaaaaaaaaaaa | : Company Name |
| WELL | . | aaaaaaaaaaaaaaaaaaaaaaa | : Well Name |
| FLD | . | aaaaaaaaaaaaaaaaaaaaaaa | : Field Name |
| LOC | . | aaaaaaaaaaaaaaaaaaaaaaa | : Well Location |
| PROV | . | aaaaaaaaaaaaaaaaaaaaaaa | : Province; Canadian |
| CTRY | . | aaaaaaaaaaaaaaaaaaaaaaa | : Country; Outside Canada |
| STAT | . | aaaaaaaaaaaaaaaaaaaaaaa | : State |
| CNTY | . | aaaaaaaaaaaaaaaaaaaaaaa | : County |
| UWI | . | aaaaaaaaaaaaaaaaaaaaaaa | : Unique Well ID; Within Canada 16 char string |
| API | . | aaaaaaaaaaaaaaaaaaaaaaa | : API-Number |
| SRVC | . | aaaaaaaaaaaaaaaaaaaaaaa | : Logging Company |
| LIC | . | aaaaaaaaaaaaaaaaaaaaaaa | : Regulatory License Number |
| DATE | . | aaaaaaaaaaaaaaaaaaaaaaa | : Date logged, preferred date MM/DD/YYYY |

~Well | ~Parameters | Data

| MNEM | Units | Data | Description |
|---|---|---|---|
| STRT | F | 3500 | Start Depth |
| STOP | F | 3581.0 | Stop Depth |
| STEP | F | 0.5 | Step |
| NULL | | -999.25 | Null Value |
| COMP | | Noble Petroleum, Inc | Company |
| WELL | | Shamar 1 | Well |
| FLD | | WILDCAT | Field |
| SEC | | 17 | Section |
| TOWN | | 5S | Township (e.g. 42S) |
| RANG | | 13E | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Location (Sec Town Range) |
| LOC1 | | 1515' FSL & 1195' FEL | Location 1 (quarter calls) |
| LOC2 | | SWNESE | Location 2 (footages) |
| PROV | | | Province |
| CTRY | | US | Country |
| STAT | | Kansas | State |
| CNTY | | NEMAHA | County |
| API | | 15-131-20205 | API-Number |
| UWI | | | Unique Well ID |
| SRVC | | Log Tech | Service Company |
| LIC | | | Licence Number |
| DATE | | 02/06/2012 | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 39.6137073 | Latitude |
| LONG | DEG | -95.980802 | Longitude |
| GDAT | | NAD27 | Geodetic Datum |
| X | | 244102.82 | X or East-West coordinate |
| Y | | 4388921.03 | Y or North South coordinate |
| HZCS | | UTM | Horizontal Co-ordinate System |
| UTM | | 15.0 | UTM Location |
| STUS | | | Well Status |

```
~Well
#MNEM .UNIT                  VALUE  : DESCRIPTION
 STRT  .F                     3500  : Start Depth
 STOP  .F                     3580  : Stop Depth
 STEP  .F                      0.5  : Step
 NULL  .                    -999.25  : Null Value
 COMP  .          Noble Petroleum, Inc.  : Company
 WELL  .                    Shamar 1  : Well
 FLD   .                     WILDCAT  : Field
 SEC   .                          17  : Section
 TOWN  .                          5S  : Township (e.g. 42S)
 RANG  .                         13E  : Range  (e.g. 25E)
 LOC   .                   5S-13E-17  : Location (Sec Town Range)
 LOC1  .       1515' FSL & 1195' FEL  : Location 1 (quarter calls)
 LOC2  .                      SWNESE  : Location 2 (footages)
 PROV  .                              : Province
 CTRY  .                          US  : Country
 STAT  .                      Kansas  : State
 CNTY  .                     NEMAHA  : County
 API   .               15-131-20205  : API-Number
 UWI   .                              : Unique Well ID
 SRVC  .                   Log Tech  : Service Company
 LIC   .                              : Licence Number
 DATE  .                  02/06/2012  : Date preferred format is MM/DD/YYYY
 LATI  .DEG               39.6137073  : Latitude
 LONG  .DEG              -95.980802  : Longitude
 GDAT  .                      NAD27  : Geodetic Datum
 X     .                  244102.82  : X or East-West coordinate
 Y     .                 4388921.03  : Y or North South coordinate
 HZCS  .                        UTM  : Horizontal Co-ordinate System
 UTM   .                       15.0  : UTM Location
 STUS  .                              : Well Status
```

"**~P**" (also known as ~PARAMETER INFORMATION SECTION") is an optional section; has formatting requirements; contains information on parameters or constants relevant to the wellbore such as mud resistivity, wire line engineer, truck number, elevation data, etc.

~Well | ~Parameters | Data

| MNEM | Units | Data | Description |
|---|---|---|---|
| EGL | F | 1294.0 | Ground Level Elevation |
| EKB | F | 1303.0 | Kelly Bushing Elevation |
| EDF | F | | Derrick Floor Elevation |
| ERT | F | | Rotary Table Elevation |
| TDL | F | 3837.0 | Total Depth Logger |
| TDD | F | 3832.0 | Total Depth Driller |
| CSGL | F | | Casing Bottom Logger |
| CSGD | F | | Casing Bottom Driller |
| CSGS | IN | | Casing Size |
| CSGW | LB | | Casing Weight |
| BS | IN | 7.875 | Bit Size |
| DFT | | Chemical | Mud type |
| MSS | | | Mud Sample Source |
| DFD | gm/cc | 9.0 | Mud Density |
| DFV | s/qt | | Mud Viscosity (Funnel) |
| DFL | cc | | Fluid Loss |
| PH | | | PH |
| RM | OHM-M | | Resistivity of Mud |
| MST | DEG-F | | Temperature of Mud |
| RMF | OHM-M | | Resistivity of Mud Filtrate |
| MFT | DEG-F | | Temperature of Mud Filtrate |
| RMC | OHM-M | | Resistivity of Mud Cake |
| MCST | DEG-F | | Temperature of Mud Cake |
| BHT | DEG-F | 116.0 | Maximum Recorded Temperature |
| RMB | OHM-M | | Resitivity @ BHT |
| TIMC | DATE | | Date/Time Circulation Stopped |
| TIML | DATE | | Date/Time Logger Tagged Bottom |
| UNIT | | 10 | Logging Unit Number |
| BASE | | Hays, Kansas | Home Base of Logging Unit |
| ENG | | Jason Wellbrock | Recording Engineer |
| WIT | | Doug Davis | Witnessed By |

```
~Parameter
#MNEM .UNIT            VALUE  : DESCRIPTION
 EGL   .F              1294.0  : Ground Level Elevation
 EKB   .F              1303.0  : Kelly Bushing Elevation
 EDF   .F                      : Derrick Floor Elevation
 ERT   .F                      : Rotary Table Elevation
 TDL   .F              3837.0  : Total Depth Logger
 TDD   .F              3832.0  : Total Depth Drill
 CSGL  .F                      : Casing Bottom Logger
 CSGD  .F                      : Casing Bottom Driller
 CSGS  .IN                     : Casing Size
 CSGW  .LB                     : Casing Weight
 BS    .IN              7.875  : Bit Size
 DFT   .              Chemical  : Mud type
 MSS   .                       : Mud Sample Source
 DFD   .gm/cc              9.0 : Mud Density
 DFV   .s/qt                   : Mud Viscosity (Funnel)
 DFL   .cc                     : Fluid Loss
 PH    .                       : PH
 RM    .OHM-M                  : Resistivity of Mud
 MST   .DEG-F                  : Temperature of Mud
 RMF   .OHM-M                  : Resistivity of Mud Filtrate
 MFT   .DEG-F                  : Temperature of Mud Filtrate
 RMC   .OHM-M                  : Resistivity of Mud Cake
 MCST  .DEG-F                  : Temperature of Mud Cake
 BHT   .DEG-F            116.0 : Maximum Recorded Temperature
 RMB   .OHM-M                  : Resitivity @ BHT
 TIMC  .DATE                   : Date/Time Circulation Stopped
 TIML  .DATE                   : Date/Time Logger Tagged Bottom
 UNIT  .                   10  : Logging Unit Number
 BASE  .          Hays, Kansas : Home Base of Logging Unit
 ENG   .       Jason Wellbrock : Recording Engineer
 WIT   .            Doug Davis : Witnessed By
```

"**~O**" (also known as "~OTHER") is an optional section; has no formatting requirements; contains other information or comments.

"**~C**" (also known as ~CURVE INFORMATION SECTION") is a required section; has formatting requirements; contains curve mnemonics and their definitions in the order that they appear in the data section.

~Well | ~Parameters | Data

~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | F | | Depth |
| X | GR | API | | Gamma Ray |
| X | NPHI | PU | | Neutron porosity |
| X | DPHI | PU | | Density porosity |

```
~Curve
#MNEM .UNIT            VALUE  : DESCRIPTION
 DEPT  .F                      : Depth
 GR    .API                    : Gamma Ray
 NPHI  .PU                     : Neutron porosity
 DPHI  .PU                     : Density porosity
```

"**~A**" (also known as ~ASCII LOG DATA") is a required section; has formatting requirements; is the last section in the file and also referred to as the data section. The index of the data columns is either Depth or Time. The index values always appear in the first column and each column of data must be separated by at least one space (ASCII 32). All values in the ASCII log data section must be floating point or integer (long) values. Other formats such as Text or Exponential values are not supported.

~Well | ~Parameters | Data

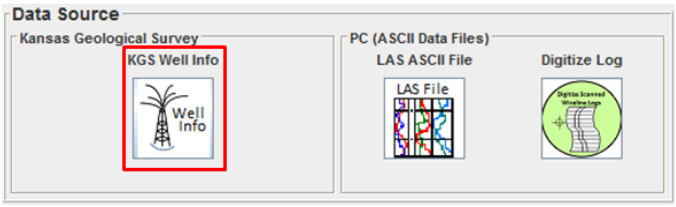
~Curves | ~ASCII

| DEPT | GR | NPHI | DPHI |
|---|---|---|---|
| 3,500 | 30 | 12.855 | 3.165 |
| 3,500.5 | 29.488 | 12.821 | 3.397 |
| 3,501 | 28.976 | 12.787 | 3.629 |
| 3,501.5 | 28.464 | 12.677 | 3.861 |
| 3,502 | 27.952 | 12.373 | 3.699 |
| 3,502.5 | 27.409 | 12.068 | 3.394 |
| 3,503 | 26.64 | 11.766 | 3.09 |
| 3,503.5 | 25.871 | 11.596 | 2.775 |
| 3,504 | 26.042 | 11.427 | 2.451 |
| 3,504.5 | 26.261 | 11.258 | 2.126 |
| 3,505 | 26.481 | 11.013 | 1.892 |
| 3,505.5 | 26.667 | 10.742 | 1.689 |
| 3,506 | 26.667 | 10.471 | 1.486 |
| 3,506.5 | 26.667 | 10.307 | 1.284 |
| 3,507 | 26.667 | 10.256 | 1.34 |
| 3,507.5 | 26.667 | 10.205 | 1.514 |
| 3,508 | 26.667 | 10.154 | 1.688 |
| 3,508.5 | 27.226 | 10.098 | 1.862 |
| 3,509 | 27.995 | 10.008 | 2.053 |
| 3,509.5 | 28.763 | 9.918 | 2.029 |
| 3,510 | 30.867 | 9.828 | 1.775 |
| 3,510.5 | 34.455 | 9.738 | 1.245 |
| 3,511 | 37.605 | 9.622 | 0.129 |
| 3,511.5 | 40.678 | 9.419 | -0.851 |
| 3,512 | 47.22 | 9.216 | -1.003 |
| 3,512.5 | 55.692 | 9.427 | -1.155 |
| 3,513 | 69.53 | 10.236 | -0.415 |
| 3,513.5 | 86.935 | 11.319 | 0.356 |
| 3,514 | 116.218 | 12.882 | 1.335 |
| 3,514.5 | 139.114 | 14.8 | 2.96 |
| 3,515 | 141.493 | 17.852 | 3.839 |
| 3,515.5 | 140.469 | 19.579 | 4.245 |
| 3,516 | 138.056 | 21.306 | 4.651 |

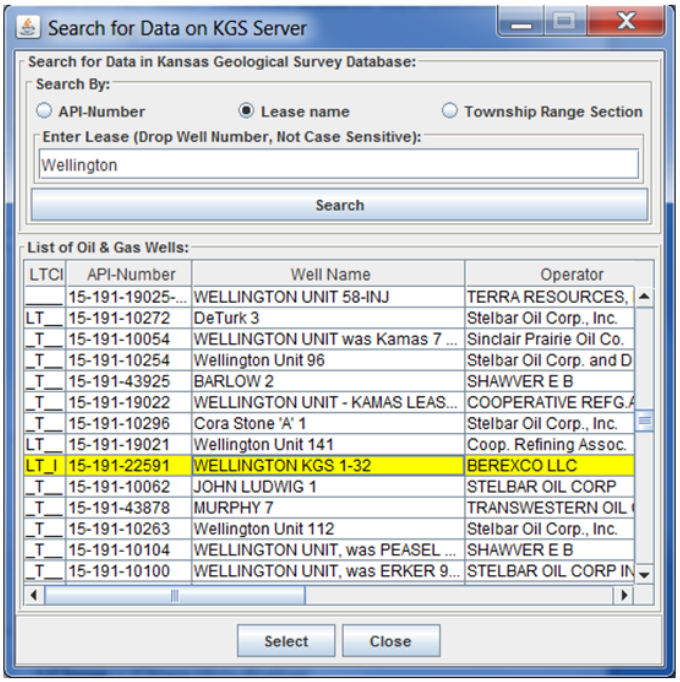
```
~ASCII
# DEPT GR NPHI DPHI
 3500.0 30.0 12.855 3.165
 3500.5 29.488 12.821 3.397
 3501.0 28.976 12.787 3.629
 3501.5 28.464 12.677 3.861
 3502.0 27.952 12.373 3.699
 3502.5 27.409 12.068 3.394
 3503.0 26.64 11.766 3.09
 3503.5 25.871 11.596 2.775
 3504.0 26.042 11.427 2.451
 3504.5 26.261 11.258 2.126
 3505.0 26.481 11.013 1.892
 3505.5 26.667 10.742 1.689
 3506.0 26.667 10.471 1.486
 3506.5 26.667 10.307 1.284
 3507.0 26.667 10.256 1.34
 3507.5 26.667 10.205 1.514
 3508.0 26.667 10.154 1.688
 3508.5 27.226 10.098 1.862
 3509.0 27.995 10.008 2.053
 3509.5 28.763 9.918 2.029
 3510.0 30.867 9.828 1.775
 3510.5 34.455 9.738 1.245
 3511.0 37.605 9.622 0.129
 3511.5 40.678 9.419 -0.851
 3512.0 47.22 9.216 -1.003
 3512.5 55.692 9.427 -1.155
 3513.0 69.53 10.236 -0.415
 3513.5 86.935 11.319 0.356
 3514.0 116.218 12.882 1.335
 3514.5 139.114 14.8 2.96
 3515.0 141.493 17.852 3.839
 3515.5 140.469 19.579 4.245
 3516.0 138.056 21.306 4.651
```

## Import Well Header Information from Kansas Geological Survey (KGS) Database

The Kansas Geological Survey (KGS) has a good collection of well data stored in the ORACLE Database. In this example the user will download the well header information from the KGS database. 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 Info" Icon Button in the Data Source Panel.




**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**

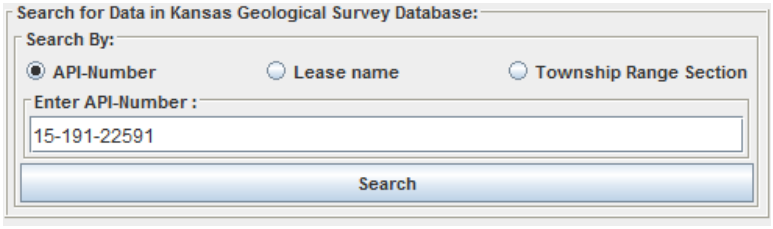
**Load Well Header Buttons**
- **Select** – Download the header information for the well selected.
- **Close** – Close this dialog

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

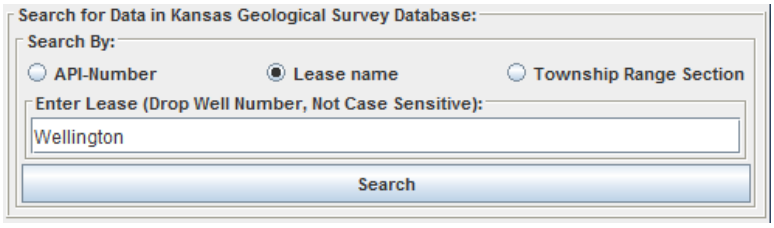
This will display the "Search for Data on KGS Server" Dialog, see above image. This dialog allows the user to search the KGS database for well header information. In this example, the well of interest will be the Wellington KGS 1-32. This example assumes the user will eventually digitize the DST Pressure/Temperature vs. Time Plots and eventually saving the data will require the Header Information Panel be filled with expected data and this search will help the user download well header information of the well of interest.

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

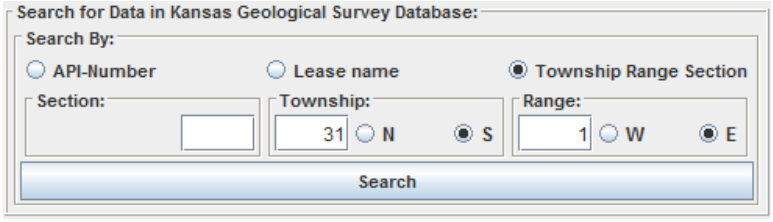
- By API-Number – KGS has a specific format for the API-Number, i.e.SS-CCC-99999 where SS is the state code for Kansas 15, CCC is the county code for Wellington KGS 1-32 it is 191 for Sumner County and the 5-Digit Well Number for the Wellington KGS 1-32 is 22591.



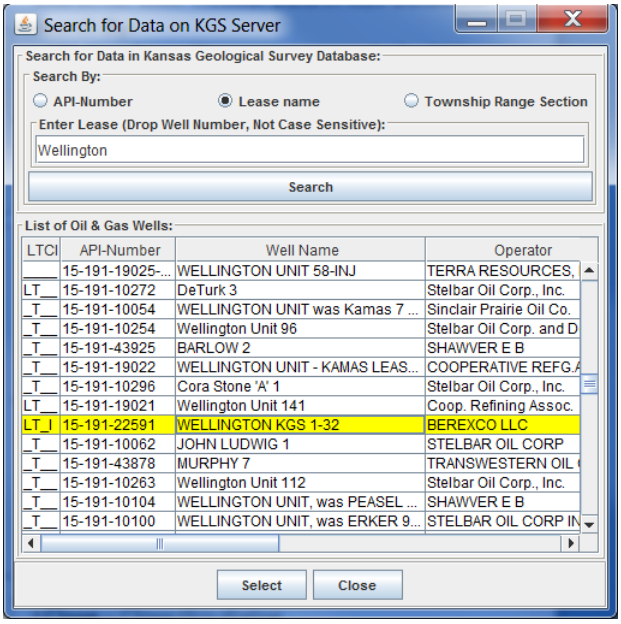

- By Partial Lease Name – The stored procedure used to retrieve the well header information allows the user to enter a partial phrase, in this example Wellington. The program places a '%' in front and back of the phrase and sends the request to the Database, i.e. "%Wellington%".




- 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.

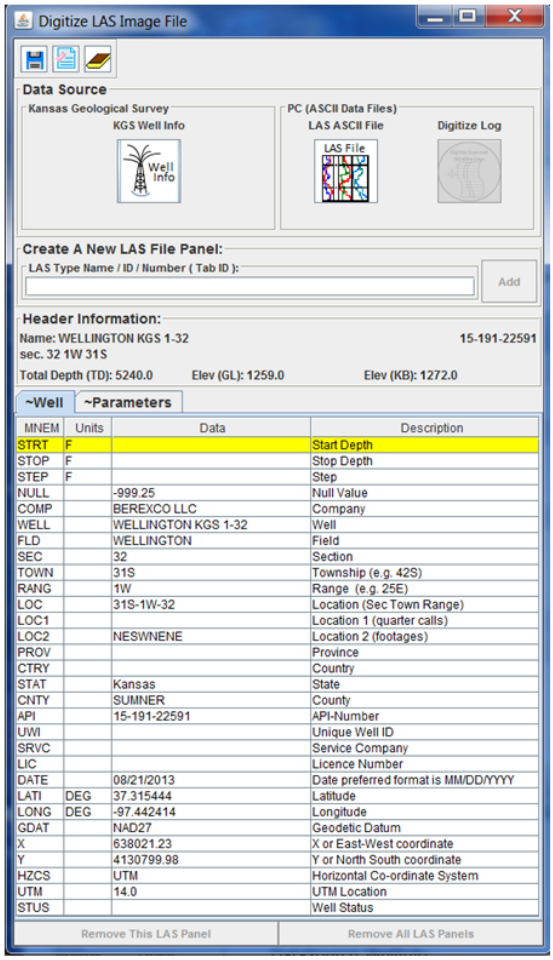



The user clicks on the "Select" button to transfer the header information to the Header Information Panel on the "Digitize LAS Image File" dialog.

**Header Information Panel**
Summary of Well Information Data for Wellington KGS 1-32.

**~Well Information Section Tab**
The well information section holds the data that will appear in the ~W (Well Information) Section of the Log ASCII Standard (LAS) File. It holds the Well Specific Information, i.e. Well Name, Company, Location, etc. It also holds the Start, Stop, Step and Null Value.

**~Parameters Section Tab**
The parameters section holds information about the bore hole, elevation, resistivity, temperature, etc.



## Example: Shamar 1- Digitize Electric Well Log from 3500’ to 3580’

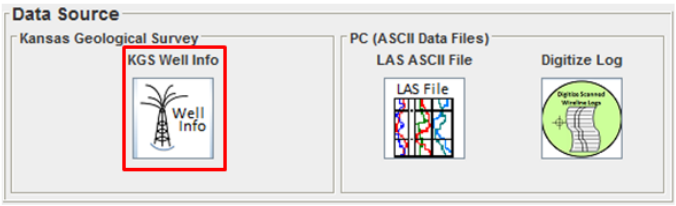
The first step is to load the well header information into the “Digitize LAS Image File” dialog. There are at least 3 methods for loading the well header information,

1. Search the Kansas Geological Survey (KGS) Database directly using the “KGS Well Info” image icon button in the “Data Source” panel at the top of the “Digitize LAS Image File” dialog.
2. Manually load the “~Well” and “~Parameters” tab panels from the header page of the Electric Well Log file.
3. For Kansas Wells – Search the Kansas Geological Survey Web Site and manually enter the necessary fields into the “~Well” and “~Parameters” tab panels.

The information in the “~Well” and “~Parameters” tab panels will be part of the Log ASCII Standard (LAS) version 2.0 file. The Start Depth, Stop Depth and Step will be loaded when the digital data is imported into the “Digitize LAS Image File” dialog.

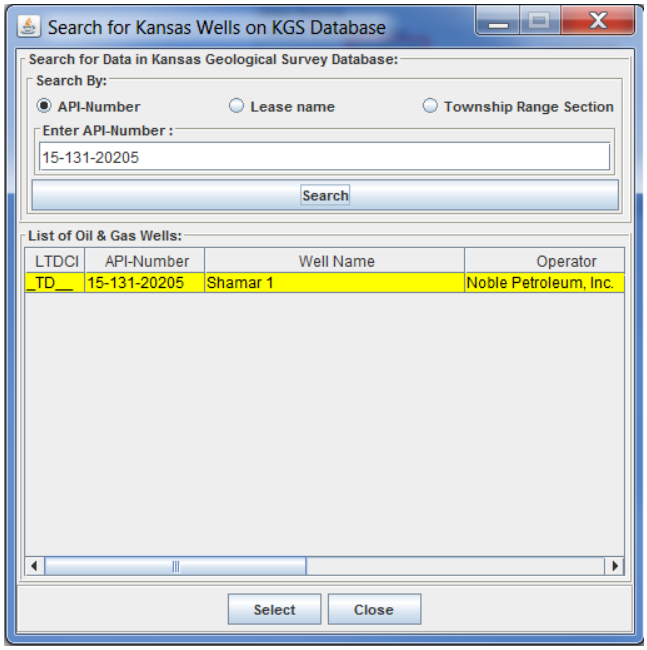
### Load ~Well & ~Parameters Panel Sections By “KGS Well Info” Icon Button

The Kansas Geological Survey (KGS) has a good collection of well data stored in the ORACLE Database. In this example the user will download the well header information from the KGS database. 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 Info” Icon Button in the Data Source Panel. 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 header information. In this example, the well of interest will be the Shamar 1. This example assumes the user will eventually digitize the Electric Well Log Image and eventually saving the data will require the Header Information Panel be filled with expected data and this search will help the user download well header information of the well of interest from the Kansas Geological Survey Database.

In the image below the API-Number “15-131-20205” is entered to search for well in Kansas. In this example it is the Shamar 1 is found and is highlighted.




The user clicks on the "Select" button to transfer the header information to the Header Information Panel on the "Digitize LAS Image File" dialog.

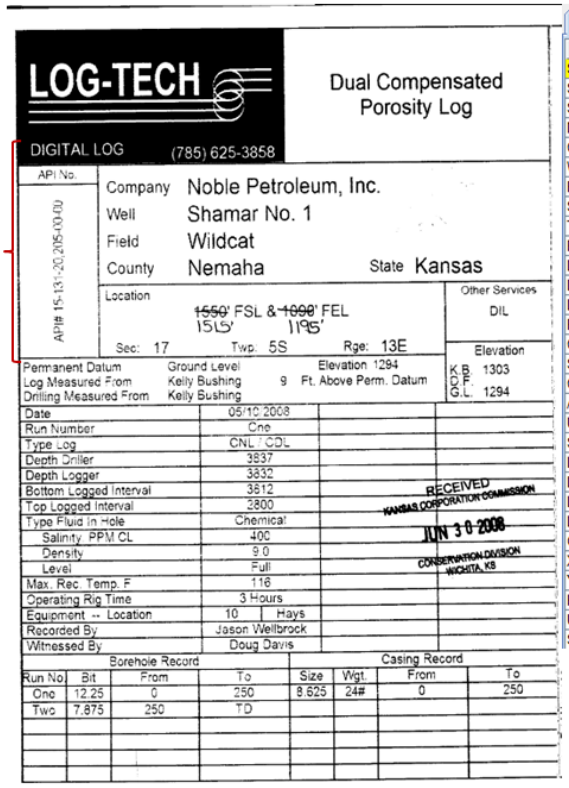
**Header Information:**

**Name: Shamar 1** **15-131-20205**
**sec. 17 13E 5S**
**Total Depth (TD): 3837.0** **Elev (GL): 1294.0** **Elev (KB): 1303.0**

~Well | ~Parameters

| MNEM | Units | Data | Description |
|---|---|---|---|
| STRT | F | | Start Depth |
| STOP | F | | Stop Depth |
| STEP | F | | Step |
| NULL | | -999.25 | Null Value |
| COMP | | Noble Petroleum, Inc. | Company |
| WELL | | Shamar 1 | Well |
| FLD | | WILDCAT | Field |
| SEC | | 17 | Section |
| TOWN | | 5S | Township (e.g. 42S) |
| RANG | | 13E | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Location (Sec Town Range) |
| LOC1 | | | Location 1 (quarter calls) |
| LOC2 | | SWNESE | Location 2 (footages) |
| PROV | | | Province |
| CTRY | | | Country |
| STAT | | Kansas | State |
| CNTY | | NEMAHA | County |
| API | | 15-131-20205 | API-Number |
| UWI | | | Unique Well ID |
| SRVC | | | Service Company |
| LIC | | | Licence Number |
| DATE | | 02/06/2012 | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 39.6137073 | Latitude |
| LONG | DEG | -95.980802 | Longitude |
| GDAT | | NAD27 | Geodetic Datum |
| X | | 244102.82 | X or East-West coordinate |
| Y | | 4388921.03 | Y or North South coordinate |
| HZCS | | UTM | Horizontal Co-ordinate System |
| UTM | | 15.0 | UTM Location |
| STUS | | | Well Status |

## Load ~Well & ~Parameters Panel Sections By Electric Well Log Header Page



LOG-TECH

DIGITAL LOG (785) 625-3858

Dual Compensated Porosity Log

API No. 15-131-20,205-00-00

Company Noble Petroleum, Inc.
Well Shamar No. 1
Field Wildcat
County Nemaha State Kansas

Location ~~1550~~' FSL & ~~1098~~' FEL
1515' 1195'
Sec: 17 Twp: 5S Rge: 13E

Other Services: DIL

Elevation
K.B. 1303
D.F.
G.L. 1294

Permanent Datum Ground Level Elevation 1294
Log Measured From Kelly Bushing 9 Ft. Above Perm. Datum
Drilling Measured From Kelly Bushing

| | |
|---|---|
| Date | 05/10/2008 |
| Run Number | One |
| Type Log | CNL / CDL |
| Depth Driller | 3837 |
| Depth Logger | 3832 |
| Bottom Logged Interval | 3812 |
| Top Logged Interval | 3800 |
| Type Fluid In Hole | Chemical |
| Salinity PPM CL | 400 |
| Density | 9.0 |
| Level | Full |
| Max. Rec. Temp. F | 116 |
| Operating Rig Time | 3 Hours |
| Equipment -- Location | 10 Hays |
| Recorded By | Jason Wellbrock |
| Witnessed By | Doug Davis |

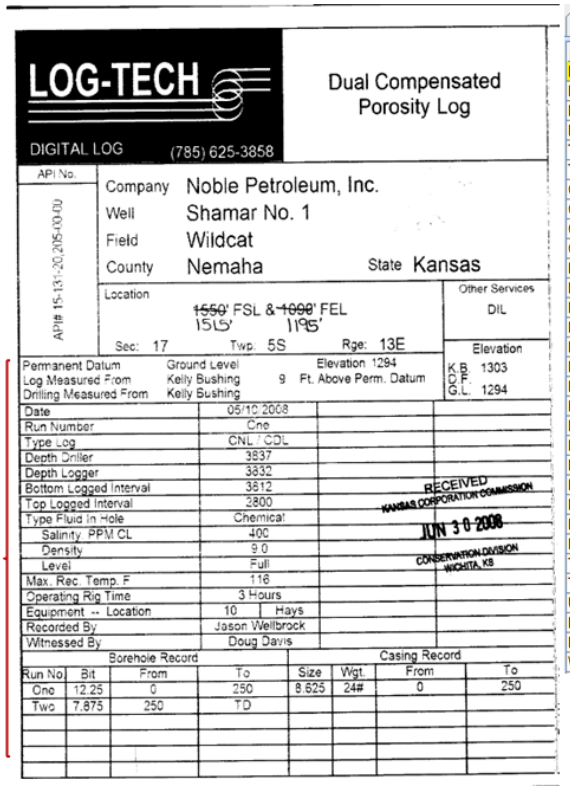
RECEIVED KANSAS CORPORATION COMMISSION JUN 30 2008 CONSERVATION DIVISION WICHITA, KS

| Borehole Record | | | | Casing Record | | | |
|---|---|---|---|---|---|---|---|
| Run No. | Bit | From | To | Size | Wgt. | From | To |
| One | 12.25 | 0 | 250 | 8.625 | 24# | 0 | 250 |
| Two | 7.875 | 250 | TD | | | | |

~Well Section

~Well | ~Parameters

| MNEM | Units | Data | Description |
|---|---|---|---|
| STRT | F | 3500.0 | Start Depth |
| STOP | F | 3580.0 | Stop Depth |
| STEP | F | 0.5 | Step |
| NULL | | -999.25 | Null Value |
| COMP | | Noble Petroleum, Inc. | Company |
| WELL | | Shamar 1 | Well |
| FLD | | WILDCAT | Field |
| SEC | | 17 | Section |
| TOWN | | 5S | Township (e.g. 42S) |
| RANG | | 13E | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Location (Sec Town Range) |
| LOC1 | | 1515' FSL & 1195' FEL | Location 1 (quarter calls) |
| LOC2 | | SWNESE | Location 2 (footages) |
| PROV | | | Province |
| CTRY | | US | Country |
| STAT | | Kansas | State |
| CNTY | | NEMAHA | County |
| API | | 15-131-20205 | API-Number |
| UWI | | | Unique Well ID |
| SRVC | | | Service Company |
| LIC | | | Licence Number |
| DATE | | 02/06/2012 | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 39.6137073 | Latitude |
| LONG | DEG | -95.980802 | Longitude |
| GDAT | | NAD27 | Geodetic Datum |
| X | | 244102.82 | X or East-West coordinate |
| Y | | 4388921.03 | Y or North South coordinate |
| HZCS | | UTM | Horizontal Co-ordinate System |
| UTM | | 15.0 | UTM Location |
| STUS | | D&A | Well Status |



LOG-TECH

DIGITAL LOG (785) 625-3858

Dual Compensated Porosity Log

API No. 15-131-20,205-00-00

Company Noble Petroleum, Inc.
Well Shamar No. 1
Field Wildcat
County Nemaha State Kansas

Location ~~1550~~' FSL & ~~1098~~' FEL
1515' 1195'
Sec: 17 Twp: 5S Rge: 13E

Other Services: DIL

Elevation
K.B. 1303
D.F.
G.L. 1294

Permanent Datum Ground Level Elevation 1294
Log Measured From Kelly Bushing 9 Ft. Above Perm. Datum
Drilling Measured From Kelly Bushing

| | |
|---|---|
| Date | 05/10/2008 |
| Run Number | One |
| Type Log | CNL / CDL |
| Depth Driller | 3837 |
| Depth Logger | 3832 |
| Bottom Logged Interval | 3812 |
| Top Logged Interval | 3800 |
| Type Fluid In Hole | Chemical |
| Salinity PPM CL | 400 |
| Density | 9.0 |
| Level | Full |
| Max. Rec. Temp. F | 116 |
| Operating Rig Time | 3 Hours |
| Equipment -- Location | 10 Hays |
| Recorded By | Jason Wellbrock |
| Witnessed By | Doug Davis |

RECEIVED KANSAS CORPORATION COMMISSION JUN 30 2008 CONSERVATION DIVISION WICHITA, KS

| Borehole Record | | | | Casing Record | | | |
|---|---|---|---|---|---|---|---|
| Run No. | Bit | From | To | Size | Wgt. | From | To |
| One | 12.25 | 0 | 250 | 8.625 | 24# | 0 | 250 |
| Two | 7.875 | 250 | TD | | | | |

~Parameters Section

~Well | ~Parameters

| MNEM | Units | Data | Description |
|---|---|---|---|
| EGL | F | 1294.0 | Ground Level Elevation |
| EKB | F | 1303.0 | Kelly Bushing Elevation |
| EDF | F | | Derrick Floor Elevation |
| ERT | F | | Rotary Table Elevation |
| TDL | F | 3837.0 | Total Depth Logger |
| TDD | F | 3832.0 | Total Depth Driller |
| CSGL | F | | Casing Bottom Logger |
| CSGD | F | | Casing Bottom Driller |
| CSGS | IN | | Casing Size |
| CSGW | LB | | Casing Weight |
| BS | IN | 7.875 | Bit Size |
| DFT | | Chemical | Mud type |
| MSS | | | Mud Sample Source |
| DFD | gm/cc | 9.0 | Mud Density |
| DFV | s/qt | | Mud Viscosity (Funnel) |
| DFL | cc | | Fluid Loss |
| PH | | | PH |
| RM | OHM-M | | Resistivity of Mud |
| MST | DEG-F | | Temperature of Mud |
| RMF | OHM-M | | Resistivity of Mud Filtrate |
| MFT | DEG-F | | Temperature of Mud Filtrate |
| RMC | OHM-M | | Resistivity of Mud Cake |
| MCST | DEG-F | | Temperature of Mud Cake |
| BHT | DEG-F | 116 | Maximum Recorded Temperature |
| RMB | OHM-M | | Resitivity @ BHT |
| TIMC | DATE | | Date/Time Circulation Stopped |
| TIML | DATE | | Date/Time Logger Tagged Bottom |
| UNIT | | 10 | Logging Unit Number |
| BASE | | Hays, Kansas | Home Base of Logging Unit |
| ENG | | Jason Wellbrock | Recording Engineer |
| WIT | | Doug Davis | Witnessed By |

## Load ~Well & ~Parameters Panel Sections By Kansas Geological Survey Web Site

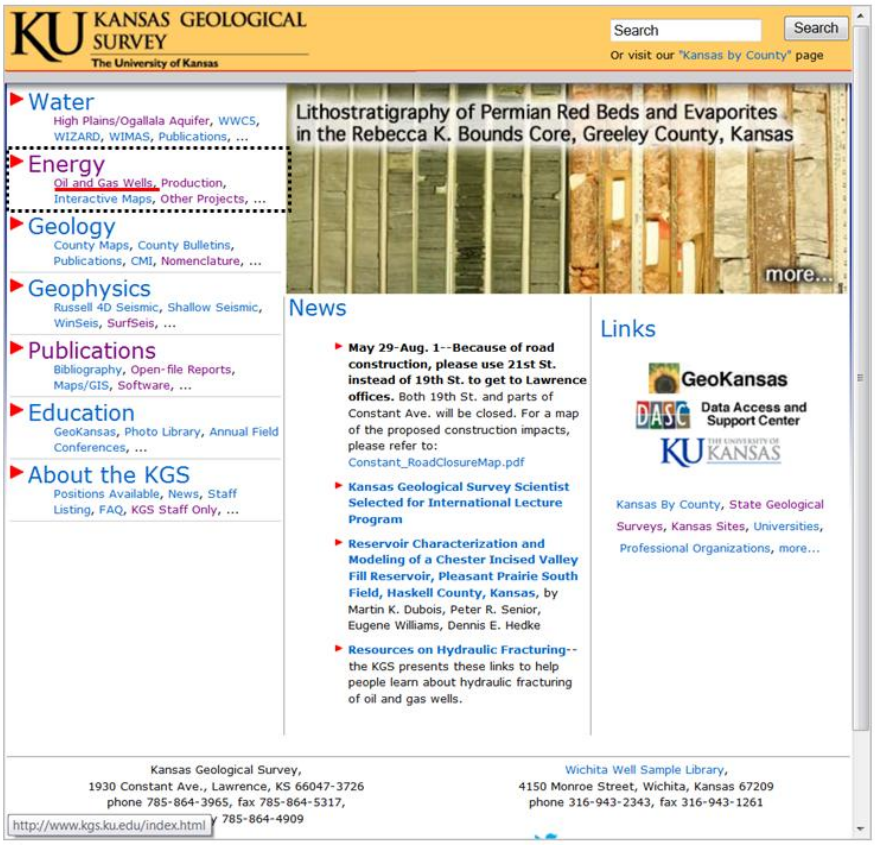
http://www.kgs.ku.edu/

The Log ASCII Standard (LAS) File has 4 Data Sections,
~Version which identifiers the version information and if the data is wrapped or not.
~Well Section holds the Primary Well Information, Name API-Number and Location as well as the Start, Stop, Step and Null Value of the Data.
~Curve Section holds the Log Curves – Mnemonics, Units and Description.
~ASCII Section the log data separated by spaces.

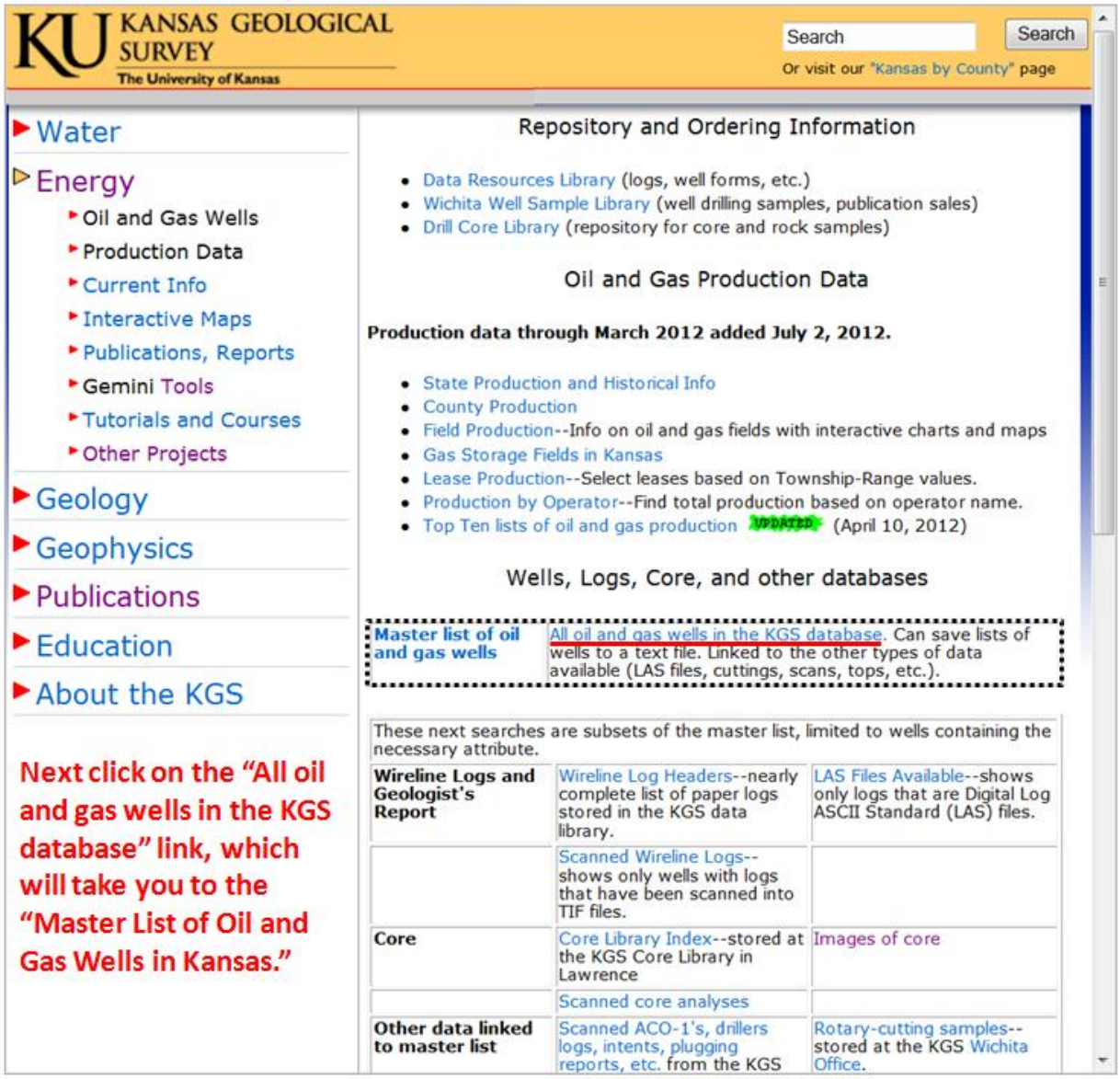
To find data to enter the ~Well & ~Parameters panel data in the "Digitize LAS Image File" Dialog for Kansas Wells.

First go to the Kansas Geological Survey Home Page http://www.kgs.ku.edu.

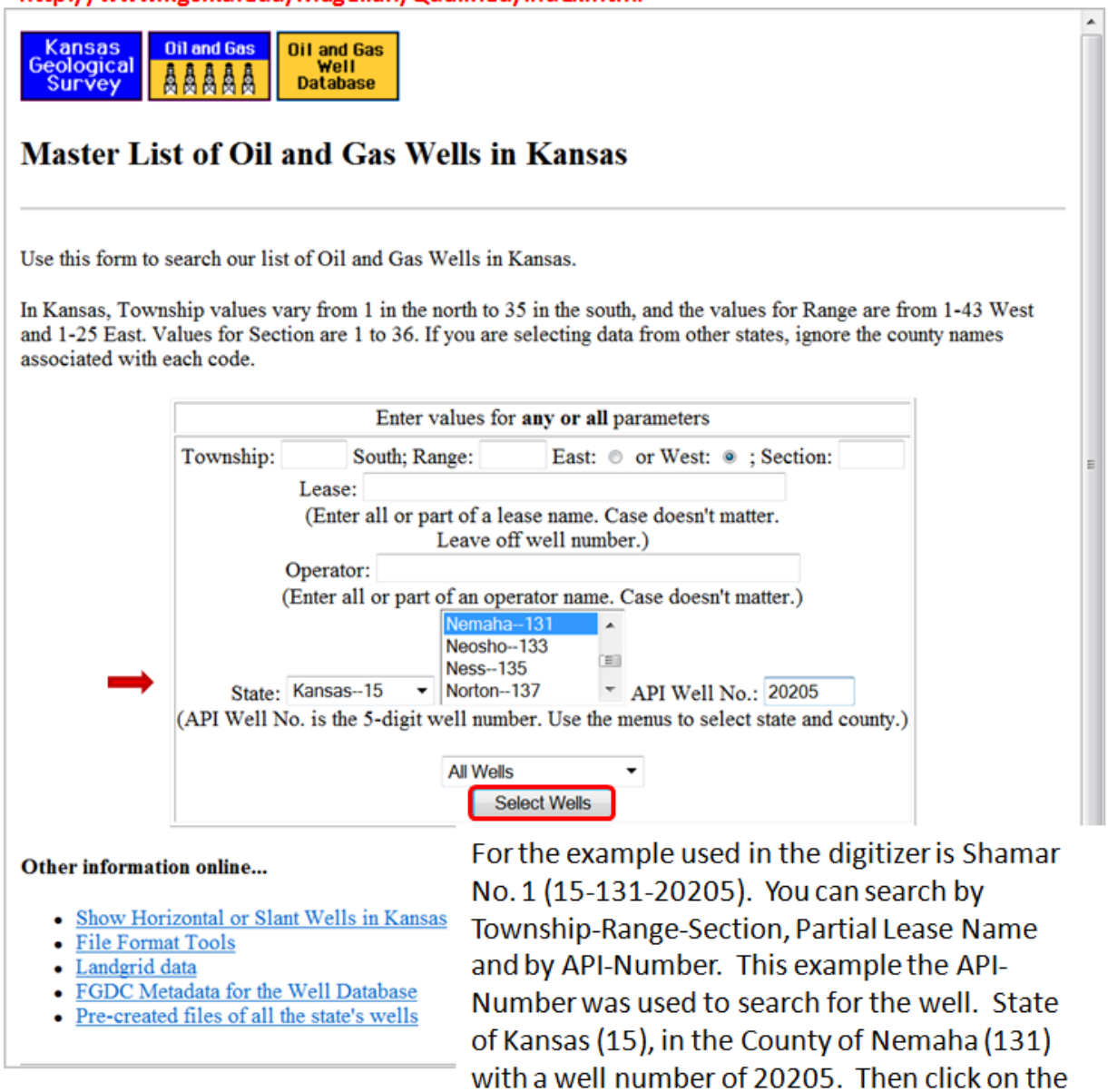
Click the "Oil and Gas Wells" menu item under the Energy Section.



http://www.kgs.ku.edu/PRS/petroDB.html



http://www.kgs.ku.edu/Magellan/Qualified/index.html




For the example used in the digitizer is Shamar No. 1 (15-131-20205). You can search by Township-Range-Section, Partial Lease Name and by API-Number. This example the API-Number was used to search for the well. State of Kansas (15), in the County of Nemaha (131) with a well number of 20205. Then click on the "Select Wells" Button.

This is the summary page of wells matching the query from the "Master List of Oil and Gas Wells in Kansas." Click on the T-R-S link to view the well header information for the Shamar No. 1

http://chasm.kgs.ku.edu/apex/qualified.ogw5.SelectWells

KGS Oil & Gas | Oil and Gas Well Database | **Select location of well to view details.** | Save Data to File

**Click on column heading to sort.**

One record found.

| T-R-S | Original operator | Well | API | Elevation Ascend. Desc. | Total Depth Ascend. Desc. | Field | Spud Date Ascend. Desc. | Plug Date Ascend. Desc. | Status |
|---|---|---|---|---|---|---|---|---|---|
| T5S R13E, Sec. 17, SW SW NE SE | Noble Petroleum, Inc. | Shamar 1 | 15-131-20205 | 1303 KB 1294 GL | 3837 (PRE-CAMBRIAN) | WILDCAT | 04-MAY-2008 | 11-MAY-2008 | D&A Plugged and Abandoned |

Kansas Geological Survey, Oil and Gas Well Database
Comments to webadmin@kgs.ku.edu
URL=http://www.kgs.ku.edu/Magellan/Qualified/index.html
Well Database Programs Updated May 2007. Data added continuously.

http://chasm.kgs.ku.edu/apex/qualified.well_page.DisplayWell?f_kid=103798997

KGS Oil & Gas | Oil and Gas Well Database

**Specific Well--15-131-20205**

**All Well Data**

~Well Section

**API:** 15-131-20205
**KID:** 1037989978
**Lease:** Shamar
**Well** 1
**Original operator:** Noble Petroleum, Inc.
**Current operator:** Noble Petroleum, Inc.
**Field:** Wildcat
**Location:** T5S R13E, Sec. 17
SW SW NE SE
1515 North, 1195 West, from SE corner
**Longitude:** -95.980802
**Latitude:** 39.6137073
Lat-long calculated from footages
**County:** Nemaha

**Permit Date:** Apr-08-2008
**Spud Date:** May-04-2008
**Completion Date:** May-11-2008
**Plugging Date:** May-11-2008
**Well Type:** D&A
**Status:** Plugged and Abandoned
**Total Depth:** 3837
**Elevation:** 1303 KB
**Producing Formation:**
**IP Oil (bbl):**
**IP Water (bbl):**
**IP GAS (MCF):**

View well on interactive map

**ACO-1 and Driller's Logs**

**PDF files from the KGS**

- DST Report

**Documents from the KCC**

- Intent To Drill Well (received by KGS Apr 21, 2008)
- Well Completion Report (received by KGS Jul 16, 2009)
- KCC Technician's Plugging Report (received by KGS Feb 06, 2009)
- Pit Closure - Drilling Pit (received by KGS May 27, 2009)
- Operator's Plugging Report (received by KGS Sep 03 2008)

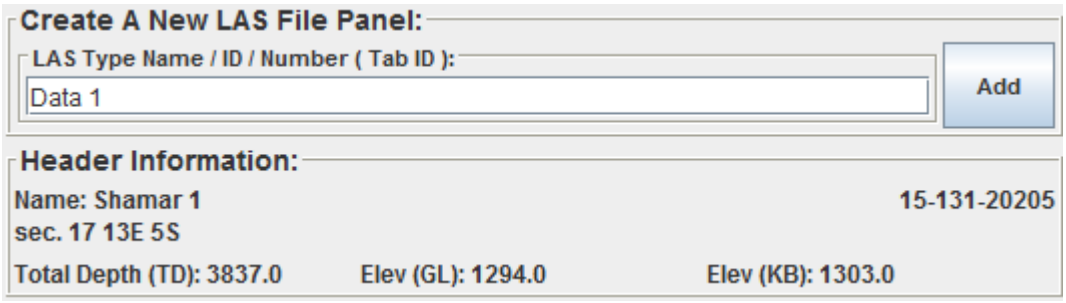
For information on software to view and use the files we distribute on our web pages

~Well | ~Parameters

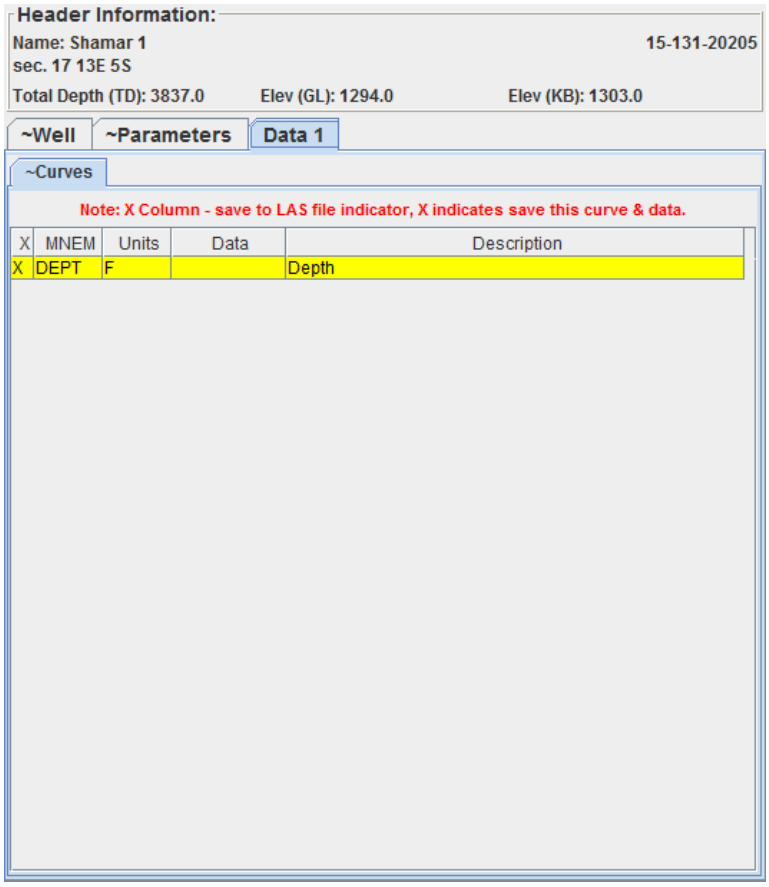
| MNEM | Units | Data | Description |
|---|---|---|---|
| STRT | F | 3500.0 | Start Depth |
| STOP | F | 3580.0 | Stop Depth |
| STEP | F | 0.5 | Step |
| NULL | | -999.25 | Null Value |
| COMP | | Noble Petroleum, Inc. | Company |
| WELL | | Shamar 1 | Well |
| FLD | | WILDCAT | Field |
| SEC | | 17 | Section |
| TOWN | | 5S | Township (e.g. 42S) |
| RANG | | 13E | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Location (Sec Town Range) |
| LOC1 | | 1515' FSL & 1195' FEL | Location 1 (quarter calls) |
| LOC2 | | SWNESE | Location 2 (footages) |
| PROV | | | Province |
| CTRY | | US | Country |
| STAT | | Kansas | State |
| CNTY | | NEMAHA | County |
| API | | 15-131-20205 | API-Number |
| UWI | | | Unique Well ID |
| SRVC | | | Service Company |
| LIC | | | Licence Number |
| DATE | | 02/06/2012 | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 39.6137073 | Latitude |
| LONG | DEG | -95.980802 | Longitude |
| GDAT | | NAD27 | Geodetic Datum |
| X | | 244102.82 | X or East-West coordinate |
| Y | | 4388921.03 | Y or North South coordinate |
| HZCS | | UTM | Horizontal Co-ordinate System |
| UTM | | 15.0 | UTM Location |
| STUS | | D&A | Well Status |

**Add New Data Panel Tab**

The user has to create a Data Tab before the user can access the digitizer. Enter the name for the first Data Section "Data 1" in the "LAS Type Name / ID / Number (Tab ID)" text field and then tab out of the text field, the "Add" button will them be enabled. Select the "Add" Button to create the "Data 1" tab with all embedded panels to hold the ~Curve Information and the ~ASCII Log Data Sections.




Select the "Add" button.

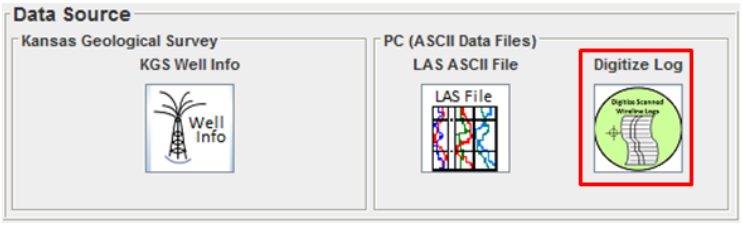



Notice that the "Data 1" tab is next to the "Parameters" Tab, with only the "Curves" tab present. This is just a place holding for the expected data that will be digitized from an Electric Well Log Image file.

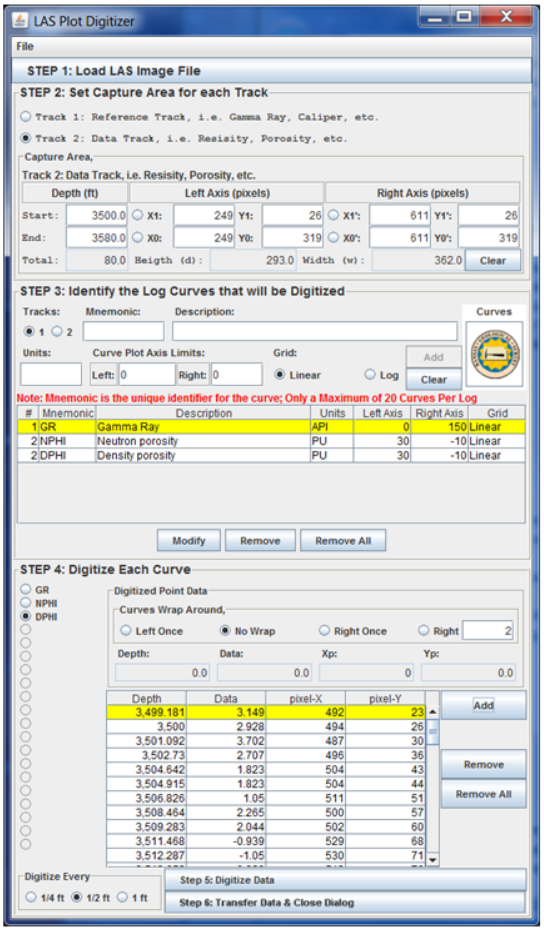
## Digitize Log Data from an Electric Well Log

Download the following Portable Network Graphics (PNG) image files.
Shamar -1: Dual Compensated Porosity Electric Well Log:
http://www.kgs.ku.edu/Gemini/Tools/documentation/Litho-Density-example.png
Electric Well Log Scale:
http://www.kgs.ku.edu/Gemini/Tools/documentation/Litho-Density-scales-example.png

Select the "Data 1" tab and notice that the "Digitize Log" icon button becomes enabled. This icon button is only enabled when the Data tab is selected, because it will take the contents of the "Curves" tab panel in the data tab panel and transfer it to the Digitizer Control dialog.




Click on the "Digitize Log" icon button to display the "LAS Plot Digitizer" dialog.




**STEP 1: Load LAS Image File.** Load a PNG, JPEG or GIF Electric Well Log Image File into Program.

**STEP 2: Set Capture Area for each Track.** Set the Capture Area for each Track. Boxes will be drawn around the data capture areas. A cyan color box will be drawn around Track 1. Reference, i.e. Gamma Ray, Caliper, etc. and a reddish box around Track 2. Data, i.e. Resistivity, Porosity, etc. The program was designed to allow for scanned images that may be rotated from the vertical. If the image is vertical only the top left and bottom right need to be entered to load all the end points if the image is rotated the user will have to set each of the four point to mark the capture areas for each track.

**STEP 3: Identify the Log Curves that will be Digitized.** This section not only identifies the log curves for digitizing, but it sets the ~Curve Section for the Log ASCII Standard (LAS) File when the data is saved. The "Kansas Geological Survey" Icon Image allows the user to select from a list of "Standard" Mnemonic Log Curves to speed up the data entry process. As the curves are added to the list you will notice that a Mnemonic radio button is displayed in the "STEP 4: Digitize Each Curve" Panel.

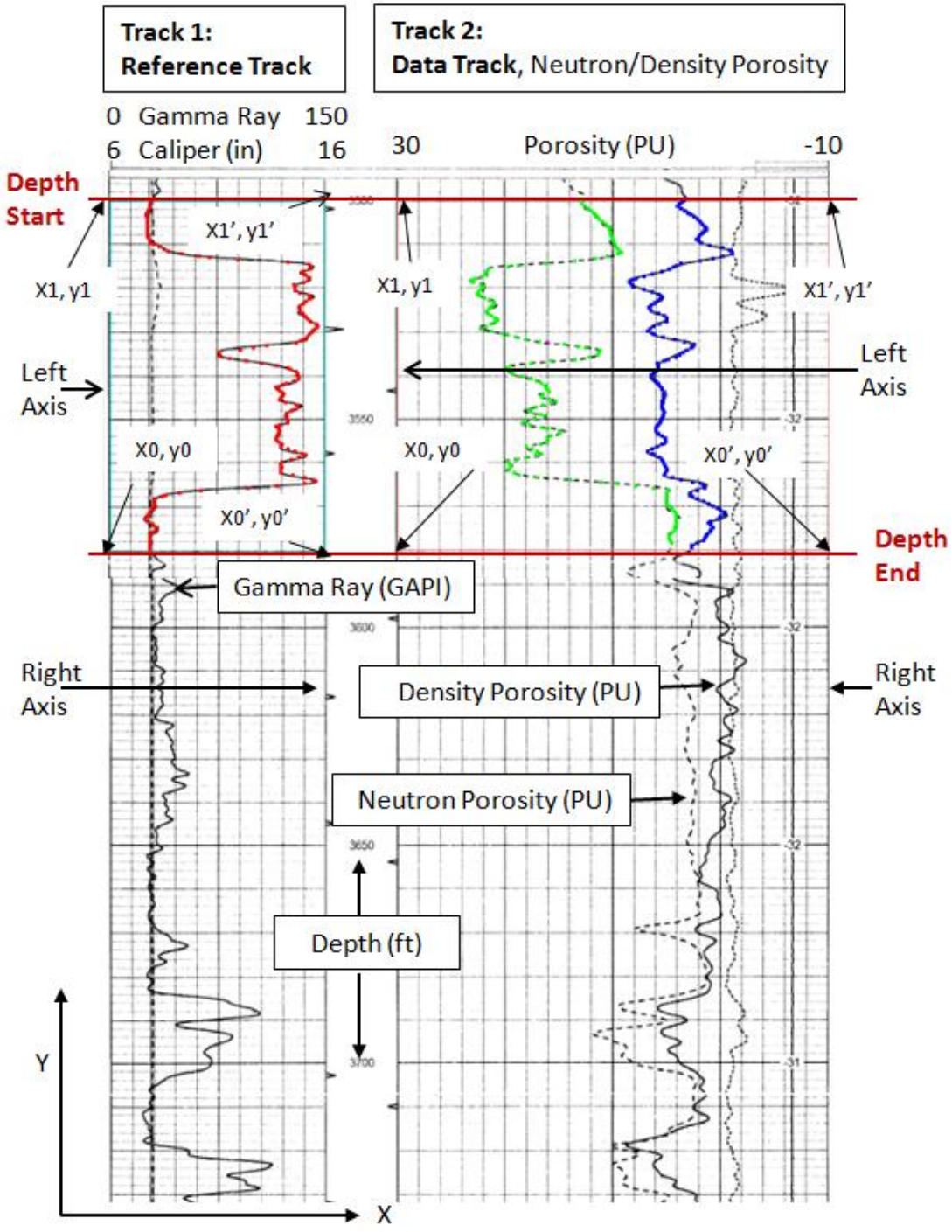
**STEP 4: Digitized Each Curve.** Each Mnemonic radio button will hold each digitized curve data. The program automatically computes the depth and data value for each pixel position. The program was designed to allow for scanned images that may be rotated from the vertical so the data is computed from a end depth and the left axis of the track.

**STEP 5: Digitize Data.** This button will sample compute the data at every depth interval depending on the Digitize Every radio button setting.

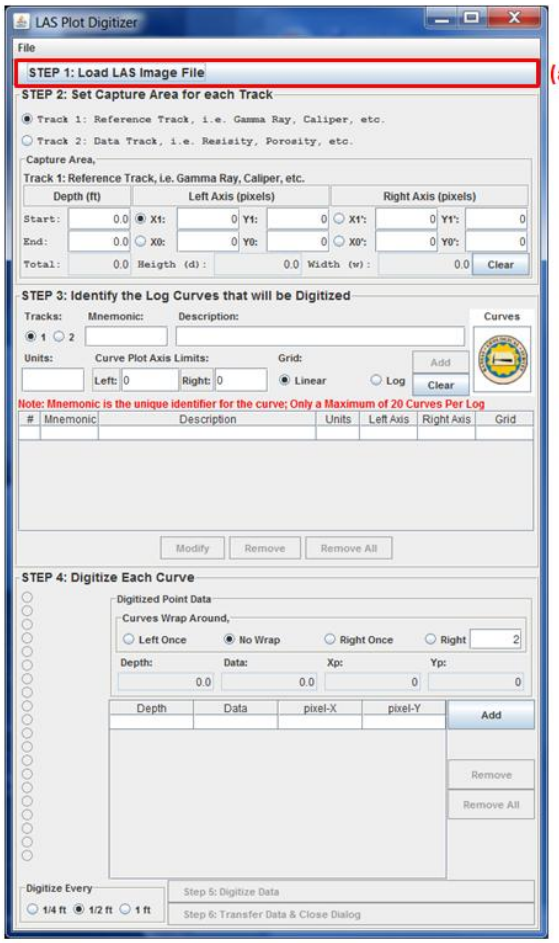
**STEP 6: Transfer Data & Close Dialog.** This button transfer the digitized data & curve list to the main dialog

The Digitizer was set up as a 6 step process. The following web pages will walk the user through each step to load an Electric Well Log Plot into the digitizer dialog. The user can set the data capture areas and to digitize and normalize the log curve data.

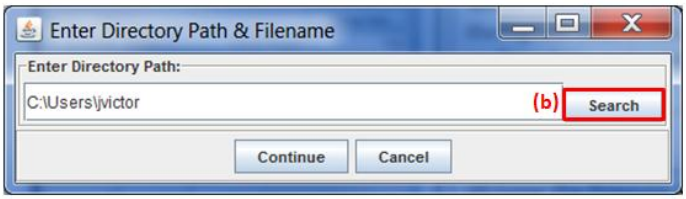
Note: The Electric Well Log Plot must be a PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file.



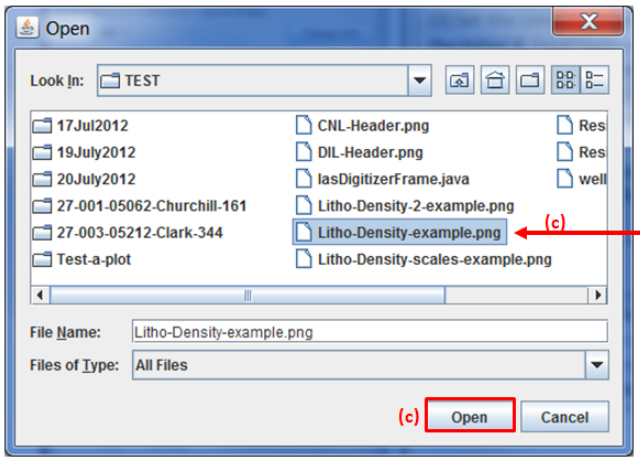
## Step 1: Loading Electric Well Log Plot Image




**Step a:** Select the "**STEP 1: Load LAS Image File**" Button to display the "Enter Directory Path & Filename" Dialog.



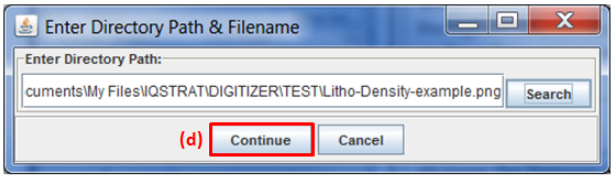

**Step b:** Select the Search Button to search your PC for the correct Electric Well Log Image Plot.
*NOTE: The starting directory is your home directory.*



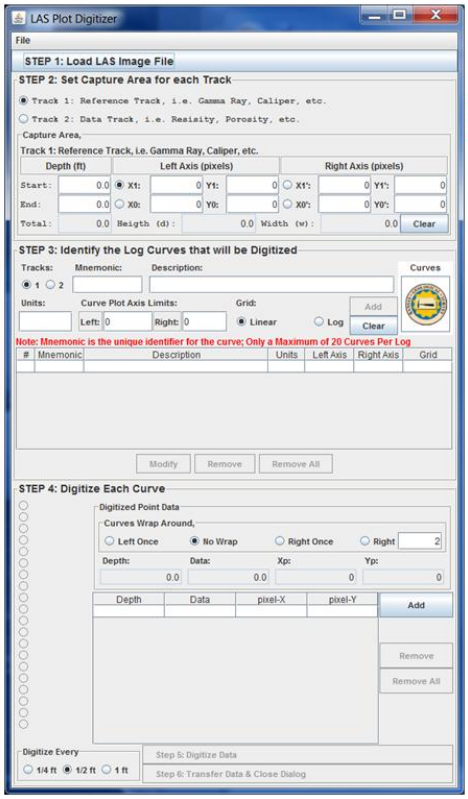

**Step c:** Highlight the Electric Well Log Image Plot to load into the digitizer. This example is a Neutron-Density Porosity Log, Litho-Density-example.png Select the "Open" Button.

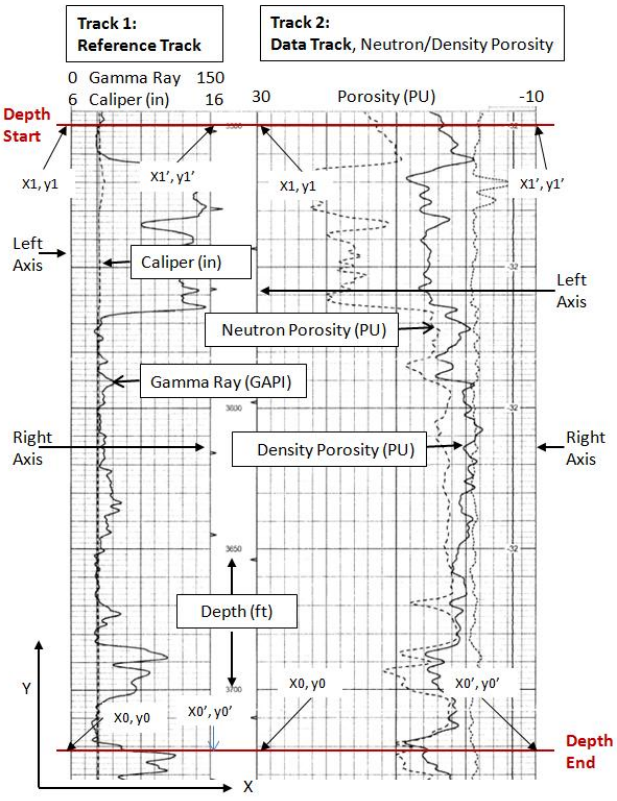
NOTE: Only PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file

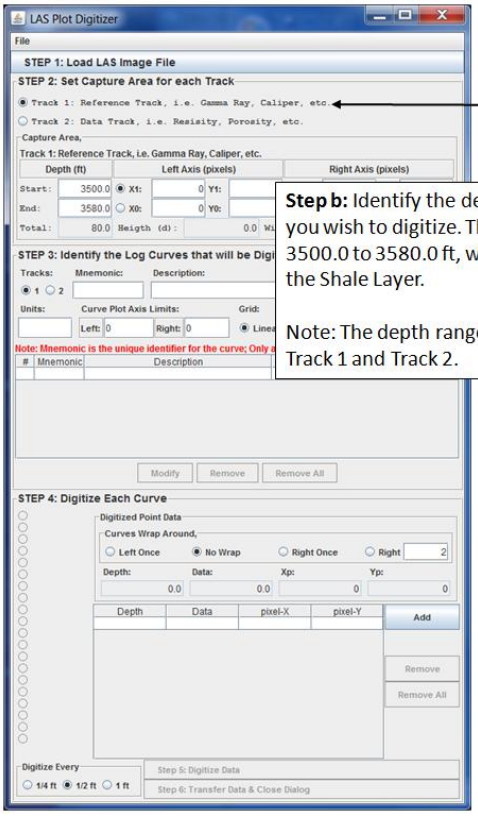
**Step d:** The Electric Well Log Image Plot directory & filename will be loaded. Select the "Continue" Button to load the image into the program.



## Step 2: Set Capture Area for each Track



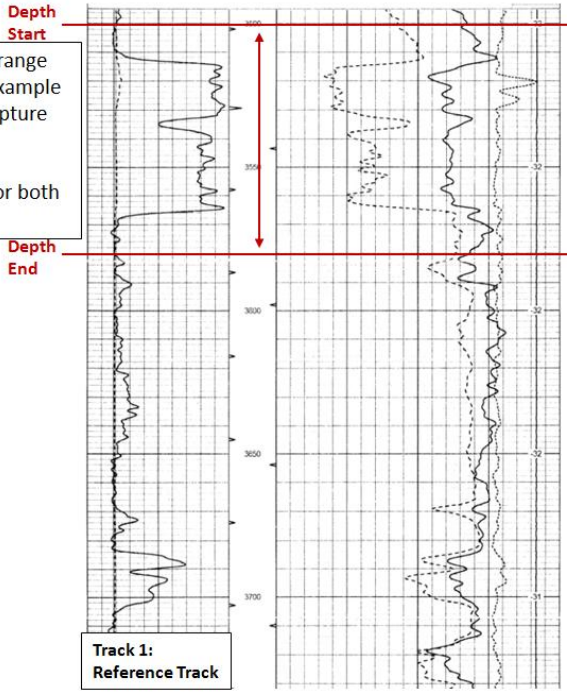



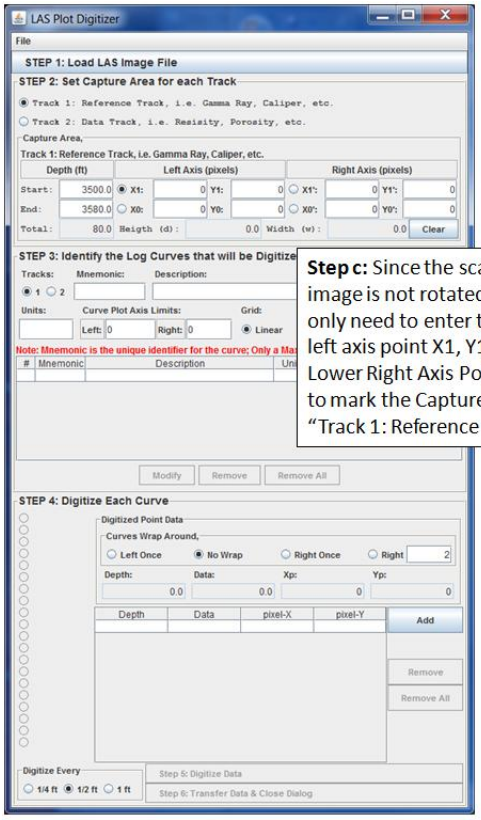



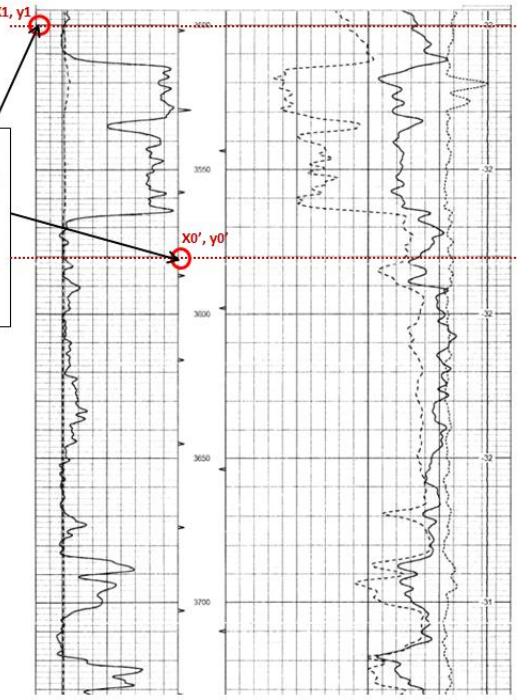

**Step a:** In the "**Step2: Set Capture Area for each Track**" set the "Track 1: Reference Track …" Radio button.

**Step b:** Identify the depth range you wish to digitize. This example 3500.0 to 3580.0 ft, will capture the Shale Layer.

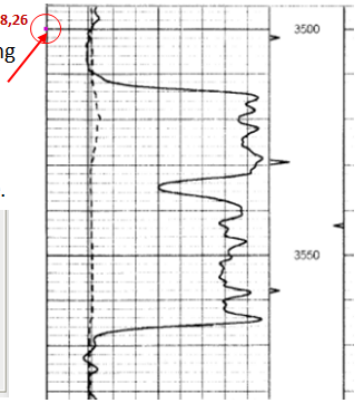
Note: The depth range is for both Track 1 and Track 2.



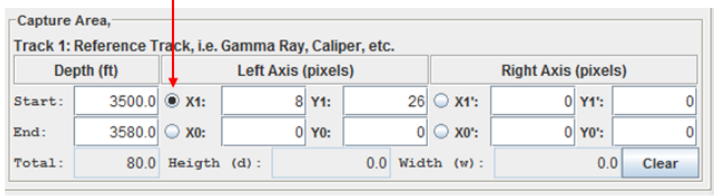


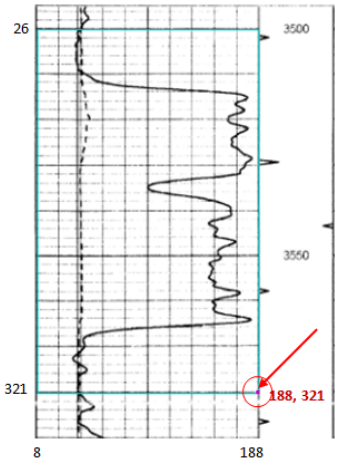




**Step c:** Since the scanned plot image is not rotated we really only need to enter the top left axis point X1, Y1 and the Lower Right Axis Point X0', y0' to mark the Capture Area for "Track 1: Reference Track …"

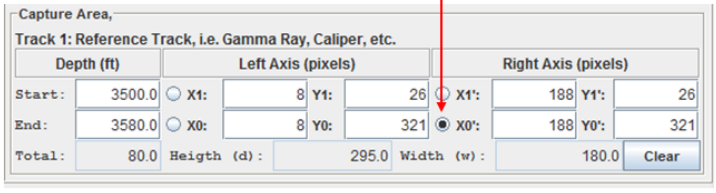


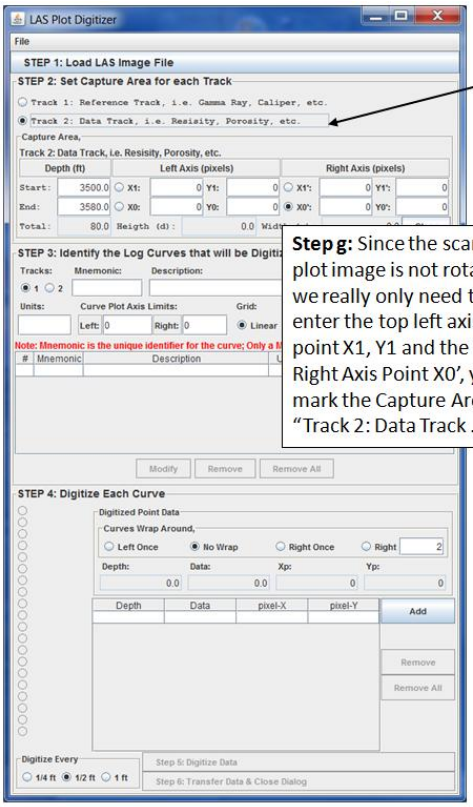

**Step d:** Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (8, 26) or 8 pixels from the left side and 26 pixels from the top of the image.



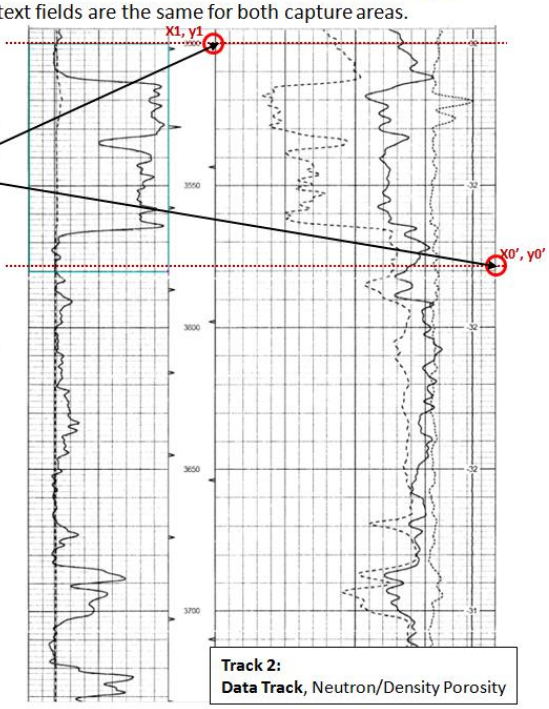

**Step e:** Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (188, 321) or 188 pixels from the left side and 321 pixels from the top of the image. Notice further that the Lower Left Axis point and the Upper Right Axis points were automatically filled and a cyan colored box is drawn around the "Track 1: Reference Track…" Capture area.



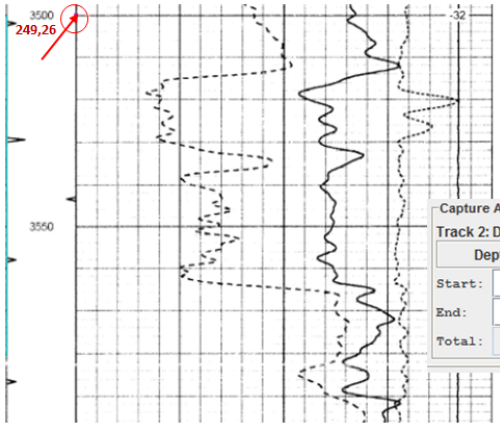



**Step f:** In the "**Step2: Set Capture Area for each Tra**ck" set the "Track 2: Data Track …" Radio button. Notice the depth range text fields are the same for both capture areas.

**Step g:** Since the scanned plot image is not rotated we really only need to enter the top left axis point X1, Y1 and the Lower Right Axis Point X0', y0' to mark the Capture Area for "Track 2: Data Track …"




**Track 2:**
**Data Track**, Neutron/Density Porosity

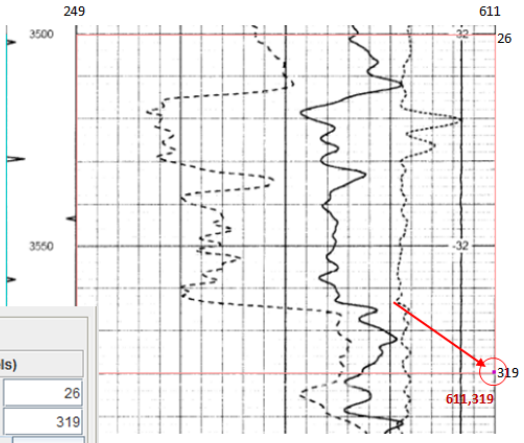



**Step h:** Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (249,26) or 249 pixels from the left side and 26 pixels from the top of the image.

Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.

| Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 249 | Y1: 26 | X1': | 0 | Y1': 0 |
| End: | 3580.0 | X0: | 0 | Y0: 0 | X0': | 0 | Y0': 0 |
| Total: | 80.0 | Heigth (d): | 0.0 | Width (w): | 0.0 | Clear | |

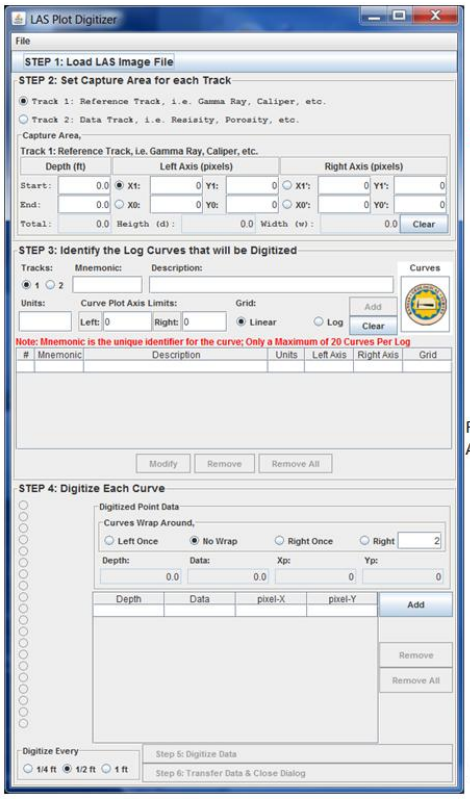
**Step i:** Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (611,319) or 611 pixels from the left side and 319 pixels from the top of the image. Notice further that the Lower Left Axis point and the Upper Right Axis points were automatically filled and a reddish colored box is drawn around the "Track 2: Data Track…" Capture area.

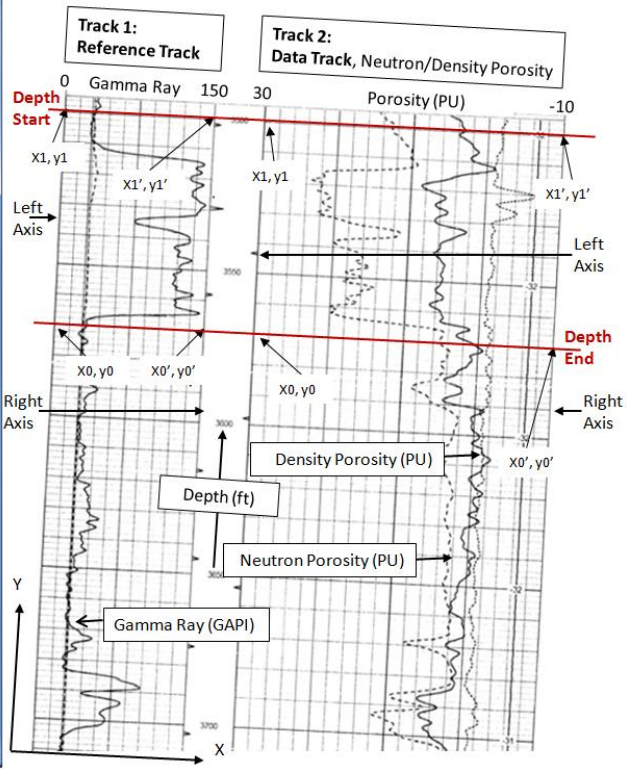


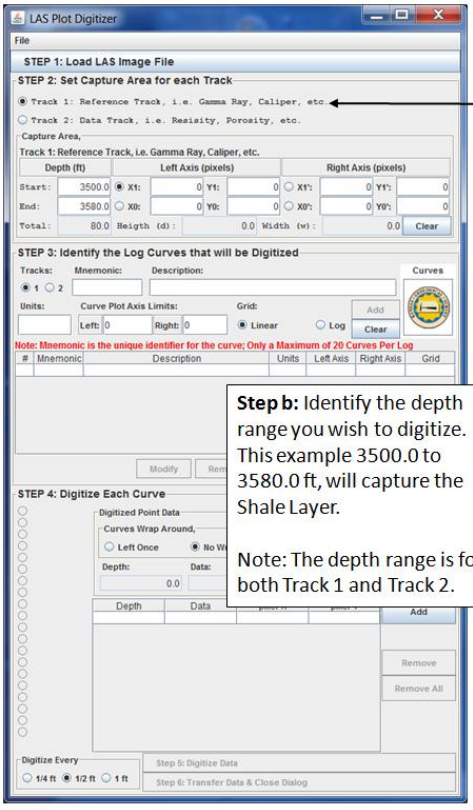

Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.

| Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 249 | Y1: 26 | X1': | 611 | Y1': 26 |
| End: | 3580.0 | X0: | 249 | Y0: 319 | X0': | 611 | Y0': 319 |
| Total: | 80.0 | Heigth (d): | 293.0 | Width (w): | 362.0 | Clear | |

## Step 2: Set Capture Area for each Track - Track is not vertical but rotated



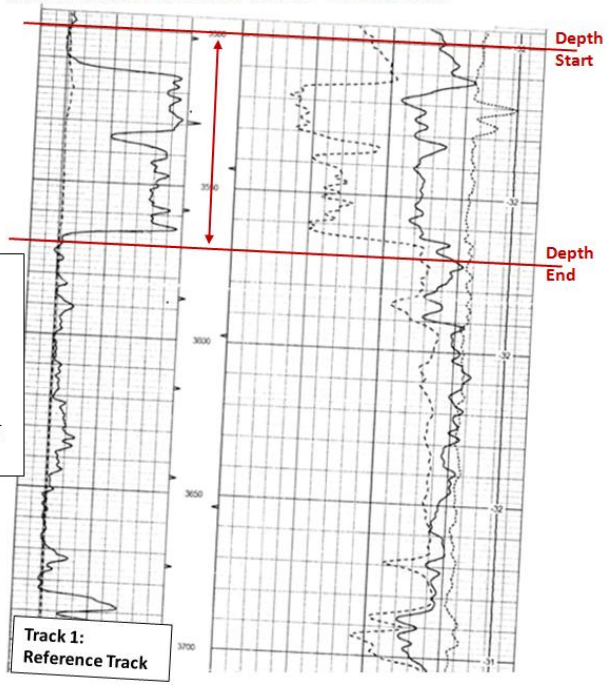



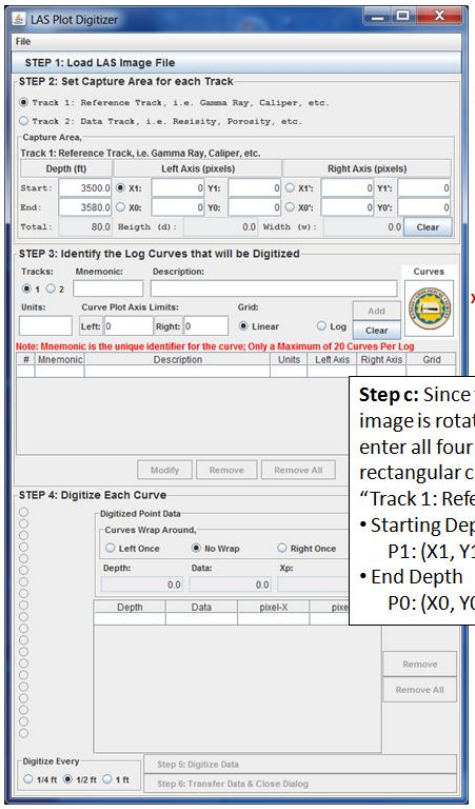



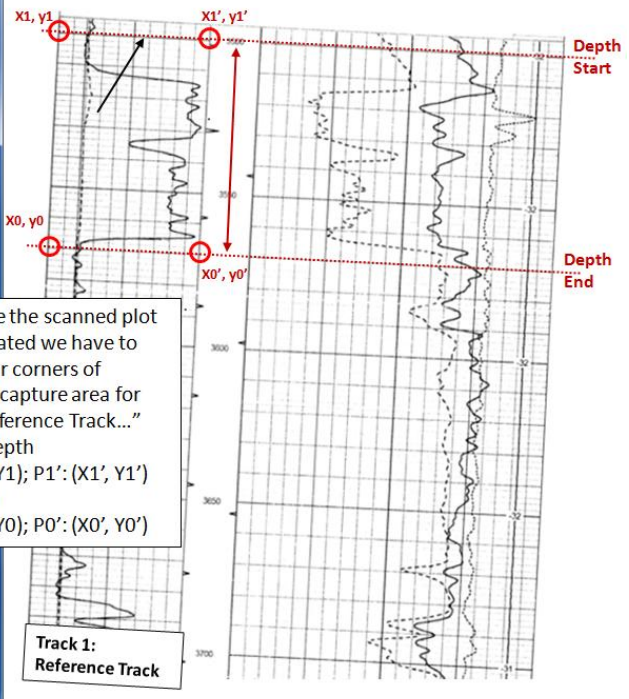

**Step a:** In the "**Step2: Set Capture Area for each Track**" set the "Track 1: Reference Track ..." Radio button.

**Step b:** Identify the depth range you wish to digitize. This example 3500.0 to 3580.0 ft, will capture the Shale Layer.

Note: The depth range is for both Track 1 and Track 2.



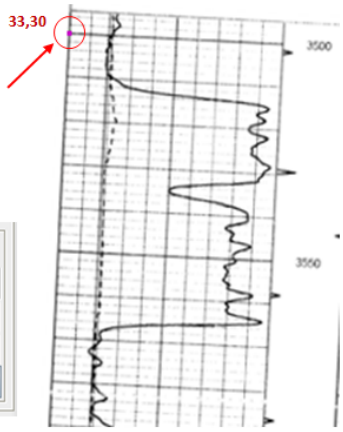



**Step c:** Since the scanned plot image is rotated we have to enter all four corners of rectangular capture area for "Track 1: Reference Track…"

- Starting Depth
  P1: (X1, Y1); P1': (X1', Y1')
- End Depth
  P0: (X0, Y0); P0': (X0', Y0')

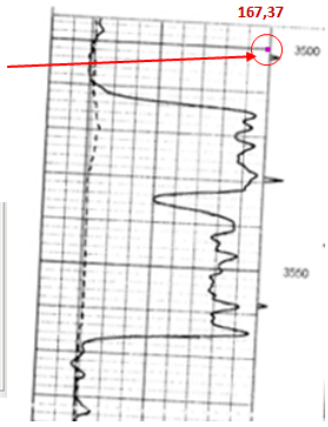
**Step d:** Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (33,30) or 30 pixels from the left side and 33 pixels from the top of the image.




Capture Area,
Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

| Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: 33 | Y1: 30 | X1': 0 | Y1': 0 | | |
| End: | 3580.0 | X0: 0 | Y0: 0 | X0': 0 | Y0': 0 | | |
| Total: | 80.0 | Heigth (d): 0.0 | Width (w): 0.0 | Clear | | | |

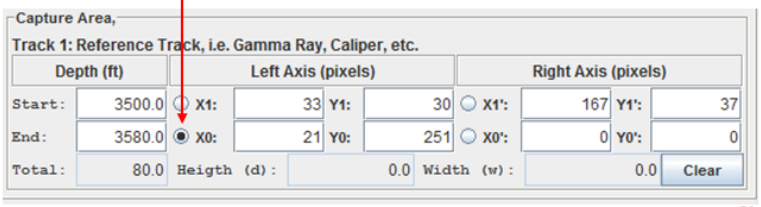
**Step e:** Make sure that the Radio button is selected for the Right Axis, Starting Depth. With the mouse pointed to the upper right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, Start Depth row. In this example this point is at (167,37) or 167 pixels from the left side and 37 pixels from the top of the image.

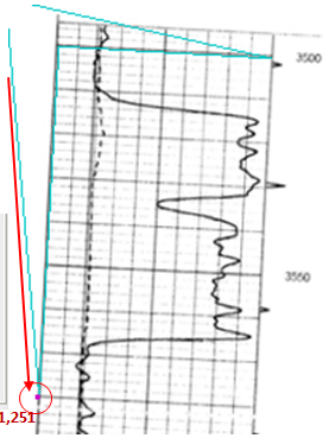



Capture Area,
Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

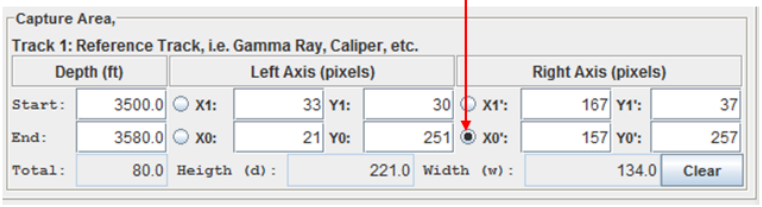
| Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: 33 | Y1: 30 | X1': 167 | Y1': 37 | | |
| End: | 3580.0 | X0: 0 | Y0: 0 | X0': 0 | Y0': 0 | | |
| Total: | 80.0 | Heigth (d): 0.0 | Width (w): 0.0 | Clear | | | |

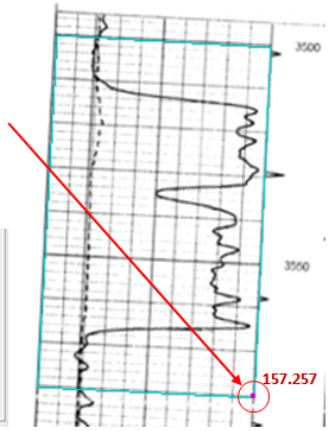
**Step f:** Make sure that the Radio button is selected for the Left Axis, Ending Depth. With the mouse pointed to the lower left point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, Start Depth row. In this example this point is at (21,251) or 21 pixels from the left side and 251 pixels from the top of the image.

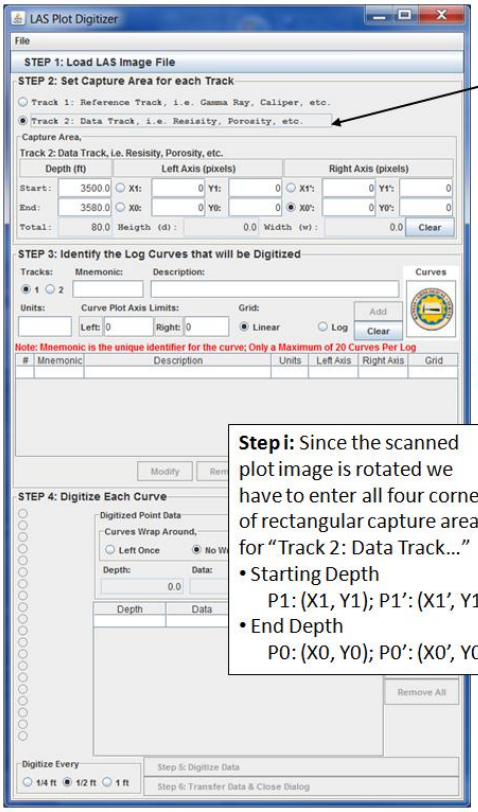


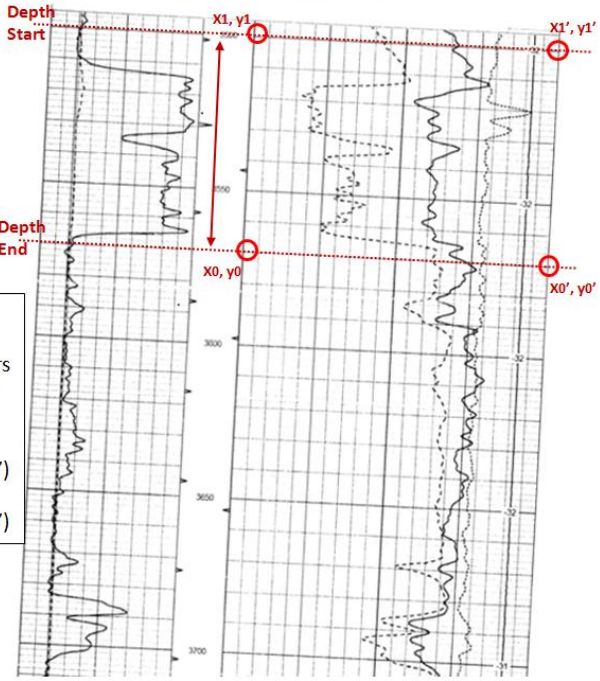

**Step g:** Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (157.257) or 157 pixels from the left side and 257 pixels from the top of the image. Notice a cyan colored box is drawn around the "Track 1: Reference Track…" Capture area.



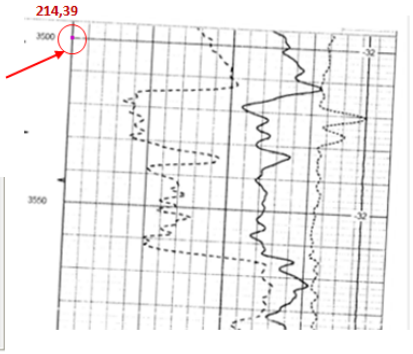

**Step h:** In the "**Step2: Set Capture Area for each Track**" set the "Track 2: Data Track …" Radio button. Notice the depth range text fields are the same for both capture areas.




**Step i:** Since the scanned plot image is rotated we have to enter all four corners of rectangular capture area for "Track 2: Data Track…"

- Starting Depth
  P1: (X1, Y1); P1': (X1', Y1')
- End Depth
  P0: (X0, Y0); P0': (X0', Y0')

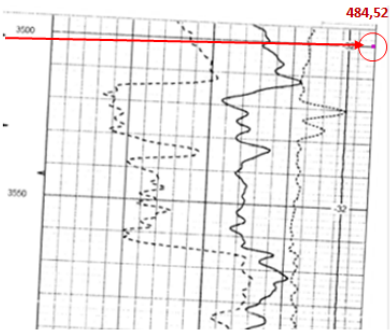
**Step j:** Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (214,39) or 214 pixels from the left side and 39 pixels from the top of the image.




Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.

| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 214 | Y1: | 39 | X1': | 0 | Y1': | 0 |
| End: | 3580.0 | X0: | 0 | Y0: | 0 | X0': | 0 | Y0': | 0 |
| Total: | 80.0 | Heigth (d): | 0.0 | Width (w): | 0.0 | | | | Clear |

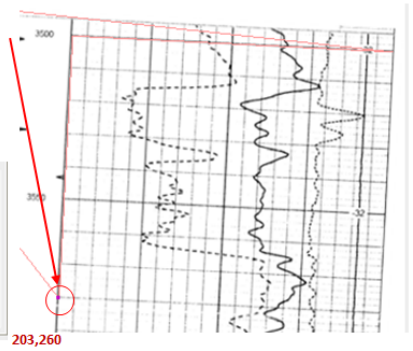
**Step k:** Make sure that the Radio button is selected for the Right Axis, Starting Depth. With the mouse pointed to the upper right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, Start Depth row. In this example this point is at (484,52) or 484 pixels from the left side and 52 pixels from the top of the image.




Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.

| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 214 | Y1: | 39 | X1': | 484 | Y1': | 52 |
| End: | 3580.0 | X0: | 0 | Y0: | 0 | X0': | 0 | Y0': | 0 |
| Total: | 80.0 | Heigth (d): | 0.0 | Width (w): | 0.0 | | | | Clear |

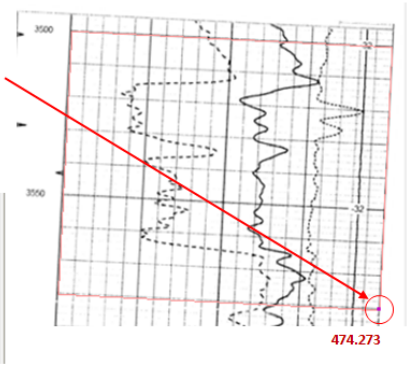
**Step l:** Make sure that the Radio button is selected for the Left Axis, Ending Depth. With the mouse pointed to the lower left point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, Start Depth row. In this example this point is at (203,260) or 203 pixels from the left side and 260 pixels from the top of the image.




Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.

| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 214 | Y1: | 39 | X1': | 484 | Y1': | 52 |
| End: | 3580.0 | X0: | 203 | Y0: | 260 | X0': | 0 | Y0': | 0 |
| Total: | 80.0 | Heigth (d): | 0.0 | Width (w): | 0.0 | | | | Clear |

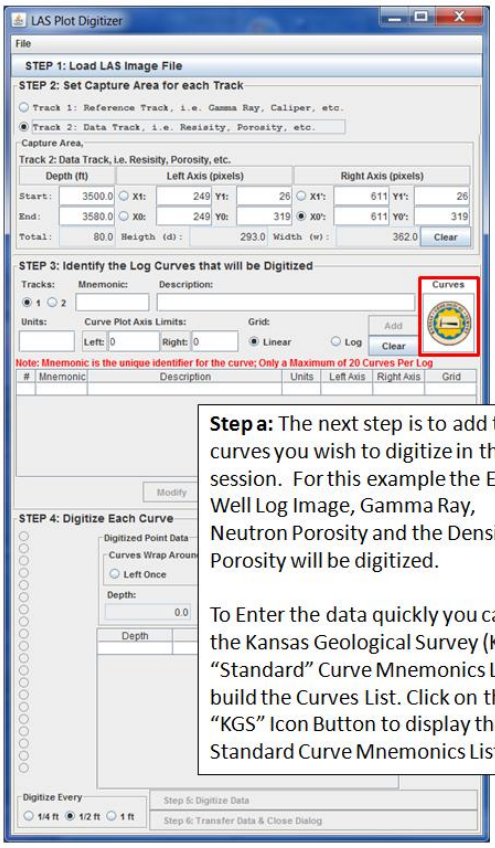
**Step m:** Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (474,273) or 474 pixels from the left side and 273 pixels from the top of the image. Notice a reddish colored box is drawn around the "Track 2: Data Track..." Capture area.




Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.

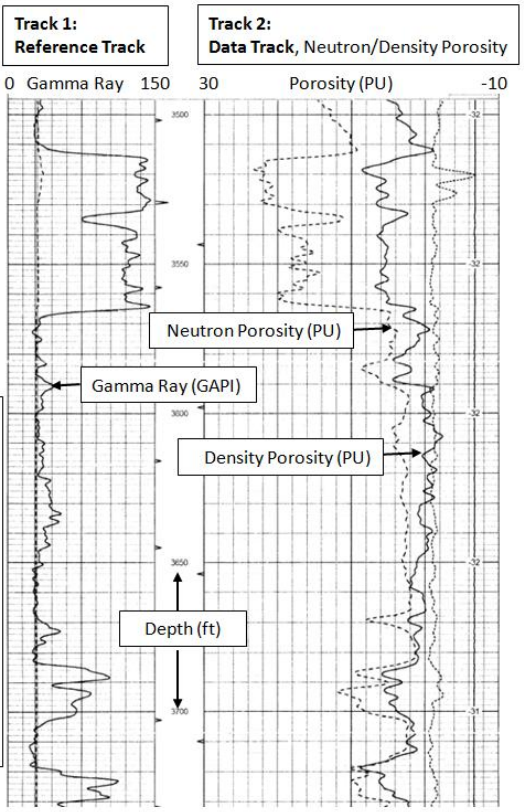
| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 214 | Y1: | 39 | X1': | 484 | Y1': | 52 |
| End: | 3580.0 | X0: | 203 | Y0: | 260 | X0': | 474 | Y0': | 273 |
| Total: | 80.0 | Heigth (d): | 221.0 | Width (w): | 270.0 | | | | Clear |

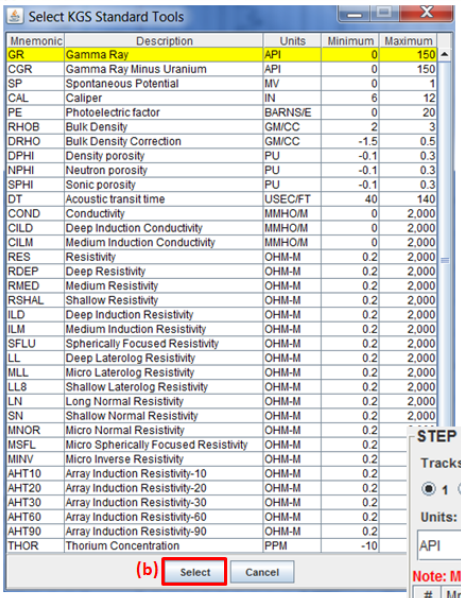
## Step 3: Identify the Log Curves that will be Digitized




**Step a:** The next step is to add the curves you wish to digitize in this session. For this example the Electric Well Log Image, Gamma Ray, Neutron Porosity and the Density Porosity will be digitized.

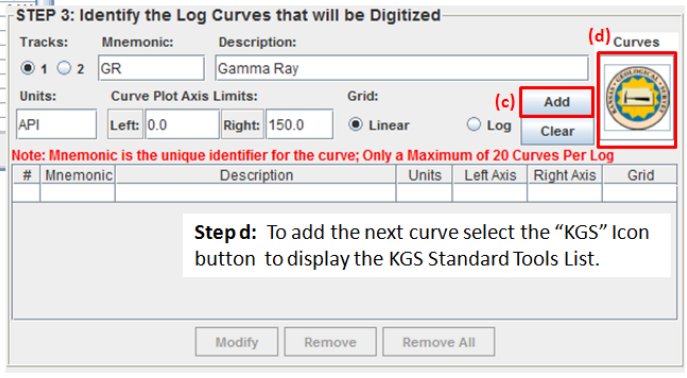
To Enter the data quickly you can use the Kansas Geological Survey (KGS) "Standard" Curve Mnemonics List to build the Curves List. Click on the "KGS" Icon Button to display the KGS Standard Curve Mnemonics List.



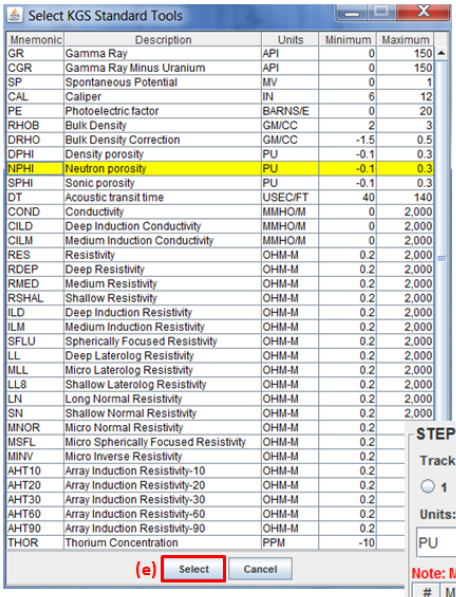




**Step b:** Highlight the Gamma Ray Row and Click on the "Select" Button. The Gamma Ray Curve Information will be transferred to the "STEP 3: Identify the Log Curves that will be Digitized" Panel.

**Step c:** Select the "Add" Button to add the Curve to the Curves Table.

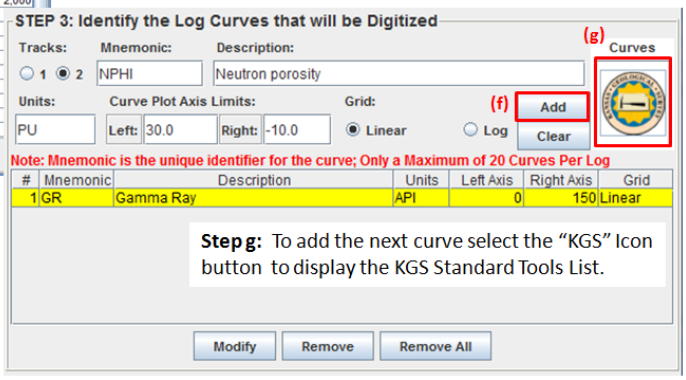



**Step d:** To add the next curve select the "KGS" Icon button to display the KGS Standard Tools List.

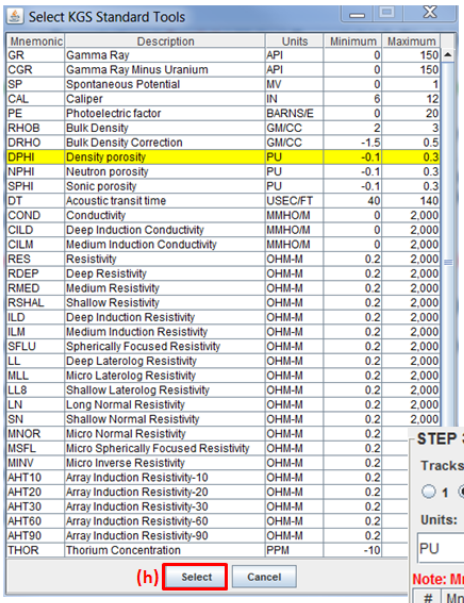



**Step e:** Highlight the Neutron Porosity Row and Click on the "Select" Button. The Neutron Porosity Curve Information will be transferred to the "STEP 3: Identify the Log Curves that will be Digitized" Panel.

**Step f:** Select the "Add" Button to add the Curve to the Curves Table.

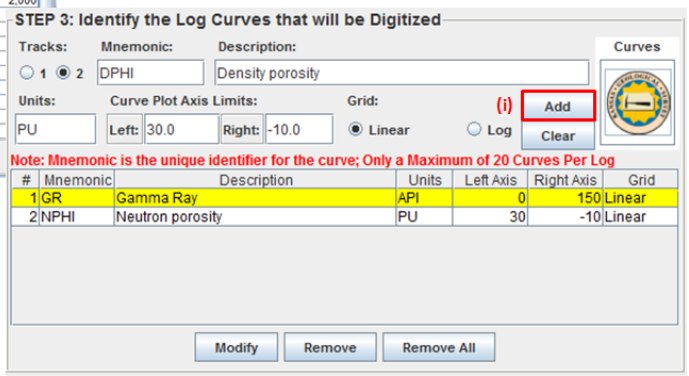


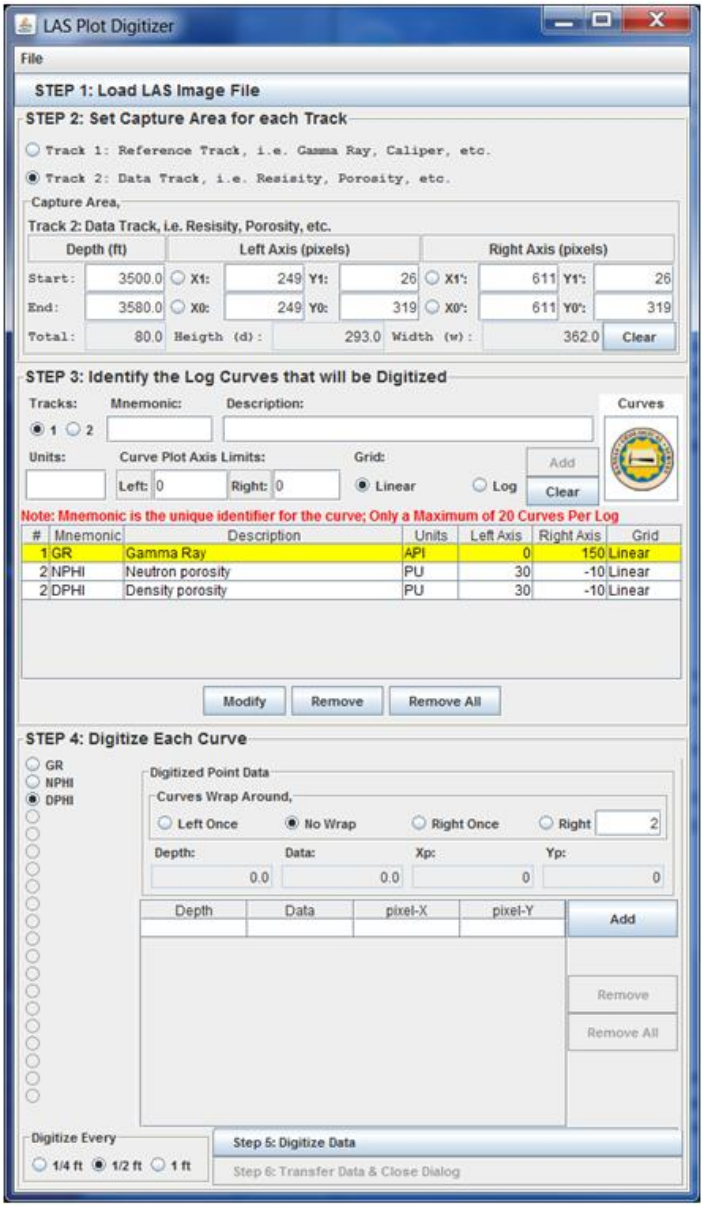

**Step g:** To add the next curve select the "KGS" Icon button to display the KGS Standard Tools List.



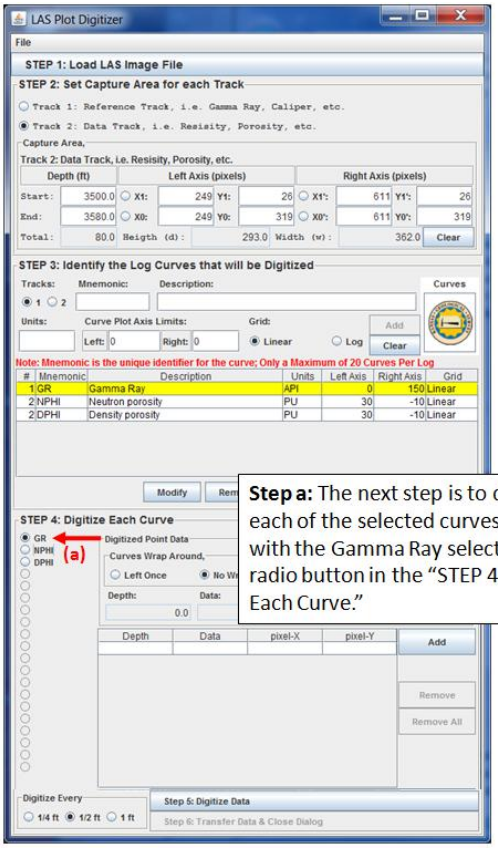

**Step h:** Highlight the Neutron Porosity Row and Click on the "Select" Button. The Neutron Porosity Curve Information will be transferred to the "STEP 3: Identify the Log Curves that will be Digitized" Panel.

**Step i:** Select the "Add" Button to add the Curve to the Curves Table.

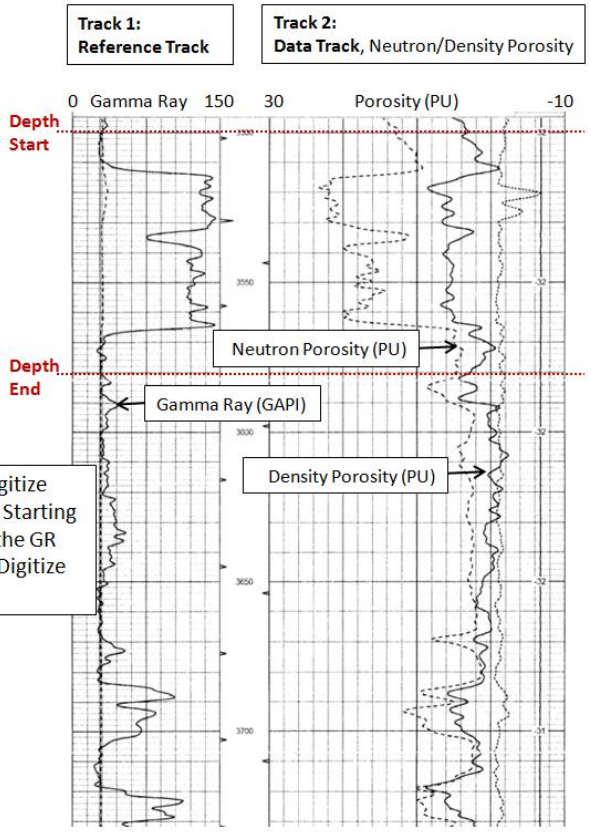


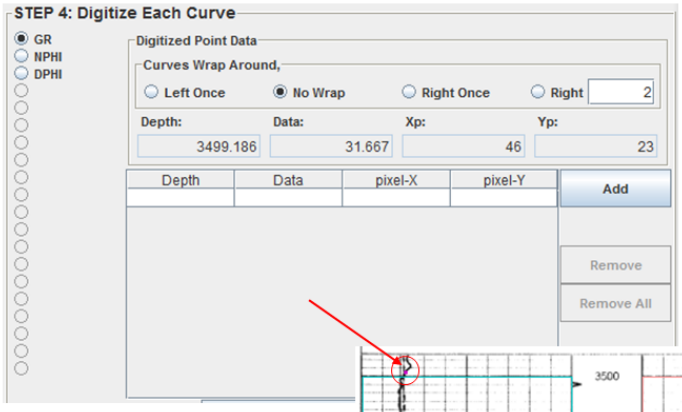

LAS Plot Digitizer
File
STEP 1: Load LAS Image File
STEP 2: Set Capture Area for each Track
Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.
Track 2: Data Track, i.e. Resisity, Porosity, etc.
Capture Area,
Track 2: Data Track, i.e. Resisity, Porosity, etc.
Depth (ft)
Left Axis (pixels)
Right Axis (pixels)
Start: 3500.0 X1: 249 Y1: 26 X1': 611 Y1': 26
End: 3580.0 X0: 249 Y0: 319 X0': 611 Y0': 319
Total: 80.0 Heigth (d): 293.0 Width (w): 362.0 Clear
STEP 3: Identify the Log Curves that will be Digitized
Tracks: Mnemonic: Description: Curves
Units: Curve Plot Axis Limits: Grid:
Left: 0 Right: 0 Linear Log Add Clear
Note: Mnemonic is the unique identifier for the curve; Only a Maximum of 20 Curves Per Log
# Mnemonic Description Units Left Axis Right Axis Grid
1 GR Gamma Ray API 0 150 Linear
2 NPHI Neutron porosity PU 30 -10 Linear
2 DPHI Density porosity PU 30 -10 Linear
Modify Remove Remove All
STEP 4: Digitize Each Curve
GR
NPHI
DPHI
Digitized Point Data
Curves Wrap Around,
Left Once No Wrap Right Once Right 2
Depth: Data: Xp: Yp:
0.0 0.0 0 0
Depth Data pixel-X pixel-Y
Add
Remove
Remove All
Digitize Every
1/4 ft 1/2 ft 1 ft
Step 5: Digitize Data
Step 6: Transfer Data & Close Dialog

## Step 4: Digitize Each Curve




**Step a:** The next step is to digitize each of the selected curves. Starting with the Gamma Ray select the GR radio button in the "STEP 4: Digitize Each Curve."

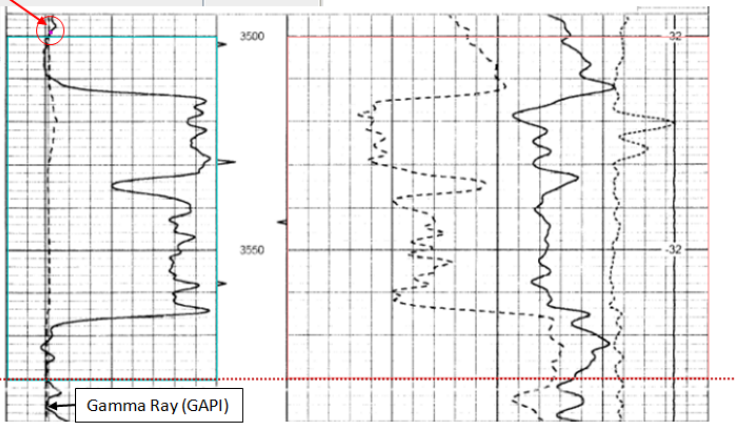


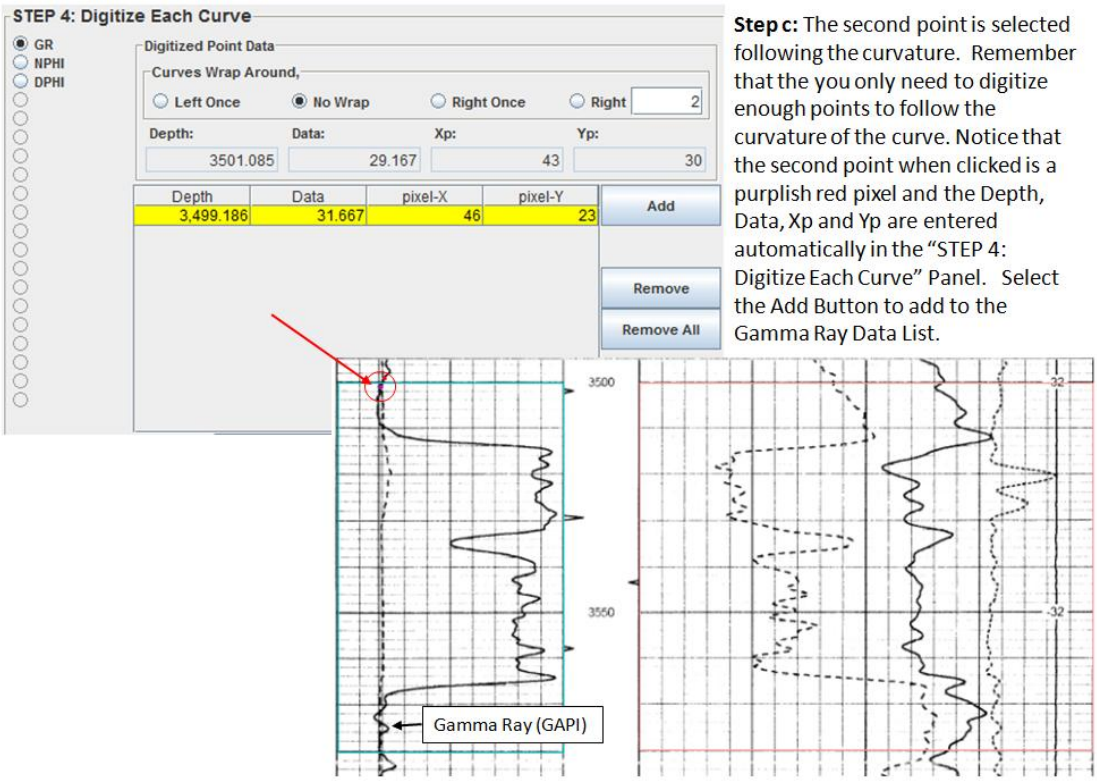




**Step b:** *The first point is important*, notice that the first point is selected above the cyan box. The program computes the depth from the depth end. When the curves are finally digitized in Step 5 the first point will allow the depth start to be included in the sampling. Notice that the first point when clicked is a purplish red pixel and the Depth, Data, Xp and Yp are entered automatically in the "STEP 4: Digitize Each Curve" Panel. Select the Add Button to add to the Gamma Ray Data List.

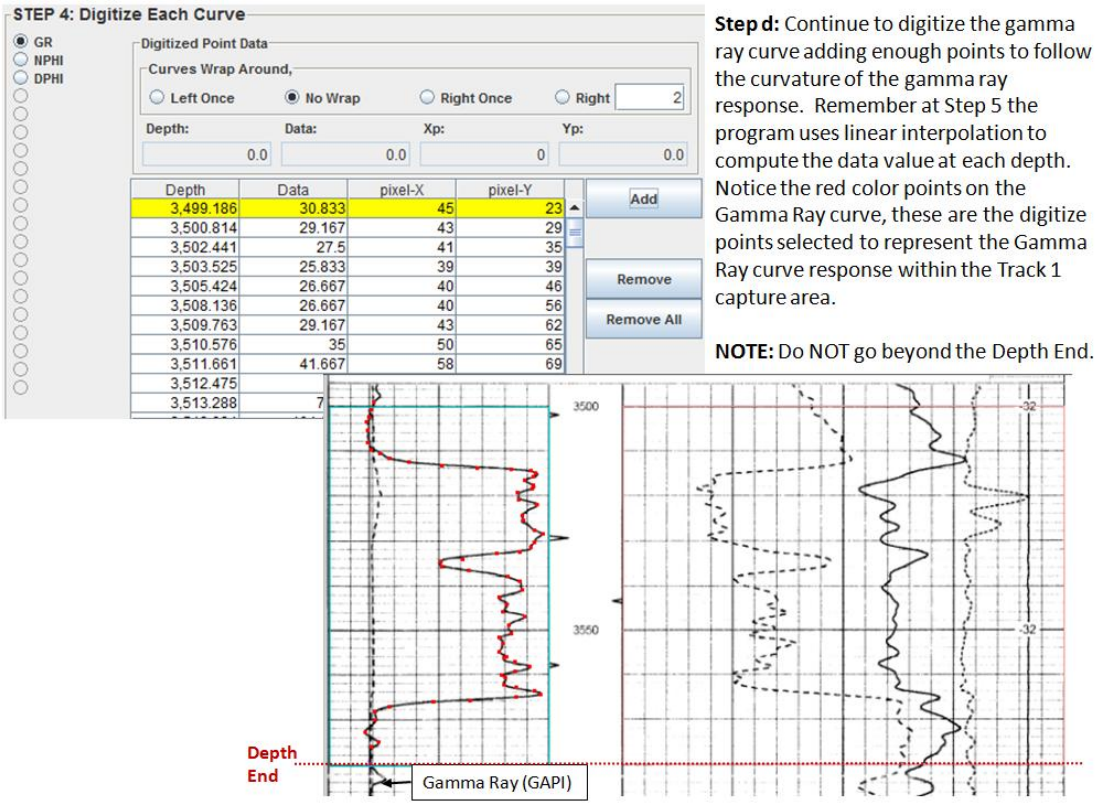
**NOTE:** Remember while digitizing to add enough points to follow the curvature of each curve. The program uses linear interpolation at each sample depth to compute the data value at Step 5.

As each point is added you will see the point on the digitize curve in a specific color. 1st curve is red, 2nd curve is green, 3rd curve is blue, etc. The program has set up a color for each of the curves up to 20 curves.



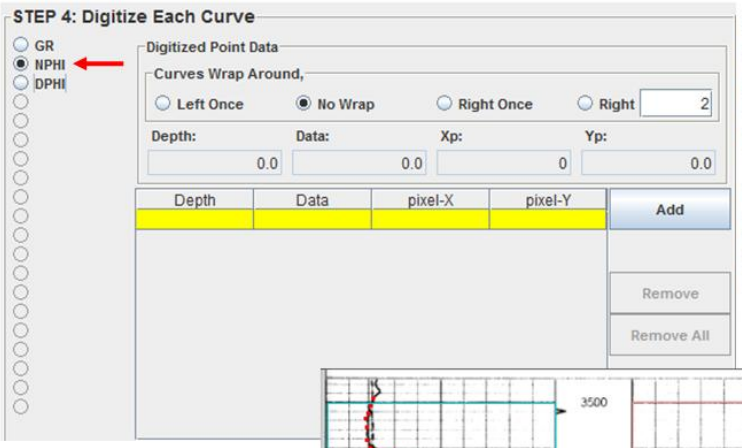



**Step c:** The second point is selected following the curvature. Remember that the you only need to digitize enough points to follow the curvature of the curve. Notice that the second point when clicked is a purplish red pixel and the Depth, Data, Xp and Yp are entered automatically in the "STEP 4: Digitize Each Curve" Panel. Select the Add Button to add to the Gamma Ray Data List.



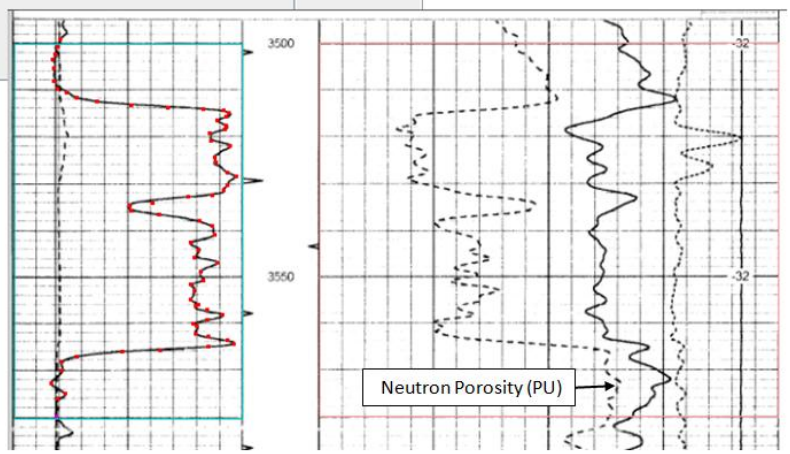

**Step d:** Continue to digitize the gamma ray curve adding enough points to follow the curvature of the gamma ray response. Remember at Step 5 the program uses linear interpolation to compute the data value at each depth. Notice the red color points on the Gamma Ray curve, these are the digitize points selected to represent the Gamma Ray curve response within the Track 1 capture area.

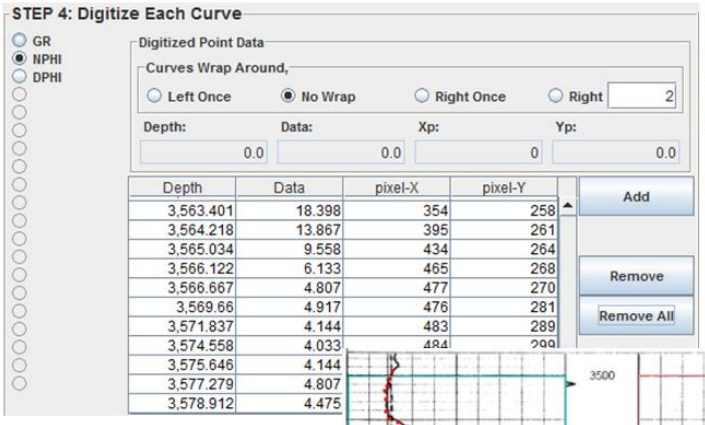
**NOTE:** Do NOT go beyond the Depth End.




**Step e:** Gamma ray has been digitized now select the Neutron Porosity (NPHI) Radio Button and begin digitizing the Neutron porosity curve in Track 2.

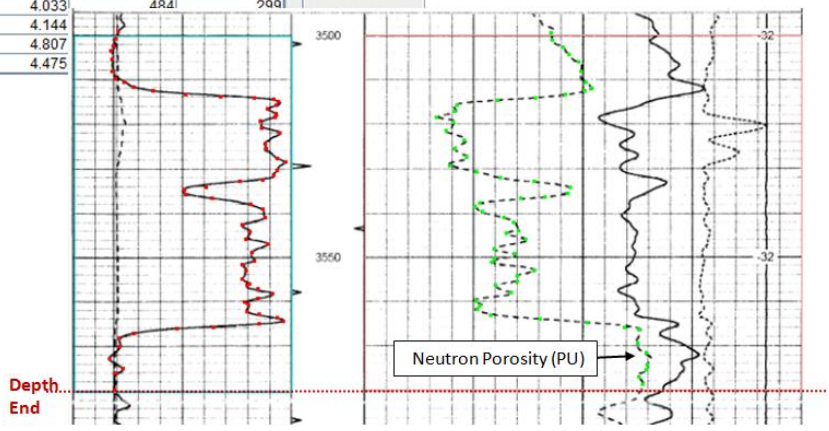
Remember to start the first point just above the reddish start depth so Step 5 will compute the Start Depth data value.

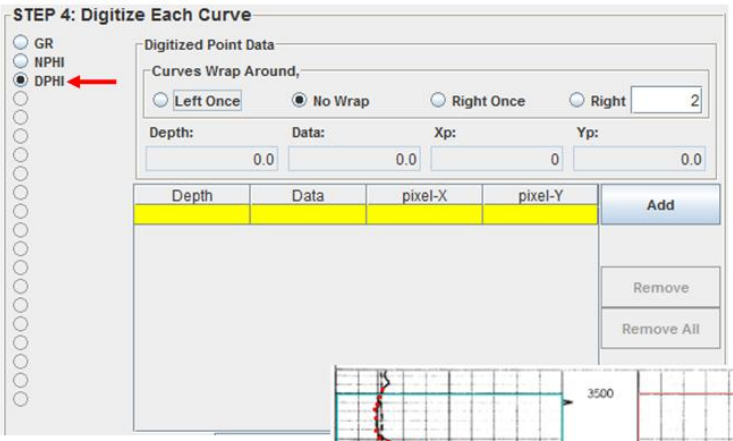



**Step f:** Notice the green color points on the Neutron Porosity curve, these are the digitize points selected to represent the Neutron Porosity curve response within the Track 2 capture area.

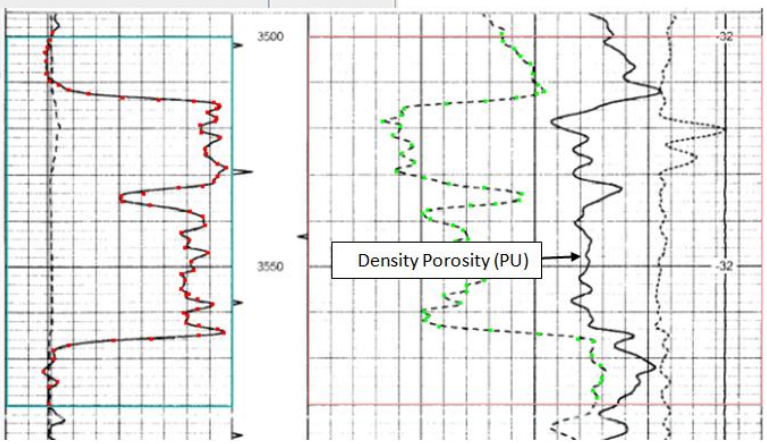
**NOTE:** Do NOT go beyond the Depth End.

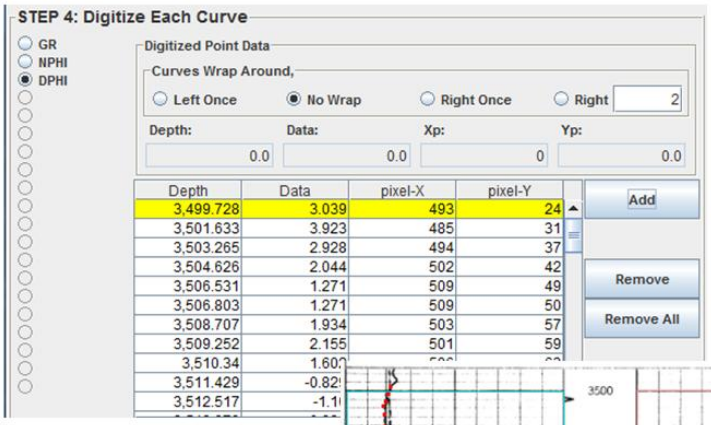





**Step g:** Neutron Porosity has been digitized now select the Density Porosity (DPHI) Radio Button and begin digitizing the Density porosity curve in Track 2.

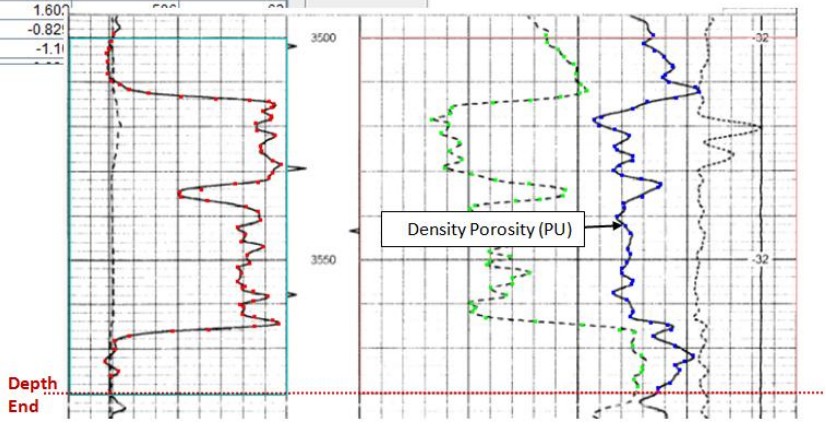
Remember to start the first point just above the reddish start depth so Step 5 will compute the Start Depth data value.



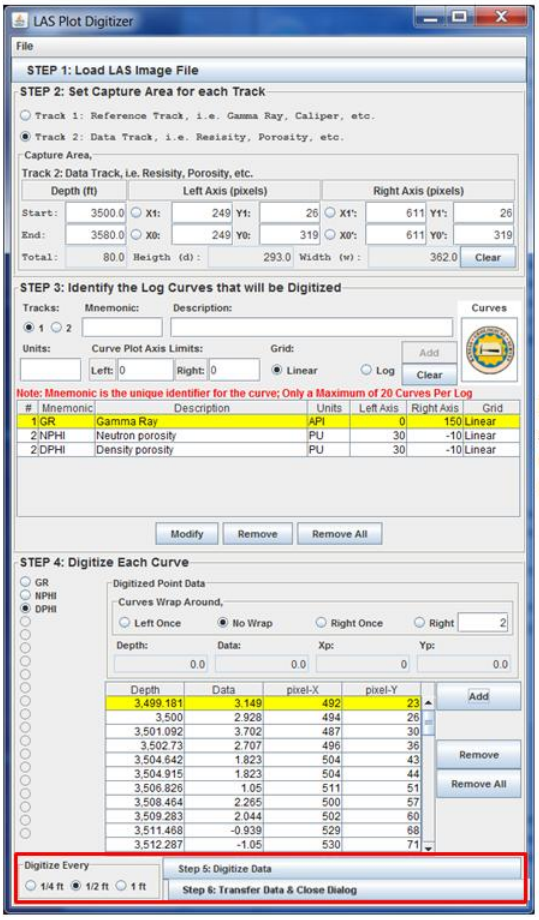




**Step h:** Notice the blue color points on the Density Porosity curve, these are the digitize points selected to represent the Density Porosity curve response within the Track 2 capture area.

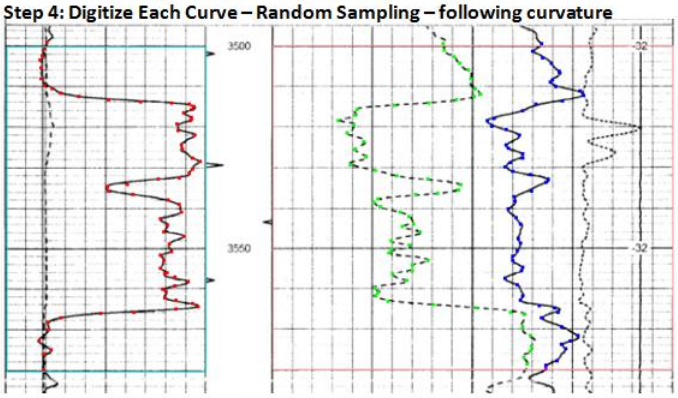
**NOTE:** Do NOT go beyond the Depth End.



## Step 5: Digitize Data & Step 6: Transfer Data & Close

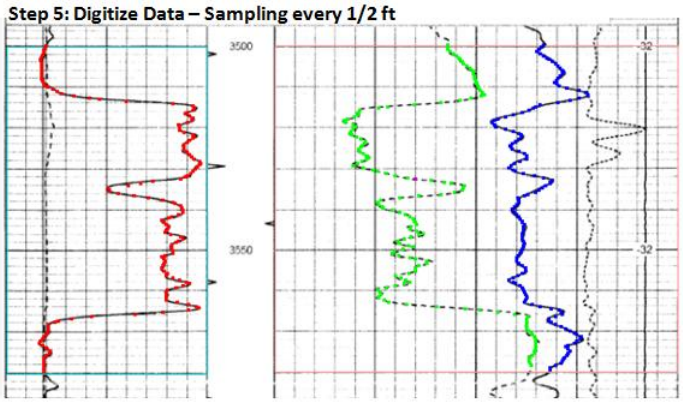



**Step 4: Digitize Each Curve – Random Sampling – following curvature**




**Digitize Data:** Set the 1/2 ft radio button in the "Digitize Every" Panel. Then select the "Step 5: Digitize Data" Button to digitize the log curves every 1/2 Once the Data has been digitized, select the "Step 6: Transfer Data & Close Dialog" Button to move data back to the "Digitize LAS Image File" Frame.

**Step 5: Digitize Data – Sampling every 1/2 ft**




~Curves ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

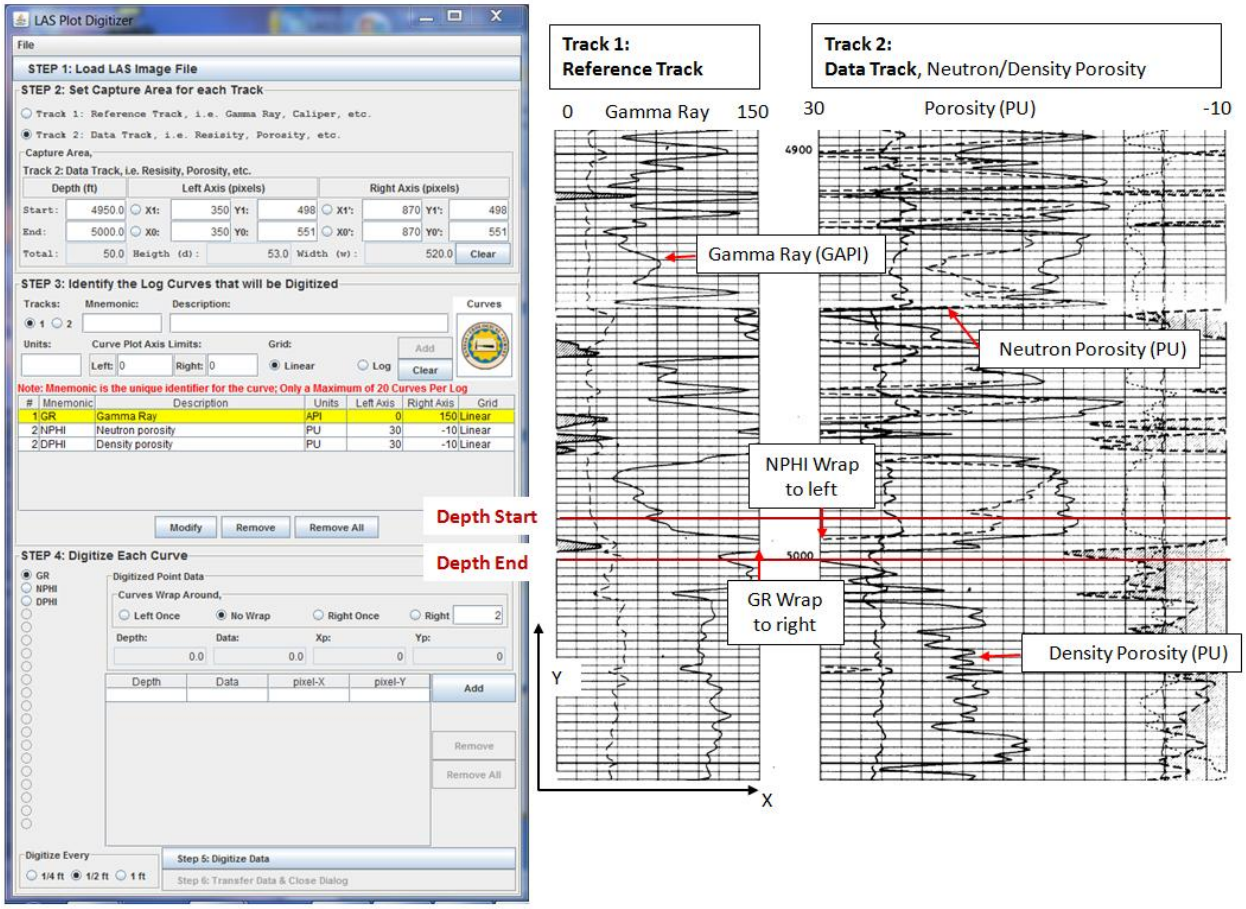
| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | F | | Depth |
| X | GR | API | | Gamma Ray |
| X | NPHI | PU | | Neutron porosity |
| X | DPHI | PU | | Density porosity |

~Curves ~ASCII

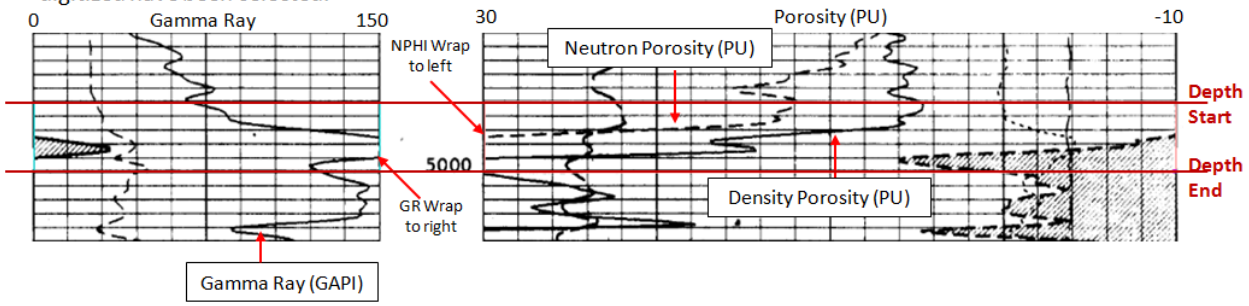
| DEPT | GR | NPHI | DPHI |
|---|---|---|---|
| 3,500 | 30 | 12.855 | 3.165 |
| 3,500.5 | 29.488 | 12.821 | 3.397 |
| 3,501 | 28.976 | 12.787 | 3.629 |
| 3,501.5 | 28.464 | 12.677 | 3.861 |
| 3,502 | 27.952 | 12.373 | 3.699 |
| 3,502.5 | 27.409 | 12.068 | 3.394 |
| 3,503 | 26.64 | 11.766 | 3.09 |
| 3,503.5 | 25.871 | 11.596 | 2.775 |
| 3,504 | 26.042 | 11.427 | 2.451 |
| 3,504.5 | 26.261 | 11.258 | 2.126 |
| 3,505 | 26.481 | 11.013 | 1.892 |
| 3,505.5 | 26.667 | 10.742 | 1.689 |
| 3,506 | 26.667 | 10.471 | 1.486 |
| 3,506.5 | 26.667 | 10.307 | 1.284 |
| 3,507 | 26.667 | 10.256 | 1.34 |
| 3,507.5 | 26.667 | 10.205 | 1.514 |
| 3,508 | 26.667 | 10.154 | 1.688 |
| 3,508.5 | 27.226 | 10.098 | 1.862 |
| 3,509 | 27.995 | 10.008 | 2.053 |
| 3,509.5 | 28.763 | 9.918 | 2.029 |
| 3,510 | 30.867 | 9.828 | 1.775 |
| 3,510.5 | 34.455 | 9.738 | 1.245 |
| 3,511 | 37.605 | 9.622 | 0.129 |
| 3,511.5 | 40.678 | 9.419 | -0.851 |
| 3,512 | 47.22 | 9.216 | -1.003 |
| 3,512.5 | 55.692 | 9.427 | -1.155 |
| 3,513 | 69.53 | 10.236 | -0.415 |
| 3,513.5 | 86.935 | 11.319 | 0.356 |

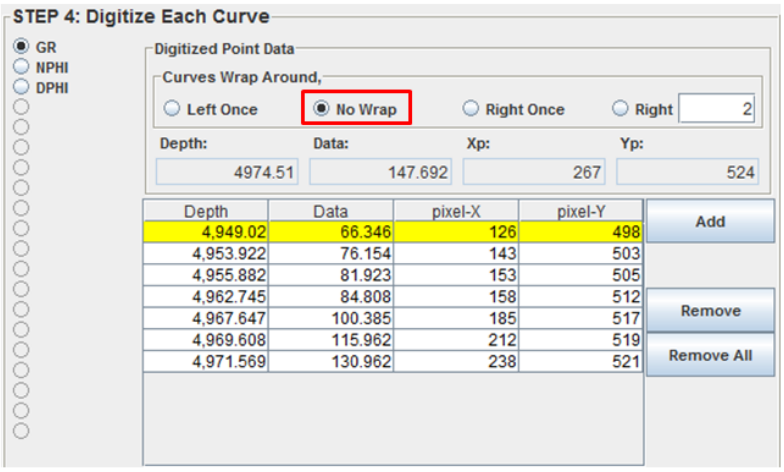
## Digitizer - Data Wrapping Around Axis

This section will show the user how to account for curves that wrap around the axis because the data is greater than the maximum track value.



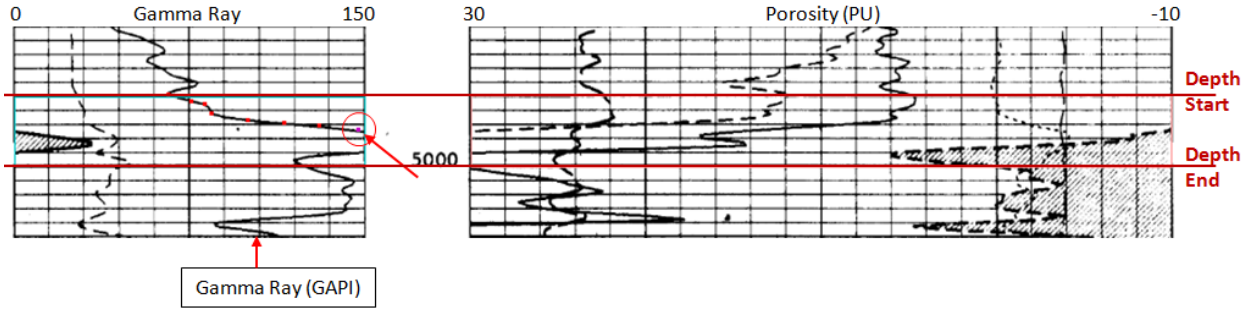

This log offers an example of a log curve that wraps to the right (Gamma Ray) and another log curve that wraps to the left (Neutron Porosity). The Track capture areas have already been determine and the curves that will be digitized have been selected.

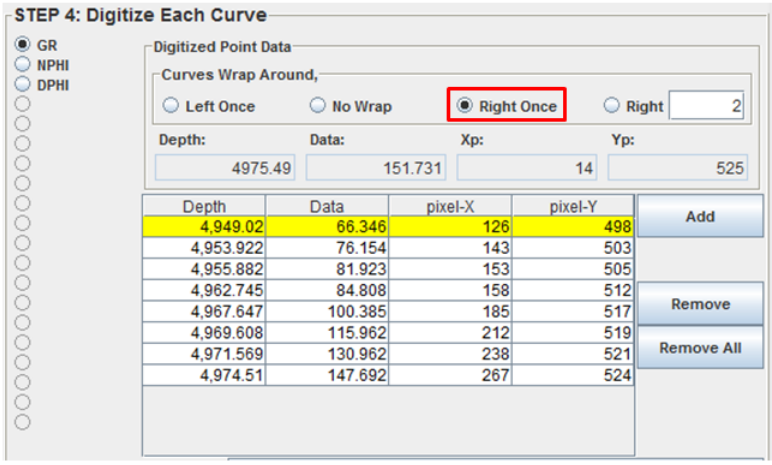




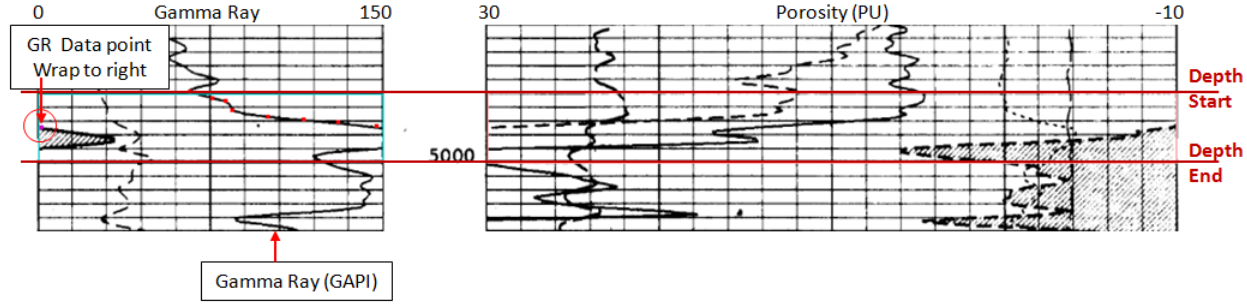

**Step a:** Digitize the Gamma Ray Log as before coming as close to the right axis as you can. This program uses linear interpolation to compute the data.
This Example: Depth is 4974.51' and the Data is 147.692 API units with respect to a maximum scale of 150 API units.

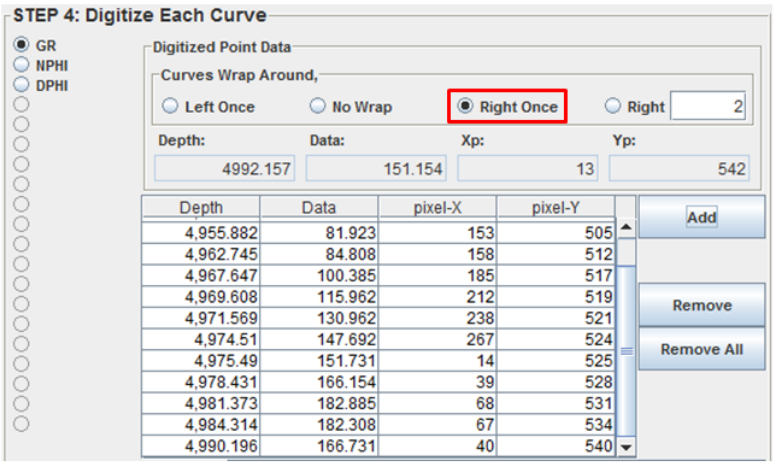
NOTE: The Wrap indicator is set to "**No Wrap**".



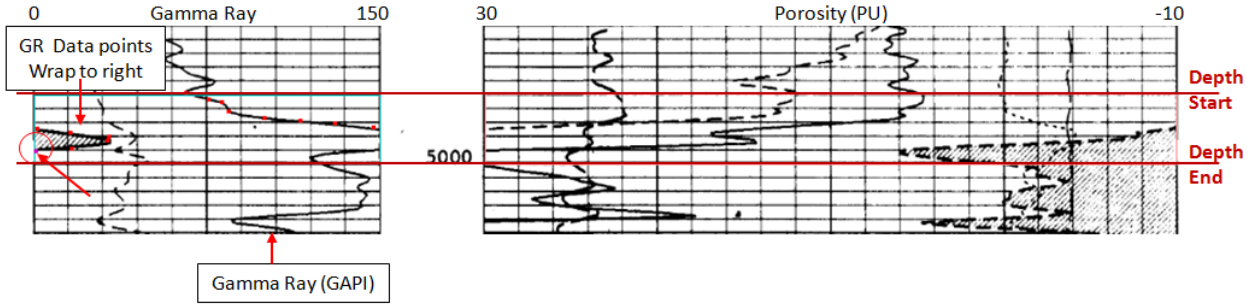

**Step b:** Since this next Gamma Ray data point is wrapping around to the right, select the "**Right Once**" radio button. This tells the program to add 150 API units to the data value. Try to set the point as close to the left axis as possible but be aware that the depth must be greater than the last point depth entered.
This Example: Last Depth is 4974.51' and the Data is 147.692 API units with respect to a maximum scale of 150 API units. This Depth is 4975.49' and the Data is 151.731 API units.

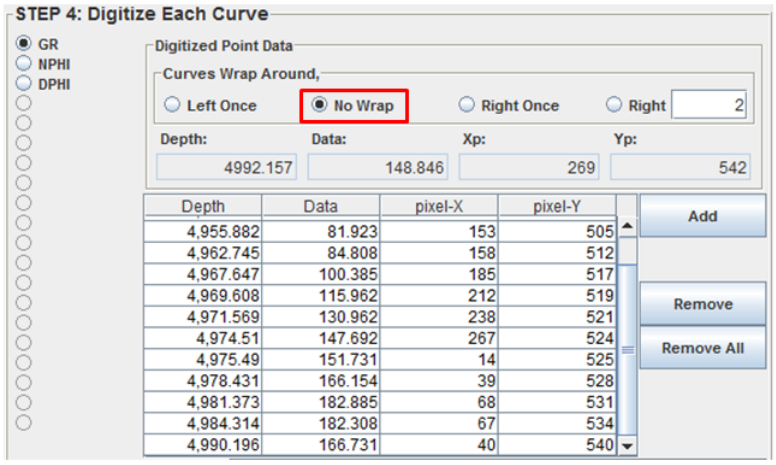




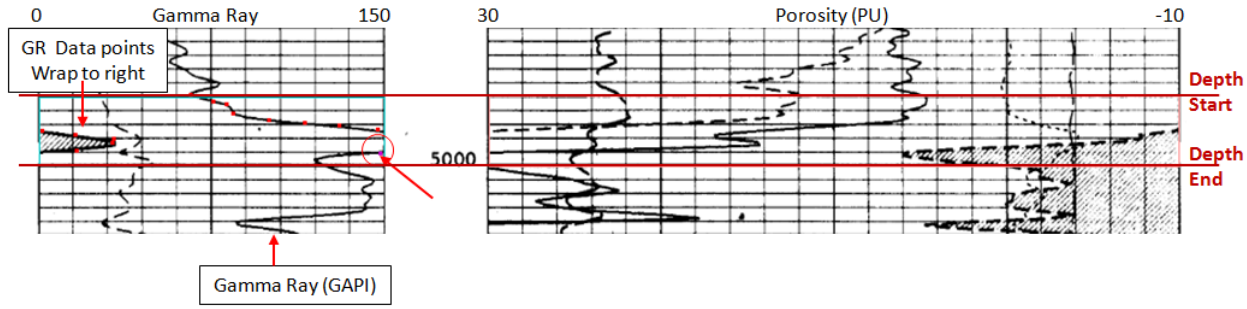

**Step c:** Continue to digitize the Wrap around Gamma Ray Log as before coming as close to the left axis as you can.
This Example: Depth is 4992.157' and the Data is 151.154 API units with respect to a maximum scale of 150 API units.

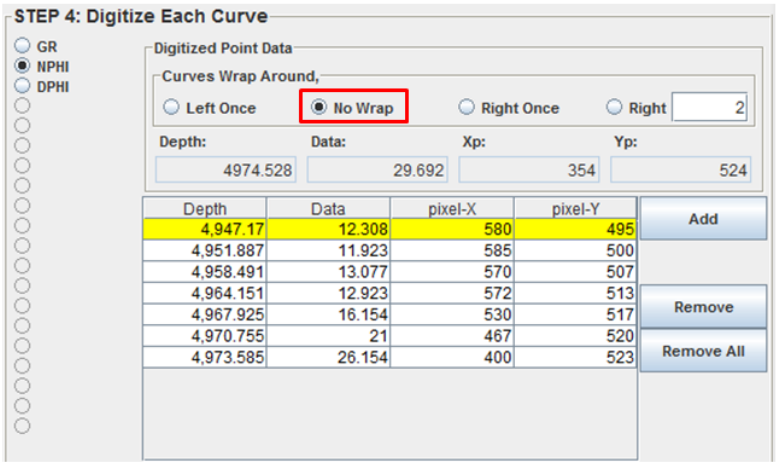
NOTE: The Wrap indicator is set to "**Right Once**".



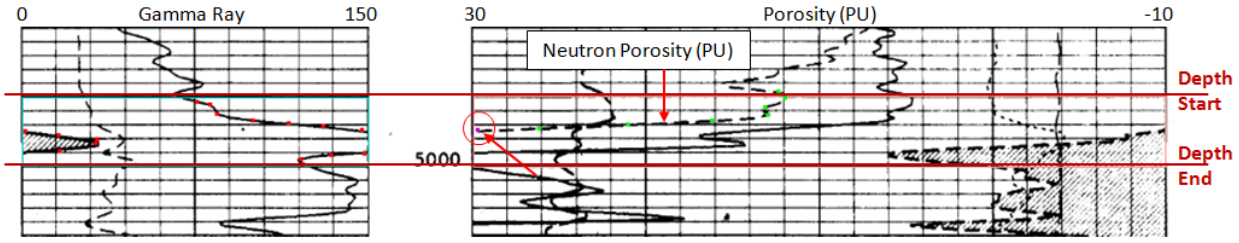

**Step d:** Since this next Gamma Ray data point is returning to the normal scale, select the "**No Wrap**" radio button. This tells the program to add 0 API units to the data value. Try to set the point as close to the right axis as possible but be aware that the depth must be greater than the last point depth entered.
This Example: Last Depth is 4992.157' and the Data is 151.154 API units with respect to a maximum scale of 150 API units. This Depth is 4992.157' and the Data is 148.846 API units.

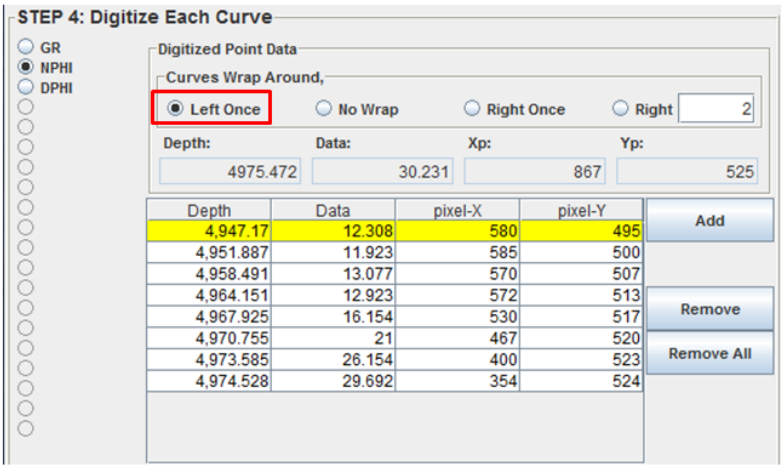




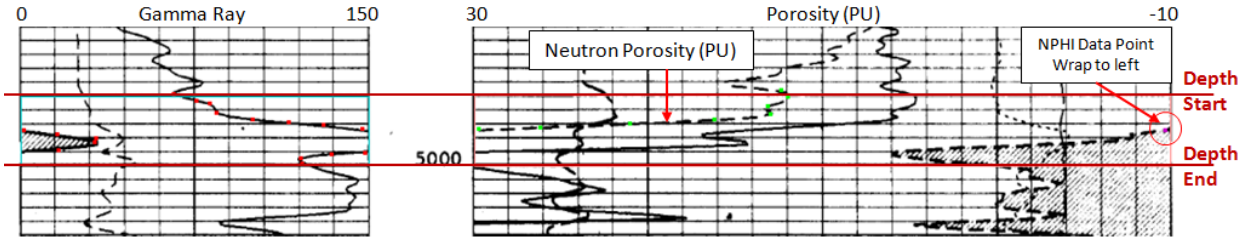

**Step e:** Digitize the Neutron Porosity Log as before coming as close to the left axis as you can. This program uses linear interpolation to compute the data.
This Example: Depth is 4974.528' and the Data is 29.692 PU with respect to a maximum scale of 30 PU.

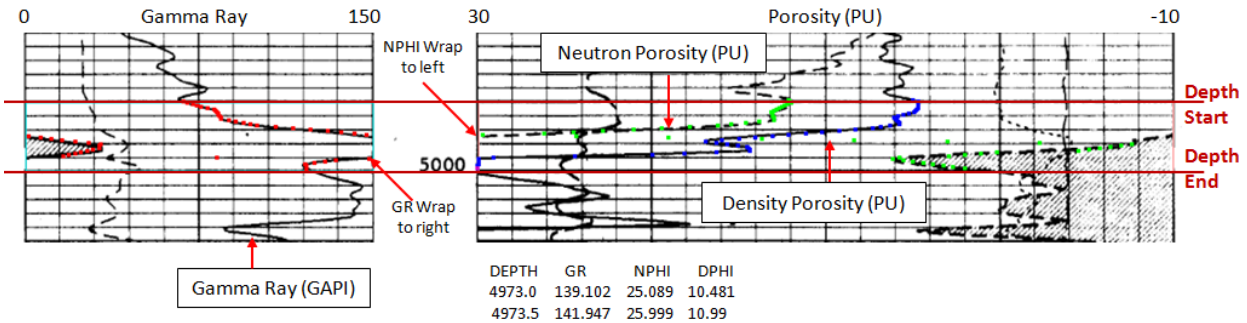
NOTE: The Wrap indicator is set to "**No Wrap**".




**Step f:** Since this next Neutron Porosity data point is wrapping around to the left, select the "**Left Once**" radio button. This tells the program to add 30 PU to the data value. Try to set the point as close to the right axis as possible but be aware that the depth must be greater than the last point depth entered.
This Example: Last Depth is 4974.528' and the Data is 29.692 PU with respect to a maximum scale of 30 PU. This Depth is 4975.472' and the Data is 30.231 PU.






| DEPTH | GR | NPHI | DPHI |
|---|---|---|---|
| 4973.0 | 139.102 | 25.089 | 10.481 |
| 4973.5 | 141.947 | 25.999 | 10.99 |
| 4974.0 | 144.791 | 27.711 | 11.5 |
| 4974.5 | 147.635 | 29.587 | 12.009 |
| 4975.0 | 149.712 | 29.879 | 12.519 |
| 4975.5 | 151.78 | 30.077 | 13.029 |
| 4976.0 | 154.232 | 30.275 | 13.538 |
| 4976.5 | 156.684 | 30.473 | 14.048 |
| 4977.0 | 159.136 | 30.671 | 14.558 |
| 4977.5 | 161.588 | 30.869 | 15.067 |
| 4978.0 | 164.04 | 31.067 | 15.577 |
| 4978.5 | 166.546 | 31.265 | 16.087 |
| 4979.0 | 169.39 | 31.463 | 16.596 |
| 4979.5 | 172.233 | 31.662 | 16.685 |
| 4980.0 | 175.077 | 31.86 | 16.369 |

Wrap around axis

## Save Digitized Log Data to a Log ASCII Standard (LAS) version 2.0 File

The LAS (Log ASCII Standard) is rapidly becoming the accepted industry standard for electronic transmission of digital wire-line logs. Earlier digital formats were commonly coded in binary (such as LIS) and so required specialized software to read them. The LAS standard was introduced by the Canadian Well Logging Society (http://www.cwls.org/) in 1989 to standardize the organization of digital log curve information for personal computer users. It did this very successfully and the standard became popular worldwide. Version 1.2 was the first version and was followed in September 1992 by version 2.0 to address some inconsistencies. A more versatile version LAS 3.0 was released in 1999 however at present LAS 2.0 remains the dominant product. LAS 3.0 clarify several of the poorly defined specifications of LAS 2.0 and provide expanded data storage capabilities, but have seen limited implementation.

The GEMINI Tools programs will read either a Log ASCII Standard (LAS) version 2.0 or 3.0 file and version 1.2 but the Well Information Section is backward in data definition and will not be parsed correctly in the GEMINI Tools web apps.

The sections defined for the LAS 2.0 standard are as follows (http://www.cwls.org/wp-content/uploads/2014/09/LAS_20_Update_Jan2014.pdf):

- **"~V"** (also known as "~VERSION INFORMATION SECTION") is a required section; has formatting requirements; must be the first section; identifies the version number and whether data is in "wrapped" or "un-wrapped" mode.
- **"~W"** (also known as "~WELL INFORMATION SECTION") is a required section; has formatting requirements; is preferably the second section; contains information on the well name, location, and start and stop values of the data in this file.
- **"~C"** (also known as ~CURVE INFORMATION SECTION") is a required section; has formatting requirements; contains curve mnemonics and their definitions in the order that they appear in the data section.
- **"~P"** (also known as ~PARAMETER INFORMATION SECTION") is an optional section; has formatting requirements; contains information on parameters or constants relevant to the wellbore such as mud resistivity, wire line engineer, truck number, elevation data, etc.
- **"~O"** (also known as "~OTHER") is an optional section; has no formatting requirements; contains other information or comments.
- **"~A"** (also known as ~ASCII LOG DATA") is a required section; has formatting requirements; is the last section in the file and also referred to as the data section. The index of the data columns is either Depth or Time. The index values always appear in the first column and each column of data must be separated by at least one space (ASCII 32). All values in the ASCII log data section must be floating point or integer (long) values. Other formats such as Text or Exponential values are not supported.

The Digitizer web app does not verify that the LAS file is correct, i.e. that all the required fields are present. It only saves the information that is provided as a Log ASCII Standard (LAS) version 2.0 format file. Check the ~Well & ~Parameters Panels to verify that required data values are filled for a valid LAS file are present.

Header Information:

Name: Shamar 1 15-131-20205
sec. 17 13E 5S
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

~Well | ~Parameters | Shamar-1.las 1

| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| STRT | F | 3500 | Required | Start Depth |
| STOP | F | 3581.0 | Required | Stop Depth |
| STEP | F | 0.5 | Required | Step |
| NULL | | -999.25 | Required | Null Value |
| COMP | | Noble Petroleum, Inc | | Company |
| WELL | | Shamar 1 | Required | Well |
| FLD | | WILDCAT | | Field |
| SEC | | 17 | | Section |
| TOWN | | 5S | | Township (e.g. 42S) |
| RANG | | 13E | | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Required | Location (Sec Town Range) |
| LOC1 | | 1515' FSL & 1195' FEL | | Location 1 (quarter calls) |
| LOC2 | | SWNESE | | Location 2 (footages) |
| PROV | | | | Province |
| CTRY | | US | Required | Country |
| STAT | | Kansas | Required | State |
| CNTY | | NEMAHA | Required | County |
| API | | 15-131-20205 | Required | API-Number |
| UWI | | | or Required | Unique Well ID |
| SRVC | | Log Tech | | Service Company |
| LIC | | | | Licence Number |
| DATE | | 02/06/2012 | | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 39.6137073 | | Latitude |
| LONG | DEG | -95.980802 | | Longitude |
| GDAT | | NAD27 | | Geodetic Datum |
| X | | 244102.82 | | X or East-West coordinate |
| Y | | 4388921.03 | | Y or North South coordinate |
| HZCS | | UTM | | Horizontal Co-ordinate System |
| UTM | | 15.0 | | UTM Location |
| STUS | | D&A | | Well Status |

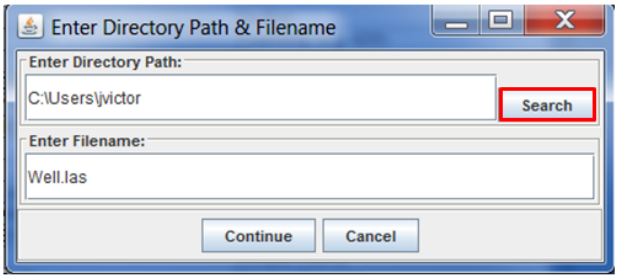
Header Information:

Name: Shamar 1 15-131-20205
sec. 17 13E 5S
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

~Well | ~Parameters | Shamar-1.las 1

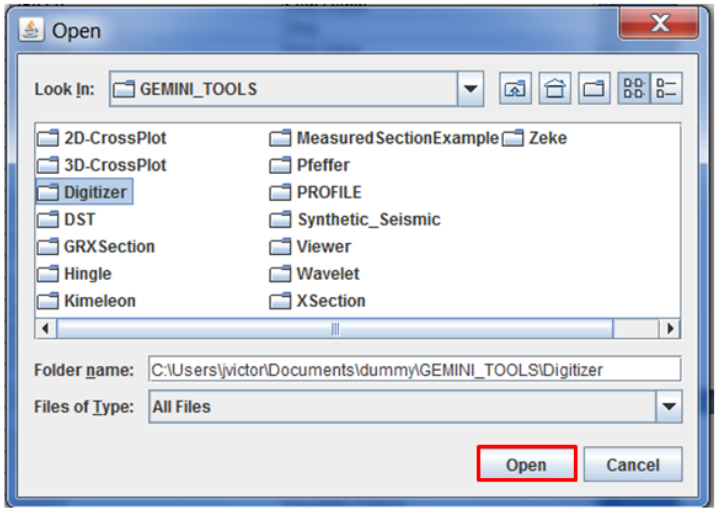
| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| EGL | F | 1294.0 | Necessary | Ground Level Elevation |
| EKB | F | 1303.0 | or Necessary | Kelly Bushing Elevation |
| EDF | F | | | Derrick Floor Elevation |
| ERT | F | | | Rotary Table Elevation |
| TDL | F | 3837.0 | Necessary | Total Depth Logger |
| TDD | F | 3832.0 | | Total Depth Driller |
| CSGL | F | | | Casing Bottom Logger |
| CSGD | F | | | Casing Bottom Driller |
| CSGS | IN | | | Casing Size |
| CSGW | LB | | | Casing Weight |
| BS | IN | 7.875 | | Bit Size |
| DFT | | Chemical | | Mud type |
| MSS | | | | Mud Sample Source |
| DFD | gm/cc | 9.0 | | Mud Density |
| DFV | s/qt | | | Mud Viscosity (Funnel) |
| DFL | cc | | | Fluid Loss |
| PH | | | | PH |
| RM | OHM-M | | | Resistivity of Mud |
| MST | DEG-F | | | Temperature of Mud |
| RMF | OHM-M | | | Resistivity of Mud Filtrate |
| MFT | DEG-F | | | Temperature of Mud Filtrate |
| RMC | OHM-M | | | Resistivity of Mud Cake |
| MCST | DEG-F | | | Temperature of Mud Cake |
| BHT | DEG-F | 116.0 | | Maximum Recorded Temperature |
| RMB | OHM-M | | | Resitivity @ BHT |
| TIMC | DATE | | | Date/Time Circulation Stopped |
| TIML | DATE | | | Date/Time Logger Tagged Bottom |
| UNIT | | 10 | | Logging Unit Number |
| BASE | | Hays, Kansas | | Home Base of Logging Unit |
| ENG | | Jason Wellbrock | | Recording Engineer |
| WIT | | Doug Davis | | Witnessed By |

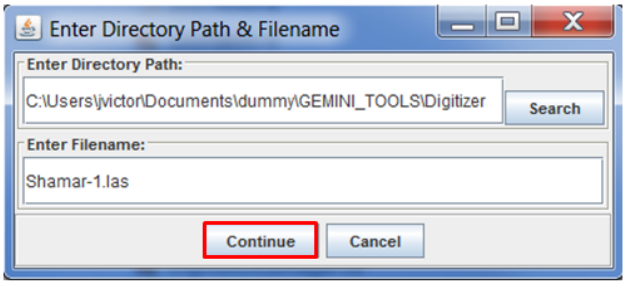
Select the Floppy Disk Image  to Open the "LAS File Data Types" Dialog. This dialog allows the user to make changes or additions to the data before it is saved to a Log ASCII Standard (LAS) version 3.0 File.




The default directory is your Home Directory. The user can search their PC for the desired directory path by selecting the "Search" button. This will display the "Open" dialog.

Once you have found the directory select the "Open" Button to select the Directory Path, which will insert the path into the "Enter Directory Path" text field in the "Enter Directory Path & Filename" dialog.






Enter the file name of the file, be sure to use ".las" at the end to identify this file as a LAS type text file. Then select the "Continue" Button and the file will be saved in the directory you selected and the LAS file will then be displayed in a browser window to verify that the file was created.

Shamar-1 - Notepad

File Edit Format View Help

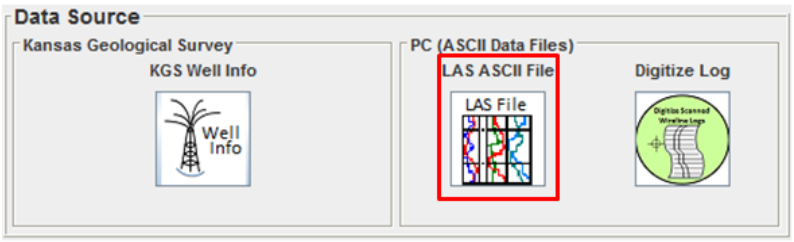
```
~Version
#MNEM .UNIT                VALUE  : DESCRIPTION
 VERS .                      2.0  : CWLS LOG ASCII STANDARD - VERSION 2.0
 WRAP .                       NO  : ONE LINE PER DEPTH STEP
~Well
#MNEM .UNIT                    VALUE  : DESCRIPTION
 STRT  .F                        3500  : Start Depth
 STOP  .F                      3581.0  : Stop Depth
 STEP  .F                         0.5  : Step
 NULL  .                      -999.25  : Null Value
 COMP  .          Noble Petroleum, Inc  : Company
 WELL  .                      Shamar 1  : Well
 FLD   .                       WILDCAT  : Field
 SEC   .                            17  : Section
 TOWN  .                            5S  : Township (e.g. 42S)
 RANG  .                           13E  : Range  (e.g. 25E)
 LOC   .                     5S-13E-17  : Location (Sec Town Range)
 LOC1  .        1515' FSL & 1195' FEL  : Location 1 (quarter calls)
 LOC2  .                       SWNESE  : Location 2 (footages)
 PROV  .                               : Province
 CTRY  .                           US  : Country
 STAT  .                       Kansas  : State
 CNTY  .                      NEMAHA  : County
 API   .                15-131-20205  : API-Number
 UWI   .                               : Unique Well ID
 SRVC  .                     Log Tech  : Service Company
 LIC   .                               : Licence Number
 DATE  .                   02/06/2012  : Date preferred format is MM/DD/YYYY
 LATI  .DEG                39.6137073  : Latitude
 LONG  .DEG               -95.980802  : Longitude
 GDAT  .                        NAD27  : Geodetic Datum
 X     .                   244102.82  : X or East-West coordinate
 Y     .                  4388921.03  : Y or North South coordinate
 HZCS  .                         UTM  : Horizontal Co-ordinate System
 UTM   .                        15.0  : UTM Location
 STUS  .                         D&A  : Well Status
~Parameter
#MNEM .UNIT                VALUE  : DESCRIPTION
 EGL   .F                  1294.0  : Ground Level Elevation
 EKB   .F                  1303.0  : Kelly Bushing Elevation
 EDF   .F                          : Derrick Floor Elevation
 ERT   .F                          : Rotary Table Elevation
 TDL   .F                  3837.0  : Total Depth Logger
 TDD   .F                  3832.0  : Total Depth Driller
 CSGL  .F                          : Casing Bottom Logger
 CSGD  .F                          : Casing Bottom Driller
 CSGS  .IN                         : Casing Size
 CSGW  .LB                         : Casing Weight
 BS    .IN                 7.875  : Bit Size
 DFT   .                Chemical  : Mud type
 MSS   .                          : Mud Sample Source
 DFD   .gm/cc                9.0  : Mud Density
 DFV   .s/qt                      : Mud Viscosity (Funnel)
 DFL   .cc                        : Fluid Loss
 PH    .                          : PH
 RM    .OHM-M                     : Resistivity of Mud
 MST   .DEG-F                     : Temperature of Mud
 RMF   .OHM-M                     : Resistivity of Mud Filtrate
 MFT   .DEG-F                     : Temperature of Mud Filtrate
 RMC   .OHM-M                     : Resistivity of Mud Cake
 MCST  .DEG-F                     : Temperature of Mud Cake
 BHT   .DEG-F              116.0  : Maximum Recorded Temperature
 RMB   .OHM-M                     : Resitivity @ BHT
 TIMC  .DATE                      : Date/Time Circulation Stopped
 TIML  .DATE                      : Date/Time Logger Tagged Bottom
 UNIT  .                      10  : Logging Unit Number
 BASE  .             Hays, Kansas  : Home Base of Logging Unit
 ENG   .          Jason Wellbrock  : Recording Engineer
 WIT   .               Doug Davis  : Witnessed By
~Curve
#MNEM .UNIT           VALUE  : DESCRIPTION
 DEPT  .F                     : Depth
```

## Example: Shamar 1- Digitize 20 additional feet

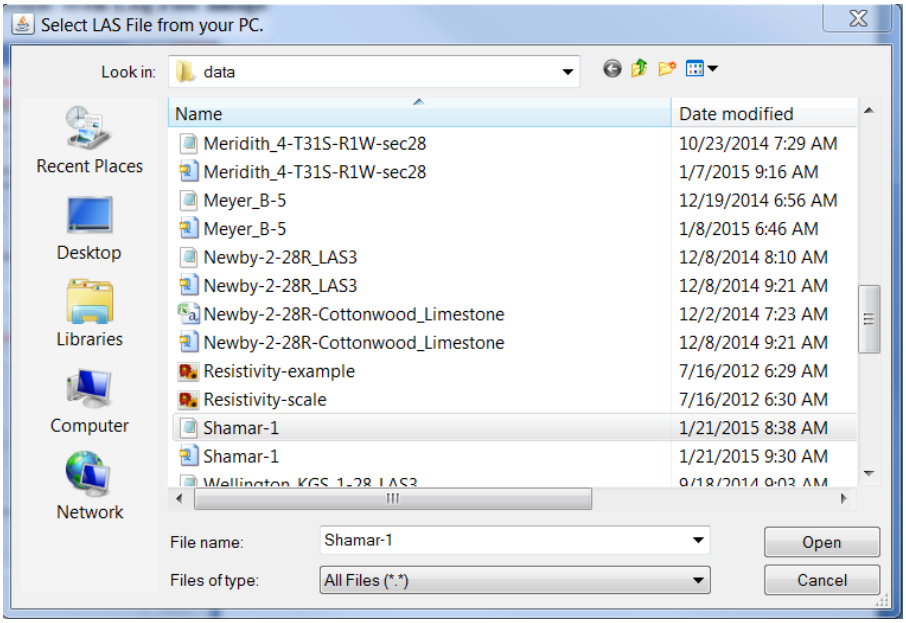
This section will digitize 20 more feet to the recently saved Shamar 1 LAS version 2.0.

Download the Log ASCII Standard (LAS) version 2.0 file.
Shamar –1 ASCII File: http://www.kgs.ku.edu/Gemini/Tools/documentation/Shamar-1.las
Zip File: http://www.kgs.ku.edu/Gemini/Tools/documentation/Shamar-1.zip

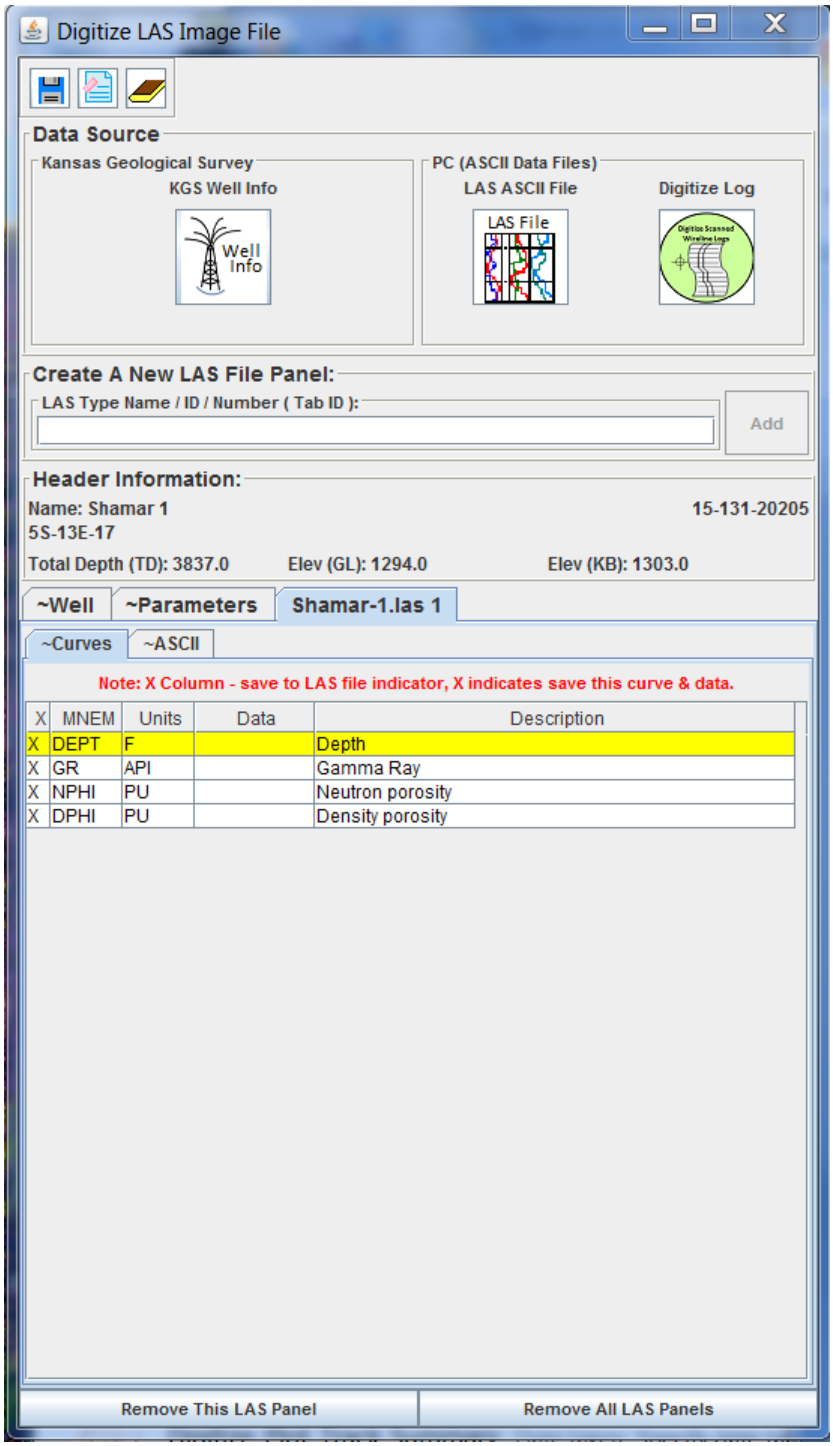
Download the following Portable Network Graphics (PNG) image files.
Shamar -1: Dual Compensated Porosity Electric Well Log Segment:
http://www.kgs.ku.edu/Gemini/Tools/documentation/Litho-Density-example.png
Electric Well Log Scale:
http://www.kgs.ku.edu/Gemini/Tools/documentation/Litho-Density-scales-example.png




Click on the "LAS ASCII File" icon button to display the "Select LAS File from your PC" dialog. Select the Shamar-1 LAS file.

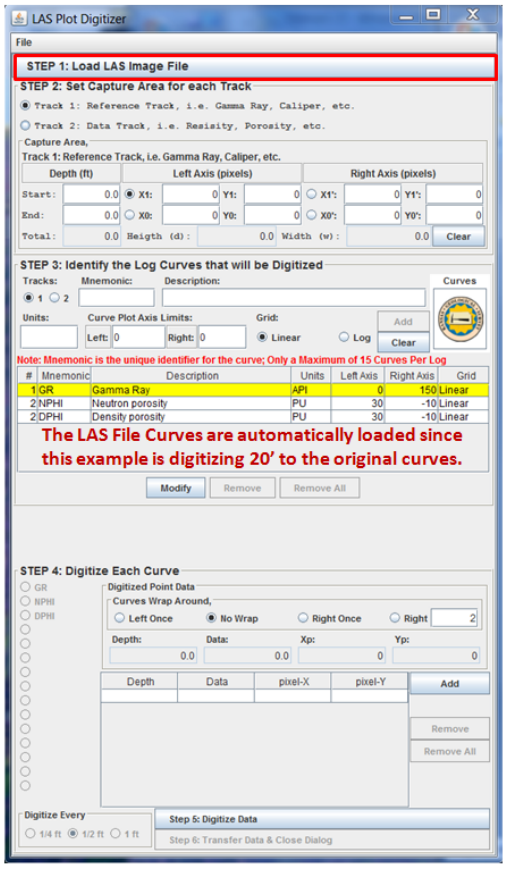



Select the "Open" button to open and parse the contents of the LAS file into the Digitizer web app. Notice that the "Shamar-1.las 1" tab is automatically added and the "Digitize Log" icon button enabled.

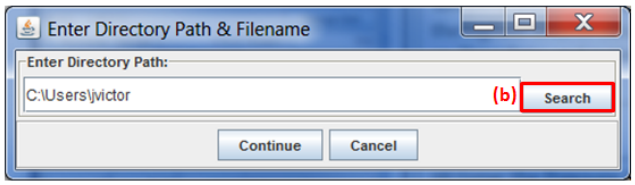



This icon button is only enabled when the Data tab is selected, because it will take the contents of the “Curves” tab panel in the data tab panel and transfer it to the Digitizer Control dialog. Click the “Digitizer Log” icon button to display the “LAS Plot Digitizer” dialog.

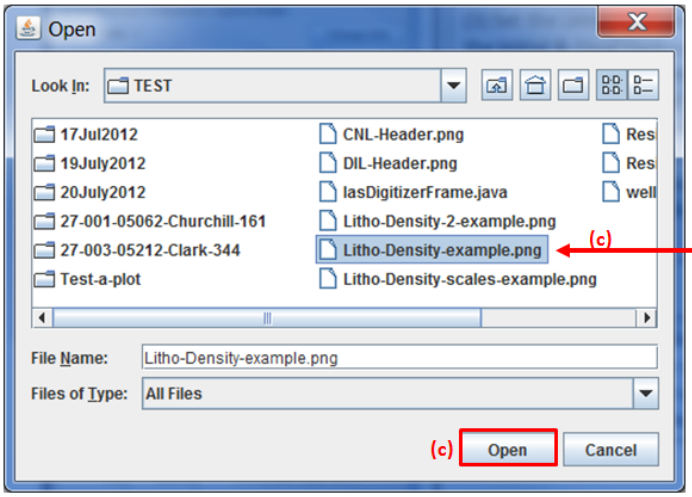
## Step 1: Loading Electric Well Log Plot Image




**Step a:** Select the "**STEP 1: Load LAS Image File**" Button to display the "Enter Directory Path & Filename" Dialog.



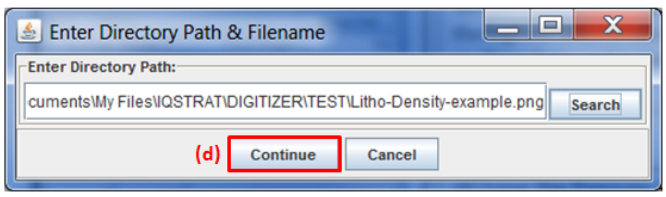

**Step b:** Select the Search Button to search your PC for the correct Electric Well Log Image Plot.
*NOTE: The starting directory is your home directory.*



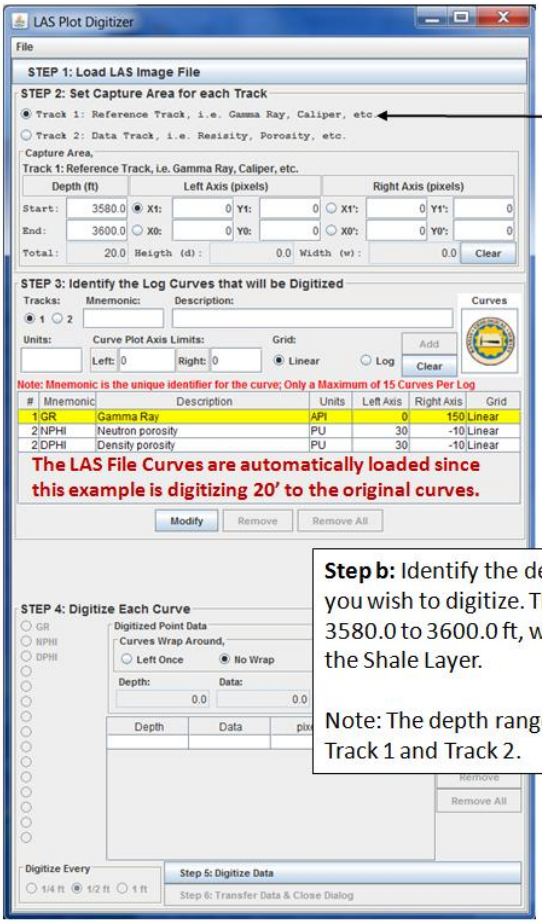

**Step c:** Highlight the Electric Well Log Image Plot to load into the digitizer. This example is a Neutron-Density Porosity Log, Litho-Density-example.png Select the "Open" Button.

NOTE: Only PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file

**Step d:** The Electric Well Log Image Plot directory & filename will be loaded. Select the "Continue" Button to load the image into the program.



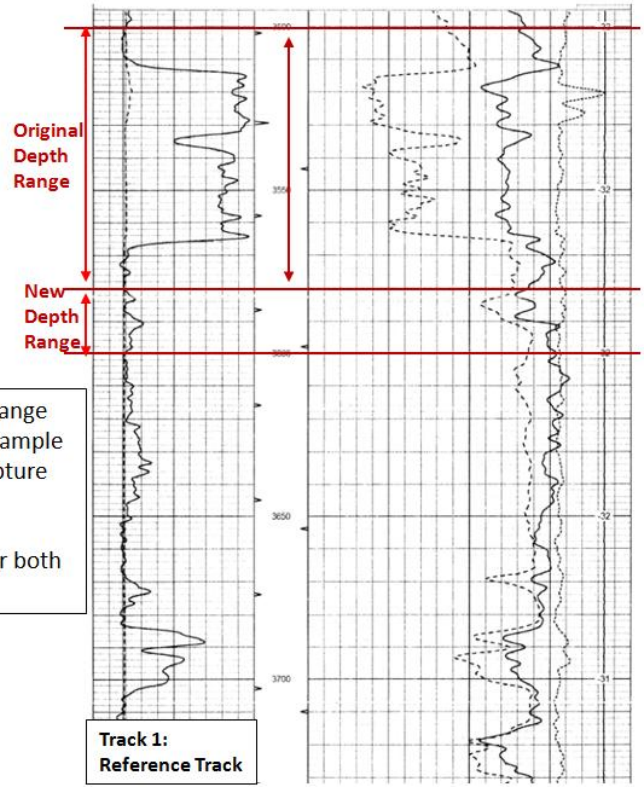
## Step 2: Set Capture Area for each Track



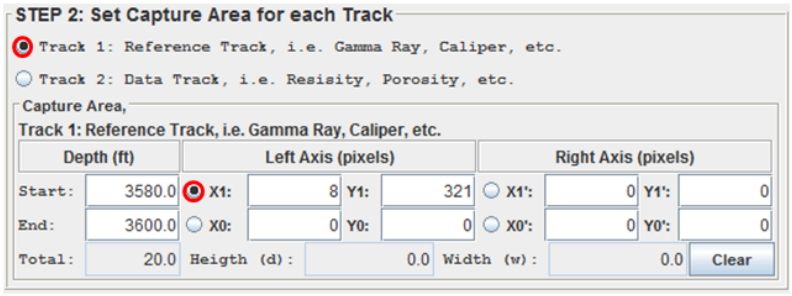

**Step a:** In the "**Step2: Set Capture Area for each Track**" set the "Track 1: Reference Track …" Radio button.

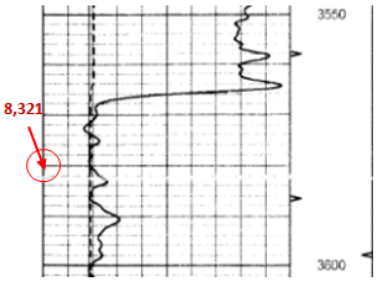
**Step b:** Identify the depth range you wish to digitize. This example 3580.0 to 3600.0 ft, will capture the Shale Layer.

Note: The depth range is for both Track 1 and Track 2.

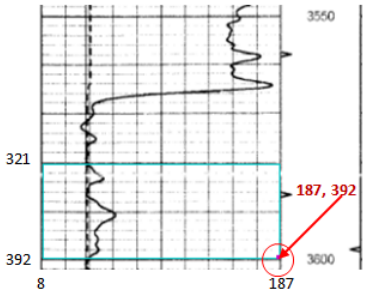



**Step c:** Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (8, 321) or 8 pixels from the left side and 321 pixels from the top of the image.



**Step d:** Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (187, 392) or 187 pixels from the left side and 392 pixels from the top of the image. Notice further that the Lower Left Axis point and the Upper Right Axis points were automatically filled and a cyan colored box is drawn around the "Track 1: Reference Track…" Capture area.




**STEP 2: Set Capture Area for each Track**

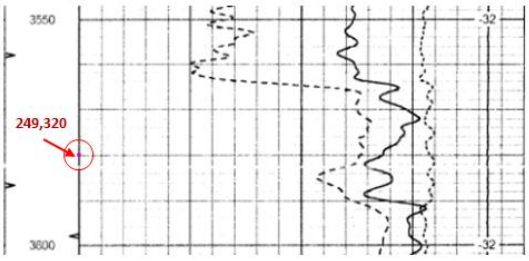
Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

Track 2: Data Track, i.e. Resisity, Porosity, etc.

Capture Area,

Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|---|
| Start: | 3580.0 | X1: | 8 | Y1: | 321 | X1': | 187 | Y1': 321 |
| End: | 3600.0 | X0: | 8 | Y0: | 392 | X0': | 187 | Y0': 392 |
| Total: | 20.0 | Heigth (d): | 71.0 | Width (w): | 179.0 | Clear | | |




**Step e:** Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (249,320) or 249 pixels from the left side and 320 pixels from the top of the image.

**STEP 2: Set Capture Area for each Track**

Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

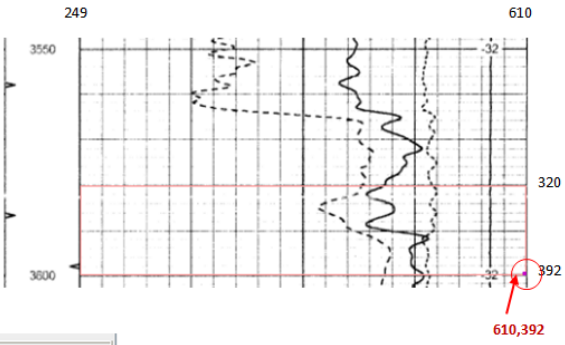
Track 2: Data Track, i.e. Resisity, Porosity, etc.

Capture Area,

Track 2: Data Track, i.e. Resisity, Porosity, etc.

| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|---|
| Start: | 3580.0 | X1: | 249 | Y1: | 320 | X1': | 0 | Y1': 0 |
| End: | 3600.0 | X0: | 0 | Y0: | 0 | X0': | 0 | Y0': 0 |
| Total: | 20.0 | Heigth (d): | 0.0 | Width (w): | 0.0 | Clear | | |

**Step f:** Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (610,392) or 610 pixels from the left side and 392 pixels from the top of the image. Notice further that the Lower Left Axis point and the Upper Right Axis points were automatically filled and a reddish colored box is drawn around the "Track 2: Data Track…" Capture area.




**STEP 2: Set Capture Area for each Track**

Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

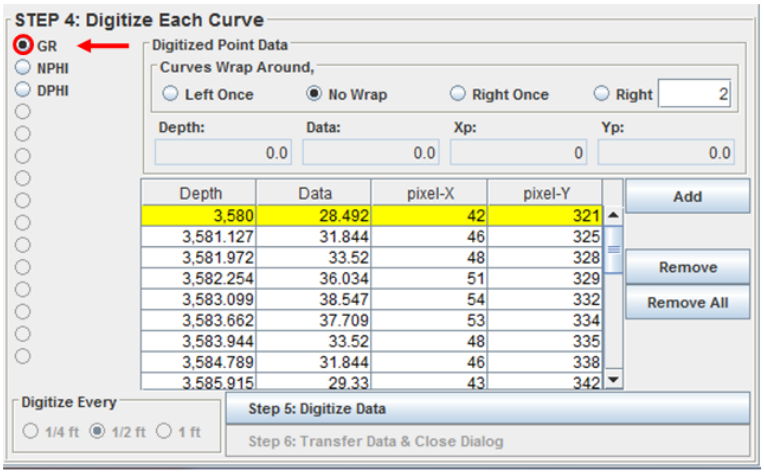
Track 2: Data Track, i.e. Resisity, Porosity, etc.

Capture Area,

Track 2: Data Track, i.e. Resisity, Porosity, etc.

| | Depth (ft) | | Left Axis (pixels) | | | Right Axis (pixels) | | |
|---|---|---|---|---|---|---|---|---|
| Start: | 3580.0 | X1: | 249 | Y1: | 320 | X1': | 610 | Y1': 320 |
| End: | 3600.0 | X0: | 249 | Y0: | 392 | X0': | 610 | Y0': 392 |
| Total: | 20.0 | Heigth (d): | 72.0 | Width (w): | 361.0 | Clear | | |

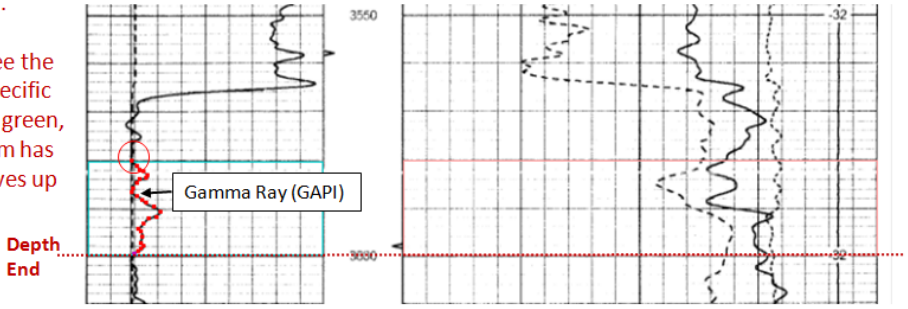
## Step 4: Digitize Each Curve

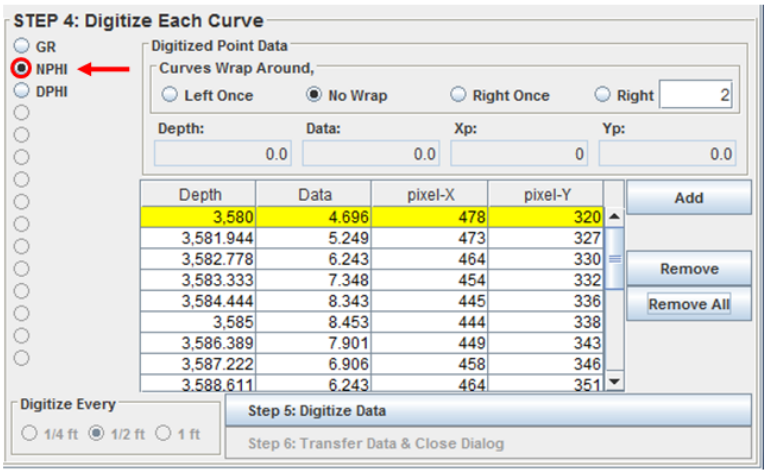



*The first point is important*, notice that the first point is selected above the cyan box. The program computes the depth from the depth end. When the curves are finally digitized in Step 5 the first point will allow the depth start to be included in the sampling. Notice that the first point when clicked is a purplish red pixel and the Depth, Data, Xp and Yp are entered automatically in the "STEP 4: Digitize Each Curve" Panel. Select the Add Button to add to the Gamma Ray Data List.
Continue to digitize the gamma ray curve adding enough points to follow the curvature of the gamma ray response. At Step 5 the program uses linear interpolation to compute the data value at each depth. Notice the red color points on the Gamma Ray curve, these are the digitize points selected to represent the Gamma Ray curve response within the Track 1 capture area.
**NOTE:** Do NOT go beyond the Depth End.

**NOTE:** Remember while digitizing to add enough points to follow the curvature of each curve. The program uses linear interpolation at each sample depth to compute the data value at Step 5.

As each point is added you will see the point on the digitize curve in a specific color. 1st curve is red, 2nd curve is green, 3rd curve is blue, etc. The program has set up a color for each of the curves up to 20 curves.



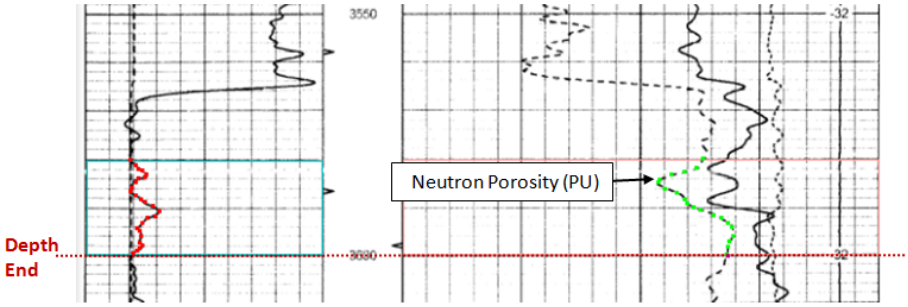


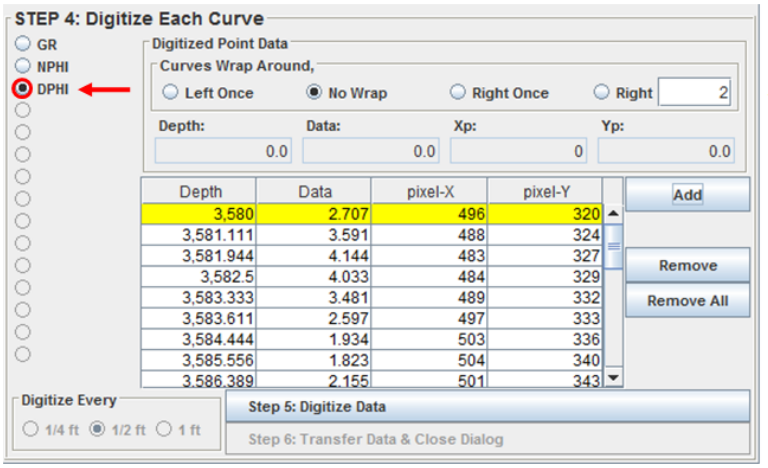

Gamma ray has been digitized now select the Neutron Porosity (NPHI) Radio Button and begin digitizing the Neutron porosity curve in Track 2.

Remember to start the first point just above the reddish start depth so Step 5 will compute the Start Depth data value.

Notice the green color points on the Neutron Porosity curve, these are the digitize points selected to represent the Neutron Porosity curve response within the Track 2 capture area.

**NOTE:** Do NOT go beyond the Depth End.



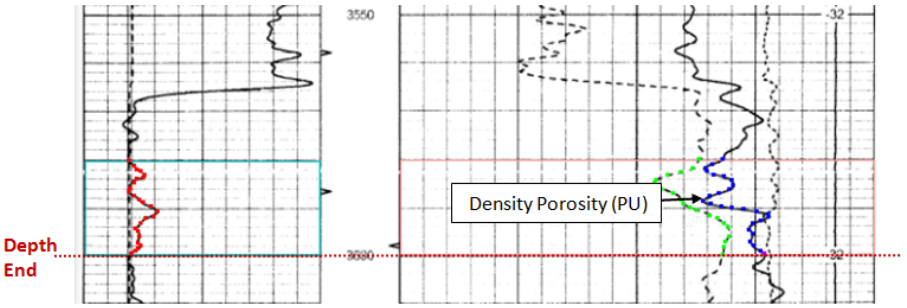




Neutron Porosity has been digitized now select the Density Porosity (DPHI) Radio Button and begin digitizing the Density porosity curve in Track 2.

Remember to start the first point just above the reddish start depth so Step 5 will compute the Start Depth data value.

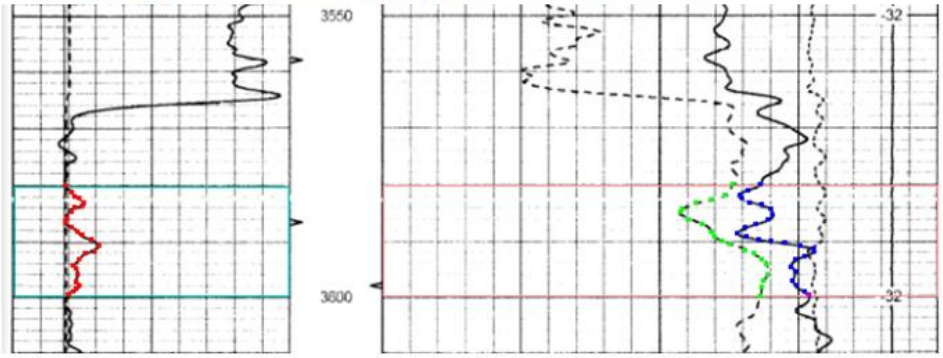
Notice the blue color points on the Density Porosity curve, these are the digitize points selected to represent the Density Porosity curve response within the Track 2 capture area.

**NOTE:** Do NOT go beyond the Depth End.



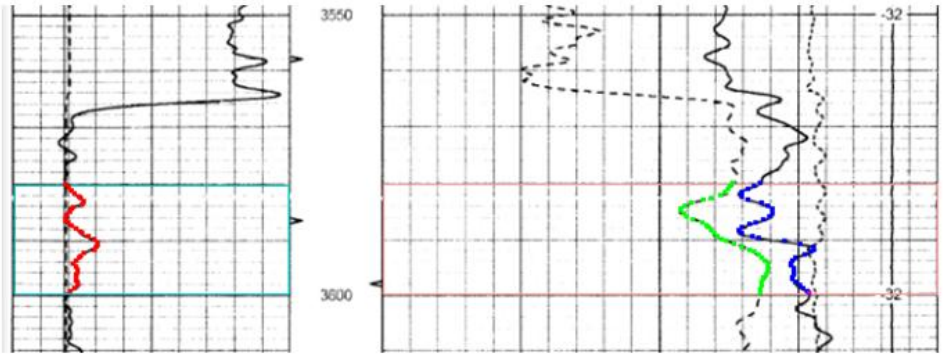
## Step 5: Digitize Data & Step 6: Transfer Data & Close

**Step 4: Digitize Each Curve – Random Sampling – following curvature**




**Digitize Data:** Set the 1/2 ft radio button in the "Digitize Every" Panel. Then select the "Step 5: Digitize Data" Button to digitize the log curves every 1/2 ft.
Once the Data has been digitized, select the "Step 6: Transfer Data & Close Dialog" Button to move data back to the "Digitize LAS Image File" Frame.

**Step 5: Digitize Data – Sampling every 1/2 ft**




Header Information:
Name: Shamar 1 15-131-20205
5S-13E-17
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

~Well | ~Parameters | Shamar-1.las 1

~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | F | | Depth |
| X | GR | API | | Gamma Ray |
| X | NPHI | PU | | Neutron porosity |
| X | DPHI | PU | | Density porosity |

**NOTE:** The new data has been appended to the original data set.

You will notice at 3579' and 3579.5' in the NPHI column "Null" values. Once you save the file you can change these two values by editing the LAS File by changing -999.25 at 3579' to 4.559 PU and changing -999.25 at 3579.5 to 4.696 PU.

Header Information:
Name: Shamar 1 15-131-20205
5S-13E-17
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

~Well | ~Parameters | Shamar-1.las 1

~Curves | ~ASCII

| DEPT | GR | NPHI | DPHI |
|---|---|---|---|
| 3,575 | 33.462 | 4.078 | 0.649 |
| 3,575.5 | 31.158 | 4.129 | 0.726 |
| 3,576 | 29.152 | 4.288 | 0.873 |
| 3,576.5 | 29.042 | 4.491 | 1.021 |
| 3,577 | 28.932 | 4.694 | 1.169 |
| 3,577.5 | 28.823 | 4.762 | 1.316 |
| 3,578 | 28.713 | 4.66 | 1.464 |
| 3,578.5 | 28.603 | 4.559 | 1.903 |
| 3,579 | 28.493 | -999.25 | 2.41 |
| 3,579.5 | 28.383 | -999.25 | 2.597 |
| 3,580 | 28.492 | 4.696 | 2.707 |
| 3,580.5 | 29.979 | 4.838 | 3.105 |
| 3,581 | 31.466 | 4.98 | 3.503 |
| 3,581.5 | 32.584 | 5.123 | 3.849 |
| 3,582 | 33.77 | 5.316 | 4.133 |
| 3,582.5 | 36.766 | 5.912 | 4.033 |
| 3,583 | 38.253 | 6.685 | 3.702 |
| 3,583.5 | 37.95 | 7.498 | 2.95 |
| 3,584 | 33.409 | 7.945 | 2.287 |
| 3,584.5 | 32.417 | 8.354 | 1.928 |
| 3,585 | 31.373 | 8.453 | 1.878 |
| 3,585.5 | 30.257 | 8.254 | 1.829 |
| 3,586 | 29.246 | 8.056 | 2 |
| 3,586.5 | 28.751 | 7.768 | 2.273 |
| 3,587 | 29.44 | 7.171 | 2.803 |
| 3,587.5 | 31.424 | 6.773 | 3.426 |
| 3,588 | 33.407 | 6.535 | 3.923 |
| 3,588.5 | 35.415 | 6.296 | 4.171 |

**Save Extended Digitized Log Data to a Log ASCII Standard (LAS) version 2.0 File**

The Digitizer web app does not verify that the LAS file is correct, i.e. that all the required fields are present. It only saves the information that is provided as a Log ASCII Standard (LAS) version 2.0 format file. Check the ~Well & ~Parameters Panels to verify that required data values are filled for a valid LAS file are present.

**Header Information:**

Name: Shamar 1 15-131-20205
5S-13E-17
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

~Well | ~Parameters | Shamar-1.las 1

| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| STRT | F | 3500 | Required | Start Depth |
| STOP | F | 3600.0 | Required | Stop Depth |
| STEP | F | 0.5 | Required | Step |
| NULL | | -999.25 | Required | Null Value |
| COMP | | Noble Petroleum, Inc | | Company |
| WELL | | Shamar 1 | Required | Well |
| FLD | | WILDCAT | | Field |
| SEC | | 17 | | Section |
| TOWN | | 5S | | Township (e.g. 42S) |
| RANG | | 13E | | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Required | Location (Sec Town Range) |
| LOC1 | | 1515' FSL & 1195' FEL | | Location 1 (quarter calls) |
| LOC2 | | SWNESE | | Location 2 (footages) |
| PROV | | | | Province |
| CTRY | | US | Required | Country |
| STAT | | Kansas | Required | State |
| CNTY | | NEMAHA | Required | County |
| API | | 15-131-20205 | Required | API-Number |
| UWI | | | or Required | Unique Well ID |
| SRVC | | Log Tech | | Service Company |
| LIC | | | | Licence Number |
| DATE | | 02/06/2012 | | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 39.6137073 | | Latitude |
| LONG | DEG | -95.980802 | | Longitude |
| GDAT | | NAD27 | | Geodetic Datum |
| X | | 244102.82 | | X or East-West coordinate |
| Y | | 4388921.03 | | Y or North South coordinate |
| HZCS | | UTM | | Horizontal Co-ordinate System |
| UTM | | 15.0 | | UTM Location |
| STUS | | D&A | | Well Status |

**NOTE:** The STOP Depth has been changed to 3600.0.

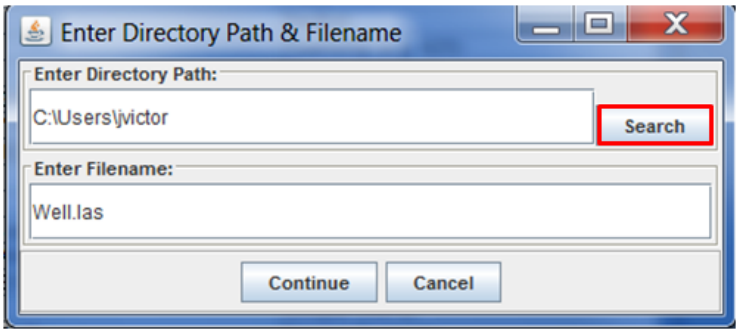
**Header Information:**

Name: Shamar 1 15-131-20205
5S-13E-17
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

~Well | ~Parameters | Shamar-1.las 1

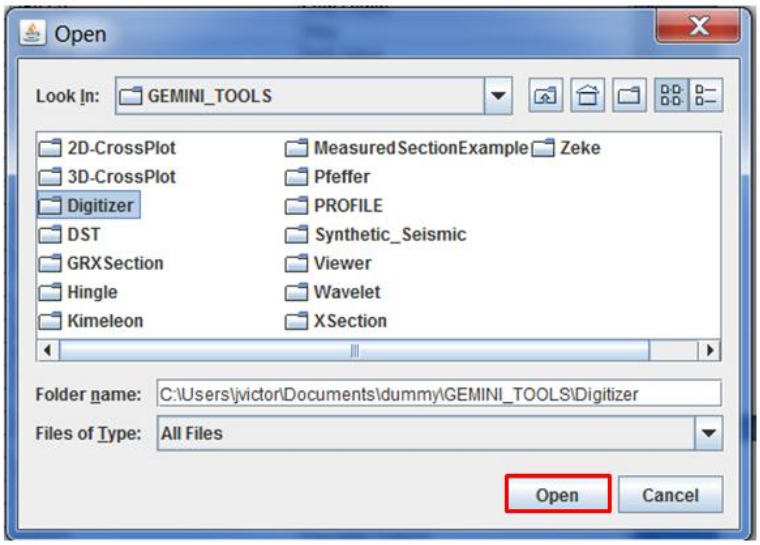
| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| EGL | F | 1294.0 | Necessary | Ground Level Elevation |
| EKB | F | 1303.0 | or Necessary | Kelly Bushing Elevation |
| EDF | F | | | Derrick Floor Elevation |
| ERT | F | | | Rotary Table Elevation |
| TDL | F | 3837.0 | Necessary | Total Depth Logger |
| TDD | F | 3832.0 | | Total Depth Driller |
| CSGL | F | | | Casing Bottom Logger |
| CSGD | F | | | Casing Bottom Driller |
| CSGS | IN | | | Casing Size |
| CSGW | LB | | | Casing Weight |
| BS | IN | 7.875 | | Bit Size |
| DFT | | Chemical | | Mud type |
| MSS | | | | Mud Sample Source |
| DFD | gm/cc | 9.0 | | Mud Density |
| DFV | s/qt | | | Mud Viscosity (Funnel) |
| DFL | cc | | | Fluid Loss |
| PH | | | | PH |
| RM | OHM-M | | | Resistivity of Mud |
| MST | DEG-F | | | Temperature of Mud |
| RMF | OHM-M | | | Resistivity of Mud Filtrate |
| MFT | DEG-F | | | Temperature of Mud Filtrate |
| RMC | OHM-M | | | Resistivity of Mud Cake |
| MCST | DEG-F | | | Temperature of Mud Cake |
| BHT | DEG-F | 116.0 | | Maximum Recorded Temperature |
| RMB | OHM-M | | | Resitivity @ BHT |
| TIMC | DATE | | | Date/Time Circulation Stopped |
| TIML | DATE | | | Date/Time Logger Tagged Bottom |
| UNIT | | 10 | | Logging Unit Number |
| BASE | | Hays, Kansas | | Home Base of Logging Unit |
| ENG | | Jason Wellbrock | | Recording Engineer |
| WIT | | Doug Davis | | Witnessed By |

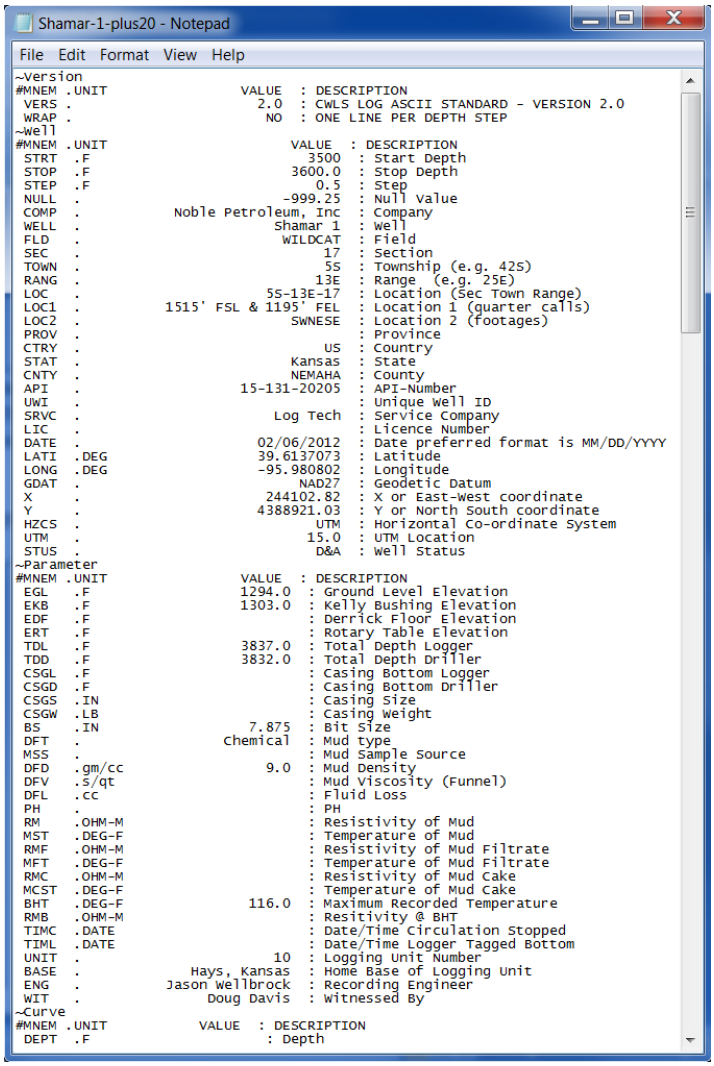
Select the Floppy Disk Image  to Open the "LAS File Data Types" Dialog. This dialog allows the user to make changes or additions to the data before it is saved to a Log ASCII Standard (LAS) version 3.0 File.




The default directory is your Home Directory. The user can search their PC for the desired directory path by selecting the "Search" button. This will display the "Open" dialog.

Once you have found the directory select the “Open” Button to select the Directory Path, which will insert the path into the “Enter Directory Path” text field in the “Enter Directory Path & Filename” dialog.



Shamar-1-plus20 - Notepad

File Edit Format View Help

```
~Version
#MNEM .UNIT                 VALUE  : DESCRIPTION
 VERS .                       2.0  : CWLS LOG ASCII STANDARD - VERSION 2.0
 WRAP .                        NO  : ONE LINE PER DEPTH STEP
~Well
#MNEM .UNIT                     VALUE  : DESCRIPTION
 STRT  .F                         3500  : Start Depth
 STOP  .F                       3600.0  : Stop Depth
 STEP  .F                          0.5  : Step
 NULL  .                        -999.25  : Null Value
 COMP  .            Noble Petroleum, Inc  : Company
 WELL  .                       Shamar 1  : Well
 FLD   .                        WILDCAT  : Field
 SEC   .                             17  : Section
 TOWN  .                             5S  : Township (e.g. 42S)
 RANG  .                            13E  : Range  (e.g. 25E)
 LOC   .                      5S-13E-17  : Location (Sec Town Range)
 LOC1  .          1515' FSL & 1195' FEL  : Location 1 (quarter calls)
 LOC2  .                         SWNESE  : Location 2 (footages)
 PROV  .                                 : Province
 CTRY  .                             US  : Country
 STAT  .                         Kansas  : State
 CNTY  .                        NEMAHA  : County
 API   .                  15-131-20205  : API-Number
 UWI   .                                : Unique Well ID
 SRVC  .                       Log Tech  : Service Company
 LIC   .                                 : Licence Number
 DATE  .                     02/06/2012  : Date preferred format is MM/DD/YYYY
 LATI  .DEG                  39.6137073  : Latitude
 LONG  .DEG                  -95.980802  : Longitude
 GDAT  .                         NAD27  : Geodetic Datum
 X     .                     244102.82  : X or East-West coordinate
 Y     .                    4388921.03  : Y or North South coordinate
 HZCS  .                           UTM  : Horizontal Co-ordinate System
 UTM   .                          15.0  : UTM Location
 STUS  .                          D&A  : Well Status
~Parameter
#MNEM .UNIT                 VALUE  : DESCRIPTION
 EGL   .F                   1294.0  : Ground Level Elevation
 EKB   .F                   1303.0  : Kelly Bushing Elevation
 EDF   .F                           : Derrick Floor Elevation
 ERT   .F                           : Rotary Table Elevation
 TDL   .F                   3837.0  : Total Depth Logger
 TDD   .F                   3832.0  : Total Depth Driller
 CSGL  .F                           : Casing Bottom Logger
 CSGD  .F                           : Casing Bottom Driller
 CSGS  .IN                          : Casing Size
 CSGW  .LB                          : Casing Weight
 BS    .IN                  7.875  : Bit Size
 DFT   .                 Chemical  : Mud type
 MSS   .                           : Mud Sample Source
 DFD   .gm/cc                 9.0  : Mud Density
 DFV   .s/qt                       : Mud Viscosity (Funnel)
 DFL   .cc                         : Fluid Loss
 PH    .                           : PH
 RM    .OHM-M                      : Resistivity of Mud
 MST   .DEG-F                      : Temperature of Mud
 RMF   .OHM-M                      : Resistivity of Mud Filtrate
 MFT   .DEG-F                      : Temperature of Mud Filtrate
 RMC   .OHM-M                      : Resistivity of Mud Cake
 MCST  .DEG-F                      : Temperature of Mud Cake
 BHT   .DEG-F                116.0  : Maximum Recorded Temperature
 RMB   .OHM-M                      : Resitivity @ BHT
 TIMC  .DATE                       : Date/Time Circulation Stopped
 TIML  .DATE                       : Date/Time Logger Tagged Bottom
 UNIT  .                       10  : Logging Unit Number
 BASE  .               Hays, Kansas  : Home Base of Logging Unit
 ENG   .           Jason Wellbrock  : Recording Engineer
 WIT   .                Doug Davis  : Witnessed By
~Curve
#MNEM .UNIT           VALUE  : DESCRIPTION
 DEPT  .F                     : Depth
```

This file was saved to Shamar-1-plus20.las.

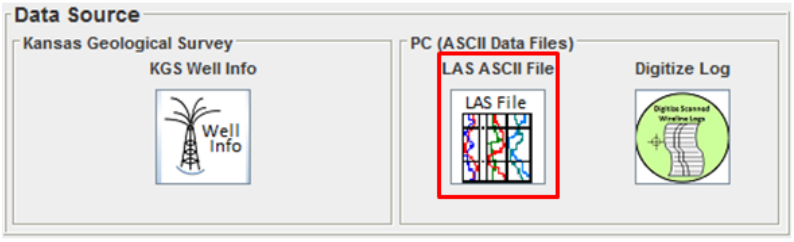
The web app displays the LAS file so the user can verify the data was saved.

## Example: Shamar 1- Digitize Deep Induction Curve from 3500’ to 3600’

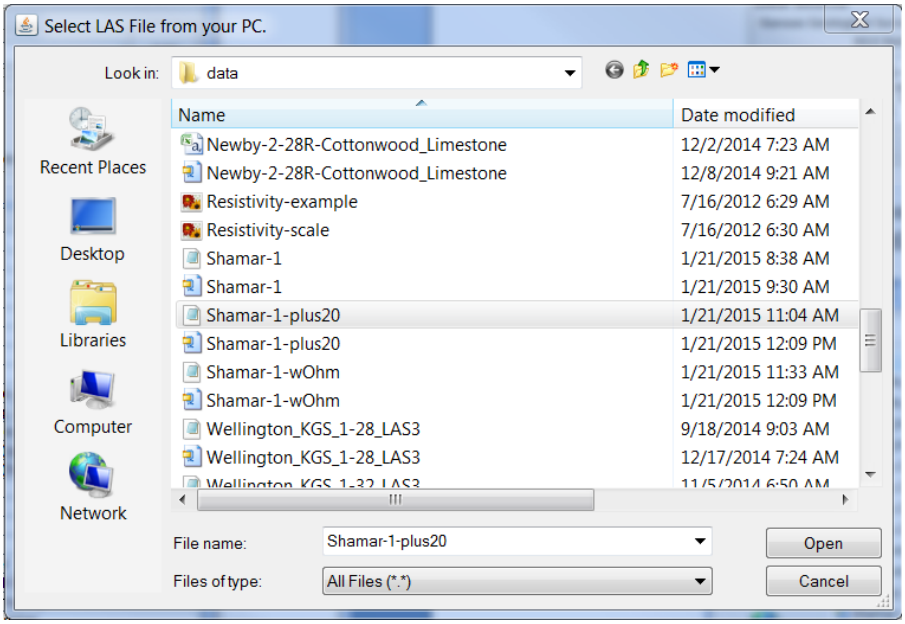
This section will add a Deep Induction Log curve to the recently saved Shamar-1-plus20 LAS version 2.0 file.

Download the Log ASCII Standard (LAS) version 2.0 file.
Shamar –1-plus20
ASCII File: http://www.kgs.ku.edu/Gemini/Tools/documentation/Shamar-1-plus20.las
Zip File: http://www.kgs.ku.edu/Gemini/Tools/documentation/Shamar-1-plus20.zip

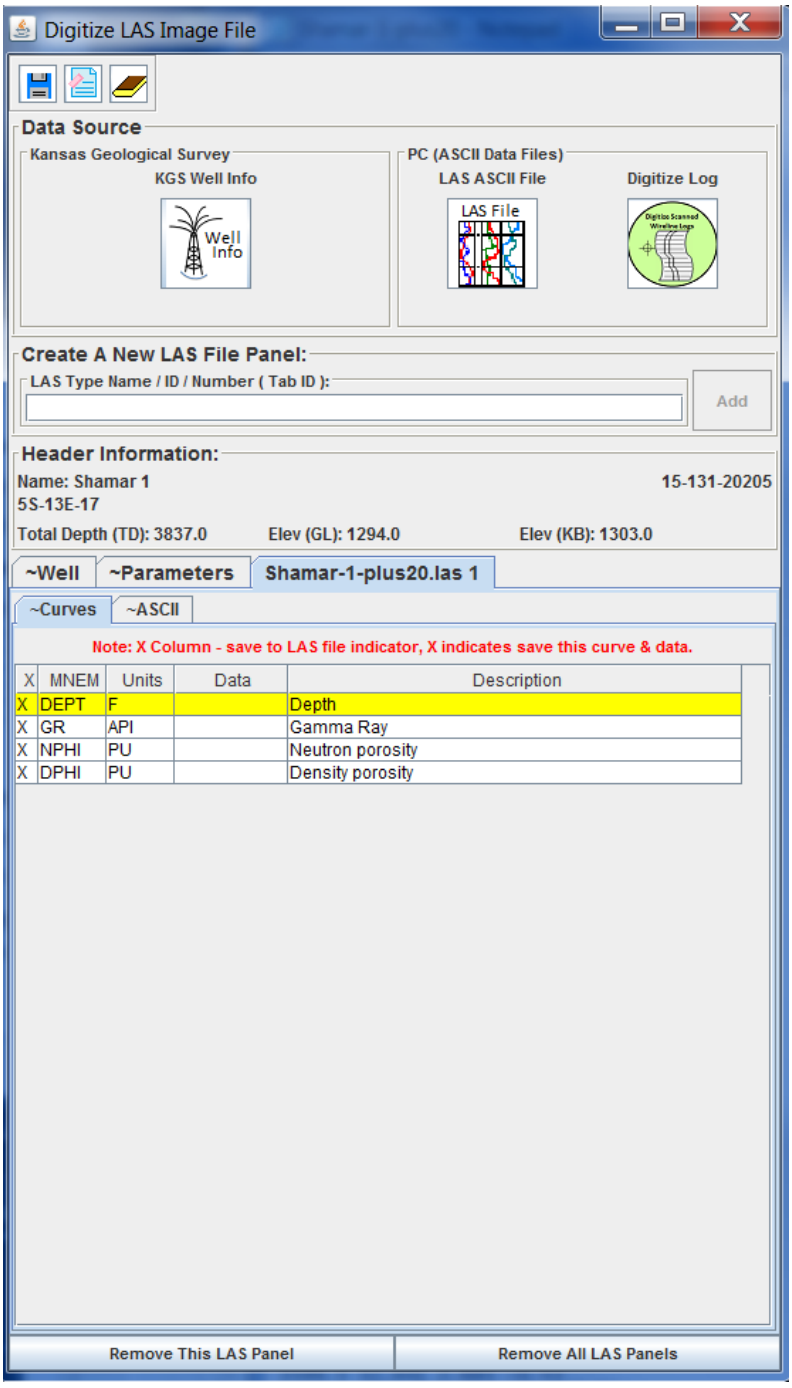
Download the following Portable Network Graphics (PNG) image files.
Shamar -1: Dual Induction Electric Well Log Segment:
http://www.kgs.ku.edu/Gemini/Tools/documentation/Resistivity-example.png
Electric Well Log Scale:
http://www.kgs.ku.edu/Gemini/Tools/documentation/Resistivity-scale.png




Click on the “LAS ASCII File” icon button to display the “Select LAS File from your PC” dialog. Select the Shamar-1-plus20 LAS file.



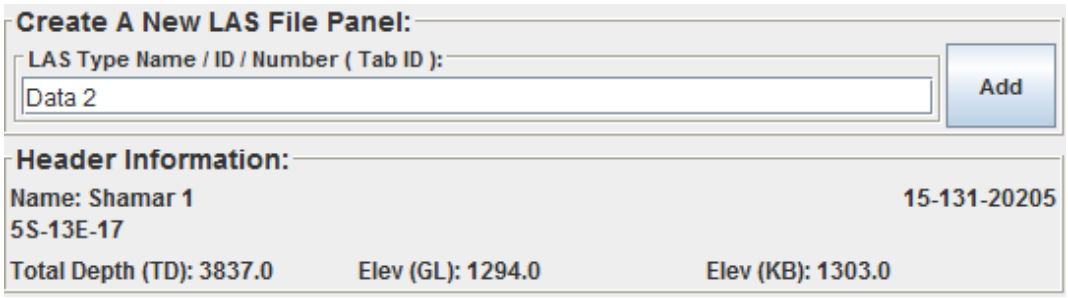
Select the “Open” button to open and parse the contents of the LAS file into the Digitizer web app. Notice that the “Shamar-1.las 1” tab is automatically added and the “Digitize Log” icon button enabled.



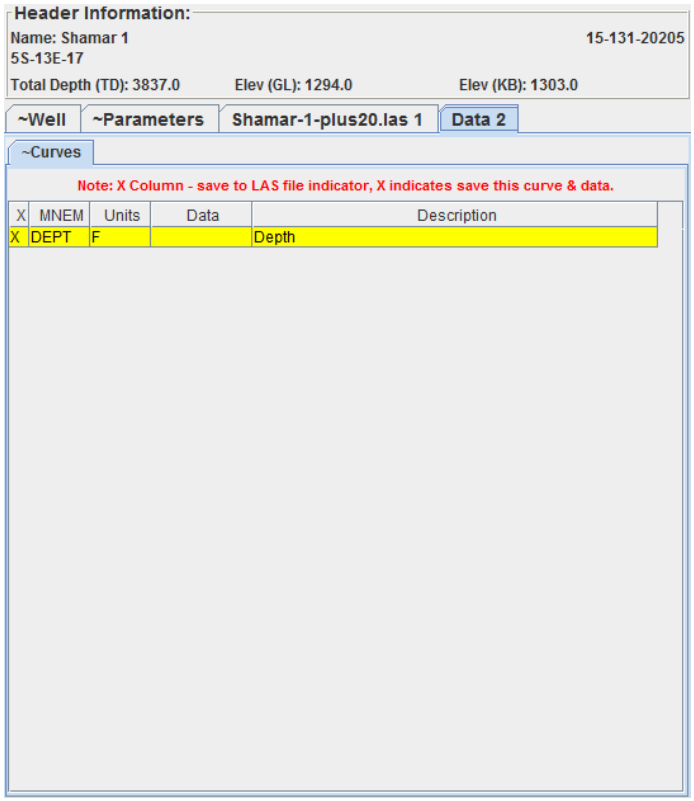

This icon button is only enabled when the Data tab is selected, because it will take the contents of the “Curves” tab panel in the data tab panel and transfer it to the Digitizer Control dialog.

**Add New Data Panel Tab**

The user has to create a Data Tab before the user can access the digitizer. Enter the name for the first Data Section "Data 2" in the "LAS Type Name / ID / Number (Tab ID)" text field and then tab out of the text field, the "Add" button will them be enabled. Select the "Add" Button to create the "Data 2" tab with all embedded panels to hold the ~Curve Information and the ~ASCII Log Data Sections.



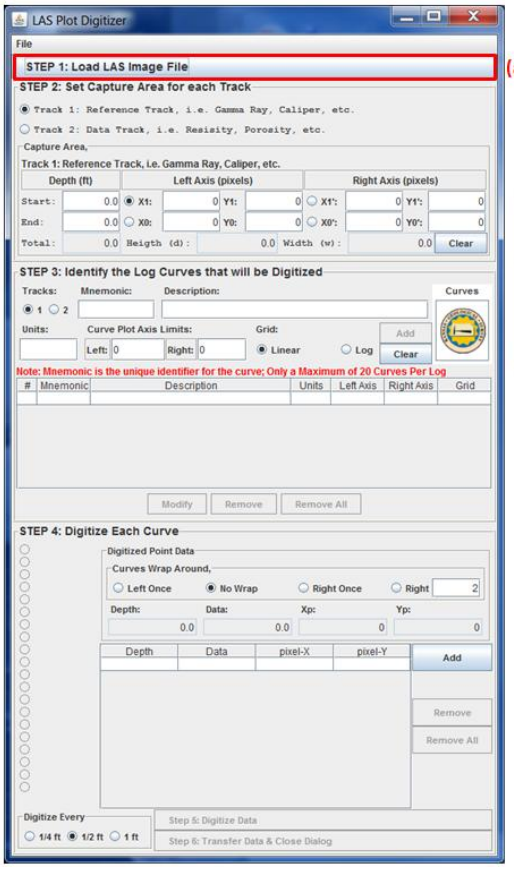

Select the "Add" button.



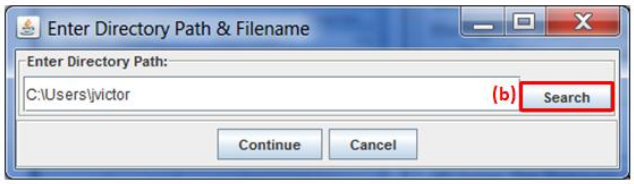

Notice that the "Data 2" tab is next to the "Shamar-1-plus20.las" Tab, with only the "Curves" tab present. This is just a place holding for the expected data that will be digitized from an Electric Well Log Image file.

Click the "Digitizer Log" icon button to display the "LAS Plot Digitizer" dialog.

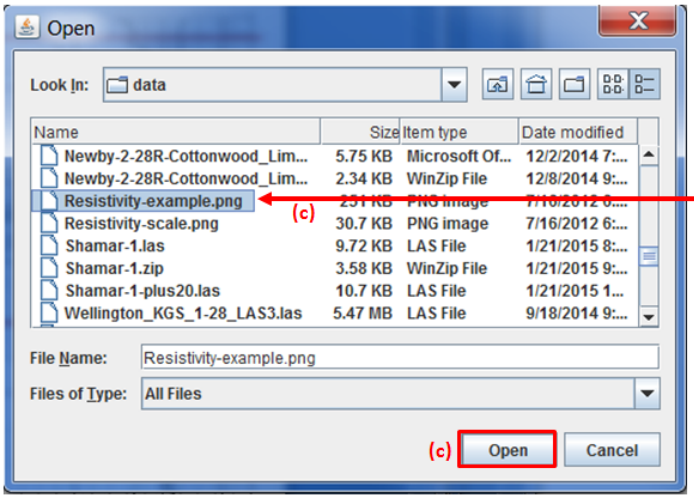
## Step 1: Loading Electric Well Log Plot Image




**Step a:** Select the "**STEP 1: Load LAS Image File**" Button to display the "Enter Directory Path & Filename" Dialog.



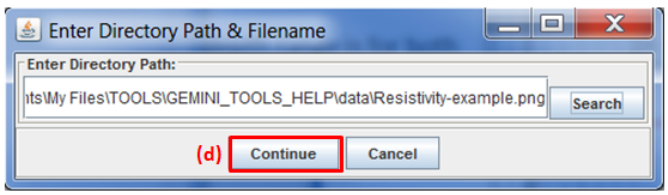

**Step b:** Select the Search Button to search your PC for the correct Electric Well Log Image Plot.
*NOTE: The starting directory is your home directory.*




**Step c:** Highlight the Electric Well Log Image Plot to load into the digitizer. This example is a Resistivity Log, Resistivity-example.png Select the "Open" Button.

NOTE: Only PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file

**Step d:** The Electric Well Log Image Plot directory & filename will be loaded. Select the "Continue" Button to load the image into the program.

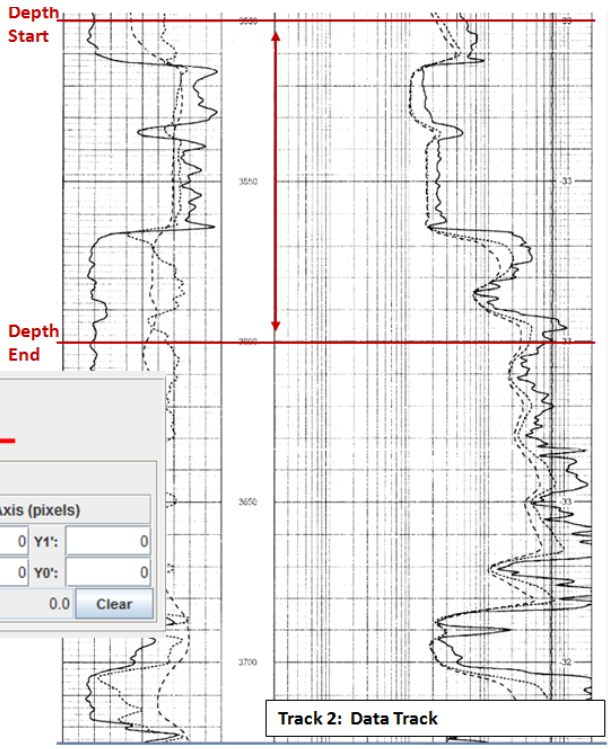


## Step 2: Set Capture Area for each Track

**Step a:** In the "**Step2: Set Capture Area for each Track**" set the "Track 2: Data Track …" Radio button.

**Step b:** Identify the depth range you wish to digitize. This example 3500.0 to 3600.0 ft, will capture the Shale Layer plus the additional 20 feet.

Note: The depth range is for both Track 1 and Track 2, but only Track 2 will be considered since only the Deep Induction Curve will be digitized.




STEP 2: Set Capture Area for each Track

Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

Track 2: Data Track, i.e. Resisity, Porosity, etc.

Capture Area,

Track 2: Data Track, i.e. Resisity, Porosity, etc.

| Depth (ft) | | Left Axis (pixels) | | | | Right Axis (pixels) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 0 | Y1: | 0 | X1': | 0 | Y1': | 0 |
| End: | 3600.0 | X0: | 0 | Y0: | 0 | X0': | 0 | Y0': | 0 |
| Total: | 100.0 | Heigth (d): | 0.0 | Width (w): | 0.0 | Clear | | | |

STEP 2: Set Capture Area for each Track

Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

Track 2: Data Track, i.e. Resisity, Porosity, etc.

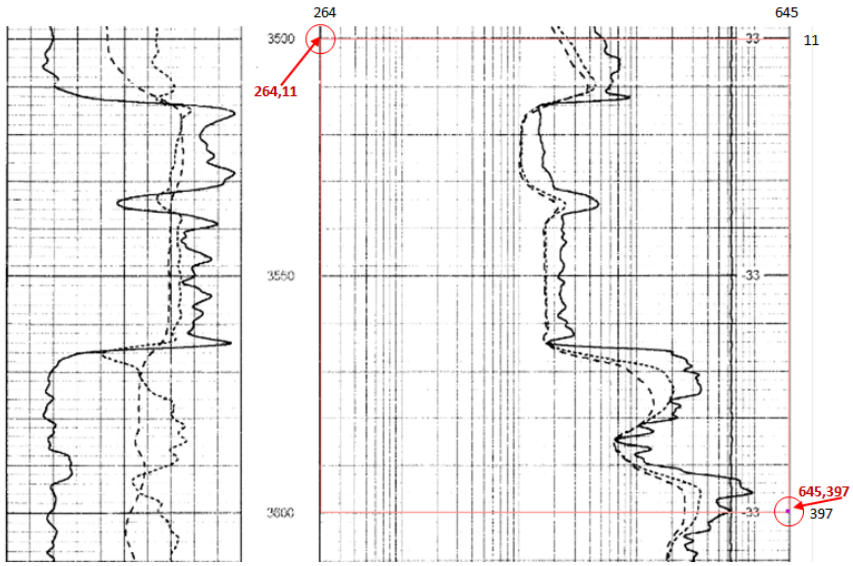
Capture Area,

Track 2: Data Track, i.e. Resisity, Porosity, etc.

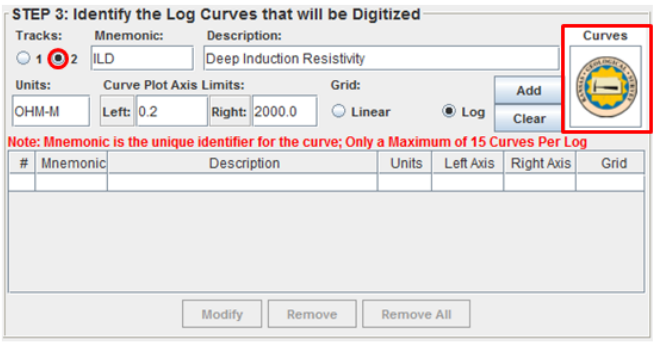
| Depth (ft) | | Left Axis (pixels) | | | | Right Axis (pixels) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Start: | 3500.0 | X1: | 264 | Y1: | 11 | X1': | 645 | Y1': | 11 |
| End: | 3600.0 | X0: | 264 | Y0: | 397 | X0': | 645 | Y0': | 397 |
| Total: | 100.0 | Heigth (d): | 386.0 | Width (w): | 381.0 | Clear | | | |

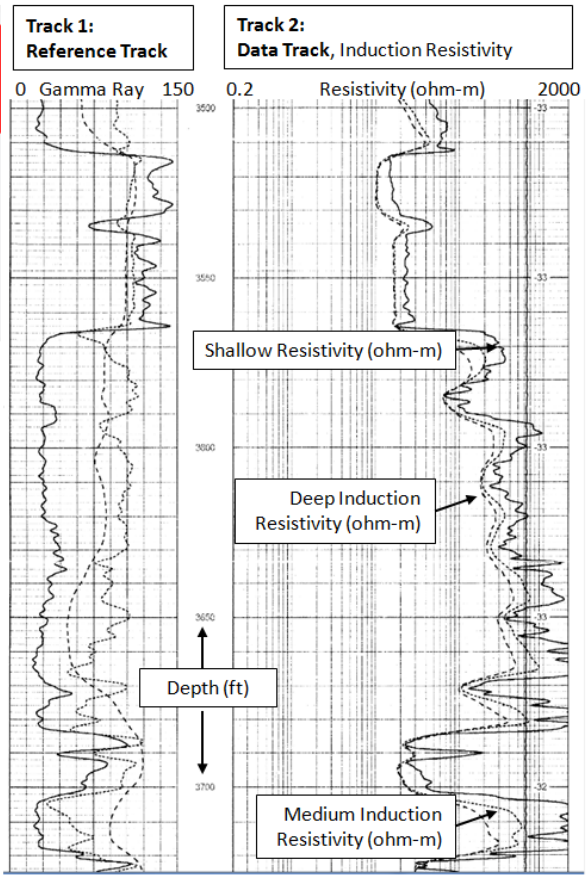
**Step c:** Select the "X1:" radio button for the upper left axis starting depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in the Left Axis (pixels) column, Start Depth row. In this example this point is at (264, 11) or 264 pixels from the left side and 11pixels from the top of the image.

**Step d:** Select the "X0':" radio button for the lower right axis ending depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in the Right Axis (pixels) column, End Depth row. In this example this point is at (645,397) or 645 pixels from the left side and 397 pixels from the top of the image. Notice further that the Lower Left Axis point and the Upper Right Axis points were automatically filled and a reddish colored box is drawn around the "Track 2: Data Track…" Capture area.



## Step 3: Identify the Deep Induction Resistivity Log Curve that will be Digitized



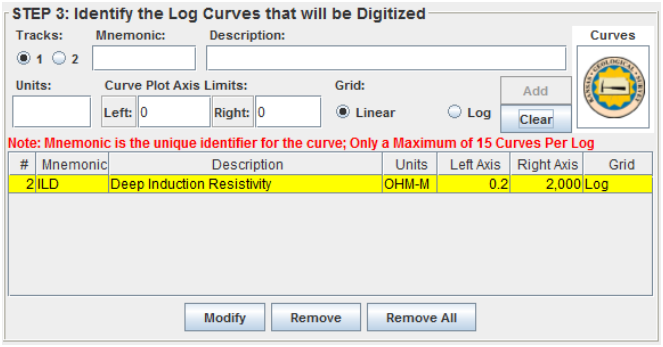

**Step a:** The next step is to add the curve you wish to digitize in this session. For this example the Electric Well Log Image, Deep Induction Resistivity will be digitized.

Make sure that the Tracks "2" radio button is selected.

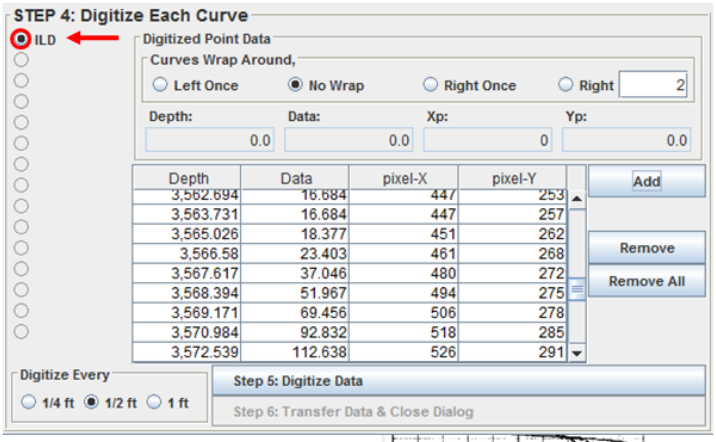
To Enter the data quickly you can use the Kansas Geological Survey (KGS) "Standard" Curve Mnemonics List to build the Curves List. Click on the "KGS Curves" Icon Button to display the KGS Standard Curve Mnemonics List.

**Step b:** Highlight the Deep Induction Resistivity Row and Click on the "Select" Button. The Deep Induction Curve Information (Description, Units, Limits and Log Grid) will be transferred to the "STEP 3: Identify the Log Curves that will be Digitized" panel.

**Step c:** Select the "Add" Button to add the Curve to the Curves Table.



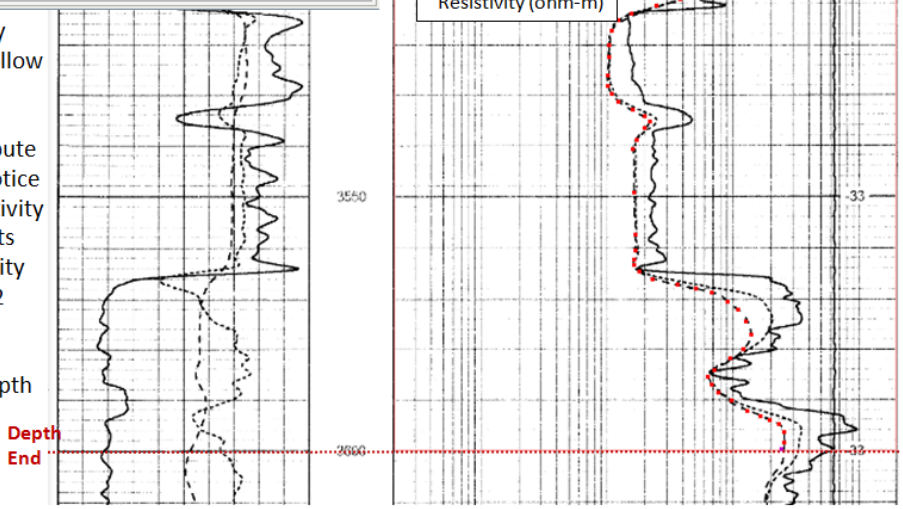
## Step 4: Digitize the Deep Induction Resistivity Curve




*The first point is important*, notice that the first point is selected above the cyan box. The program computes the depth from the depth end. When the curves are finally digitized in Step 5 the first point will allow the depth start to be included in the sampling. Notice that the first point when clicked is a purplish red pixel and the Depth, Data, Xp and Yp are entered automatically in the "STEP 4: Digitize Each Curve" Panel. Select the Add Button to add to the Deep Induction Resistivity Data List.

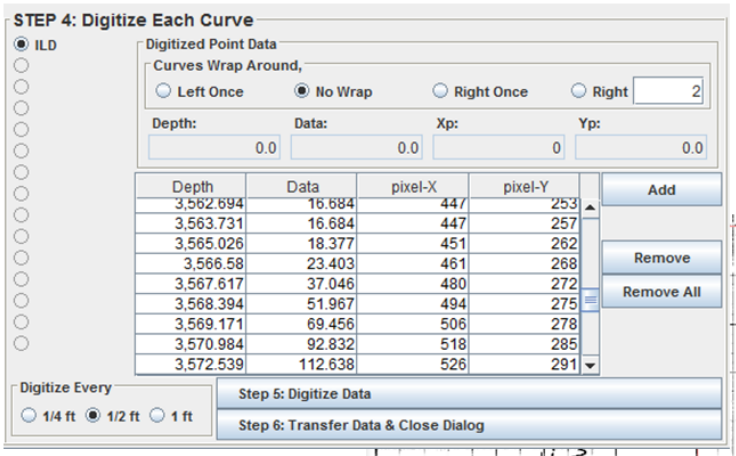
Continue to digitize the resistivity curve adding enough points to follow the curvature of the resistivity response. At Step 5 the program uses linear interpolation to compute the data value at each depth. Notice the red color points on the Resistivity curve, these are the digitize points selected to represent the resistivity curve response within the Track 2 capture area.

**NOTE:** Do NOT go beyond the Depth End.

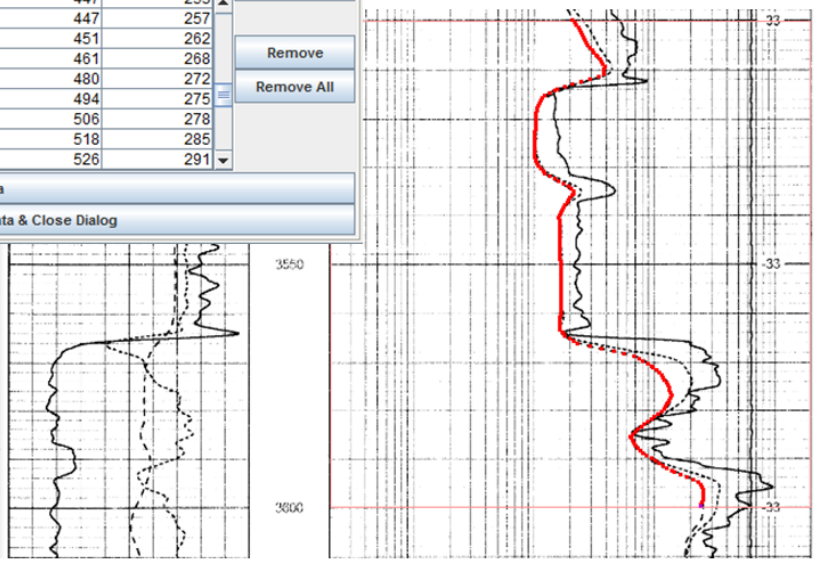


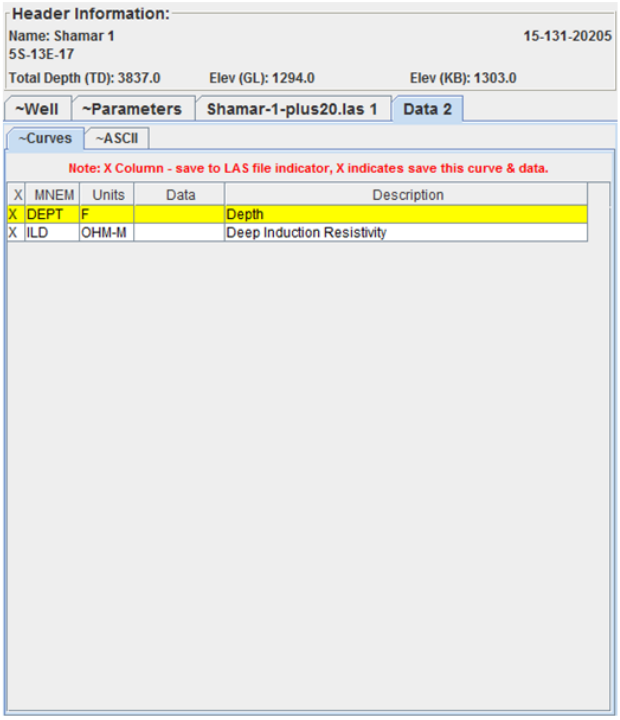
## Step 5: Digitize Data & Step 6: Transfer Data & Close

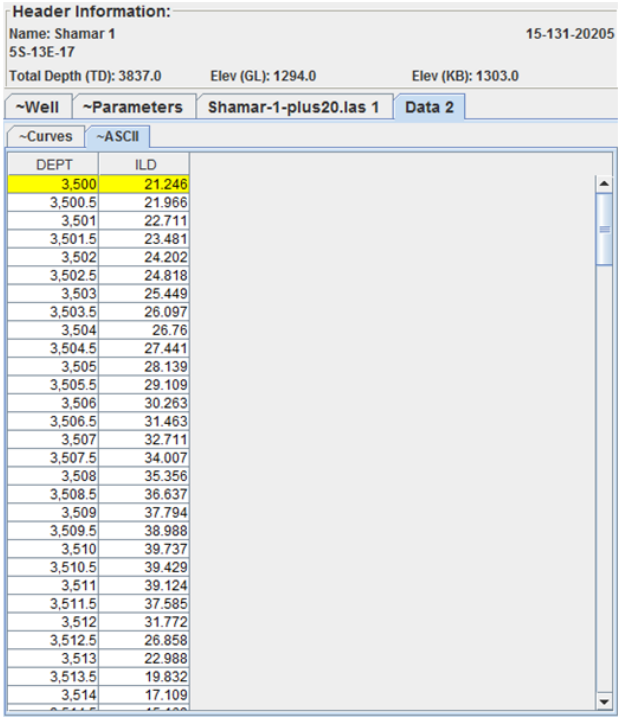
**Digitize Data:** Set the 1/2 ft radio button in the "Digitize Every" Panel. Then select the "Step 5: Digitize Data" Button to digitize the log curves every 1/2 ft.
Once the Data has been digitized, select the "Step 6: Transfer Data & Close Dialog" Button to move data back to the "Digitize LAS Image File" Frame.




**Step 5: Digitize Data – Sampling every 1/2 ft**



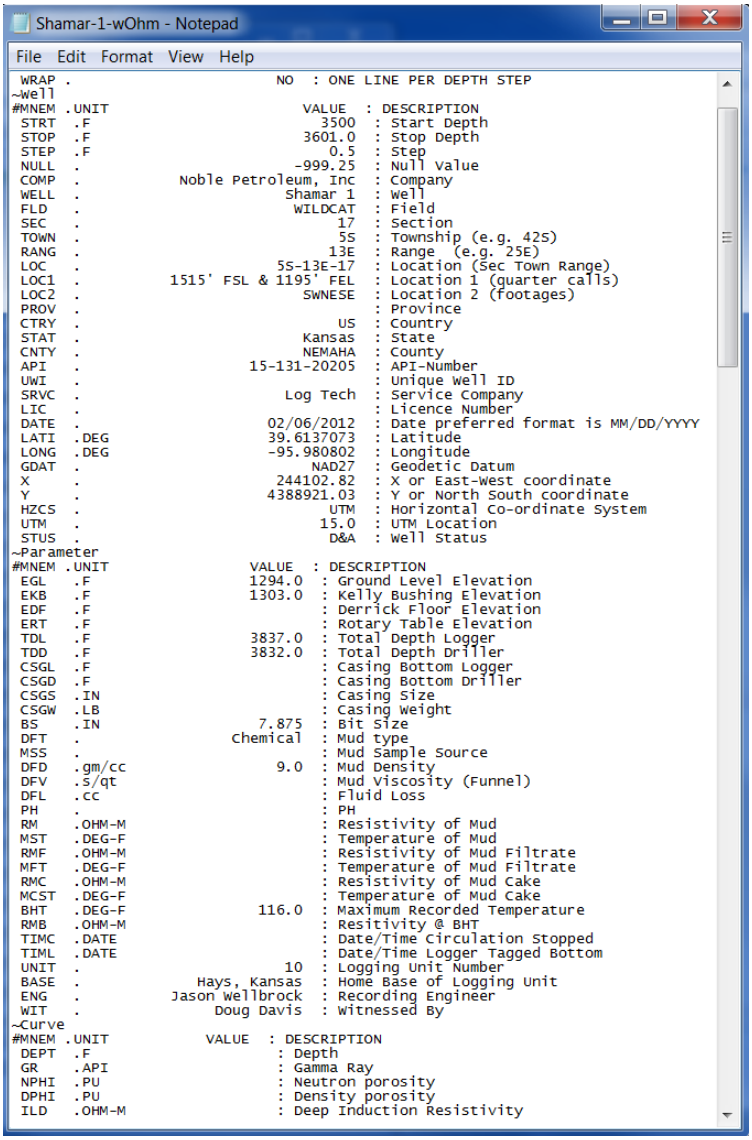



**Save Digitized Log Data with Resistivity to a Log ASCII Standard (LAS) version 2.0 File**

The Digitizer web app does not verify that the LAS file is correct, i.e. that all the required fields are present. It only saves the information that is provided as a Log ASCII Standard (LAS) version 2.0 format file. Check the ~Well & ~Parameters Panels to verify that required data values are filled for a valid LAS file are present.

Select the Floppy Disk Image  to Open the "LAS File Data Types" Dialog. This dialog allows the user to make changes or additions to the data before it is saved to a Log ASCII Standard (LAS) version 3.0 File. Enter the directory path and file name and select continue. This file was saved to Shamar-1-wOhm.las. The web app displays the LAS file so the user can verify the data was saved.




The program automatically merges the data in the two data tabs into one file.

## Merging Multiple Log ASCII Standard (LAS) version 2.0 Files

This section is designed to show an example of merging 3 Log ASCII Standard (LAS) version 2.0 Files into 1 LAS version 2.0 file. The example is for the Current 1 well in Pontotoc, Oklahoma. These logs were chosen because the depth sampling were not done at regular depth intervals, i.e. 10, 10.1, 10.2, etc., but at none even depth intervals, such as, 10.02, 10.12, 10.22, etc. The step depth is 0.1 for both cases.

This program normalizes the depth for each log before it loads the data in order to make the process of merging easier and to force the logs to be consistent in sampling.

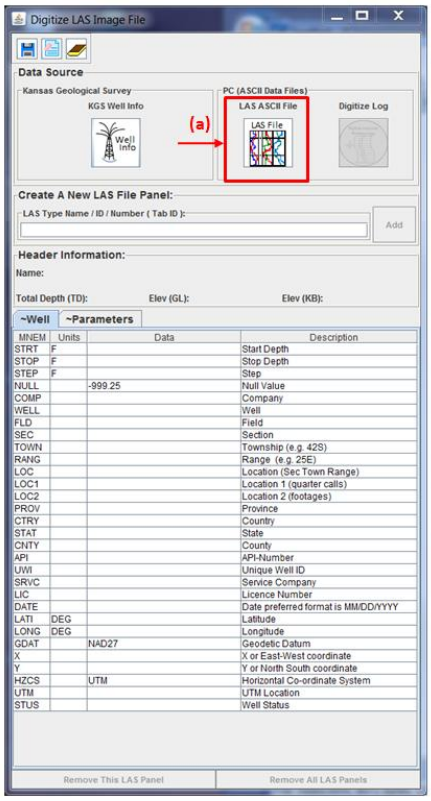
Download either the ASCII Text Files directly or the Zip files extracting the contents into a directory. The problem with the ASCII Text Files being downloaded directly from a web page is that the web page will alter the contents so it does not retain the basic structure and add HTML text to the file.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

Well Data: Current 1, Pontotoc County, Oklahoma

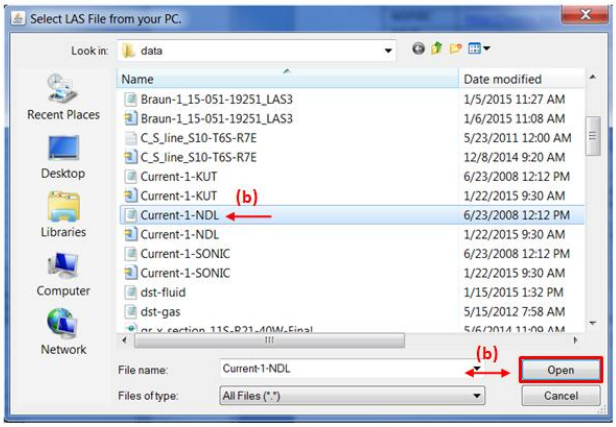
| Type | Log ASCII Standard (LAS) Text Files |
|---|---|
| NDL | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-NDL.las |
| SONIC | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-SONIC.las |
| KUT | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-KUT.las |

| Type | Zip Files |
|---|---|
| NDL | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-NDL.zip |
| SONIC | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-SONIC.zip |
| KUT | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-KUT.zip |

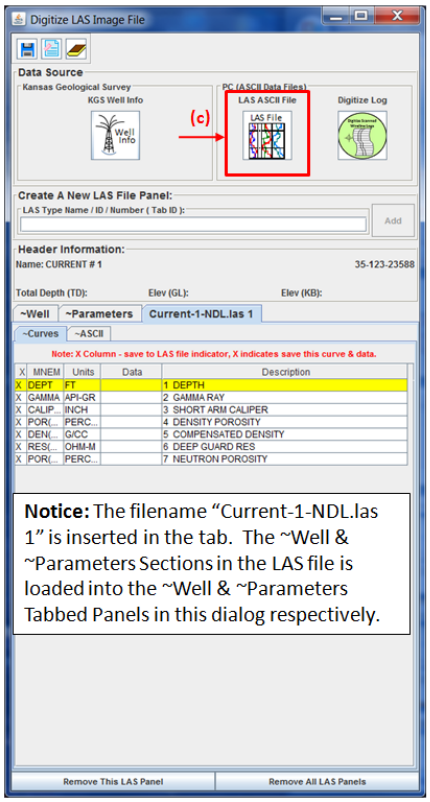
## Read the three LAS files into the program.




**Step a:** Click on the "LAS ASCII File" Icon button in the "PC (ASCII Data Files) Panel to display the "Select LAS File from your PC." Dialog.

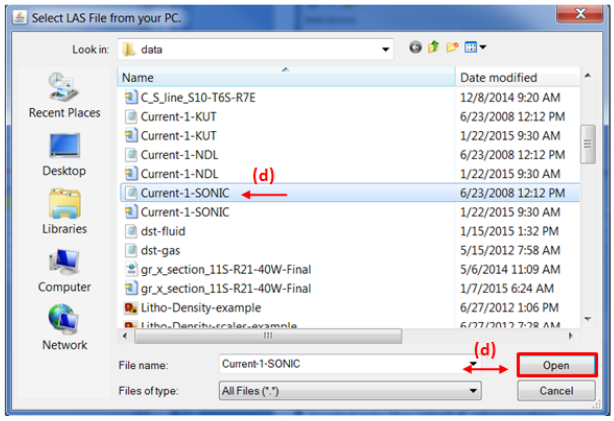



**Step b:** Select the Current-1-NDL LAS File in the directory list. Notice that the "File name:" text field shows the filename selected. Select the "Open" button to load the ~Well, ~Parameters and ~Log data sections into the program.

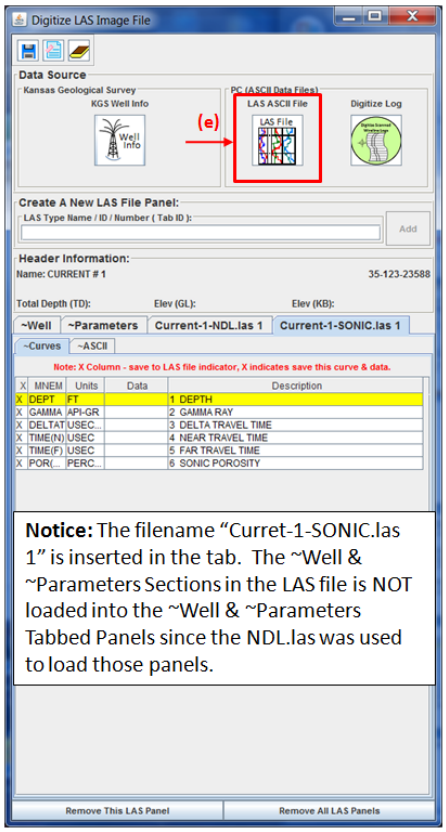



**Notice:** The filename "Current-1-NDL.las 1" is inserted in the tab. The ~Well & ~Parameters Sections in the LAS file is loaded into the ~Well & ~Parameters Tabbed Panels in this dialog respectively.

**Step c:** Click on the "LAS ASCII File" Icon button in the "PC (ASCII Data Files) Panel to display the "Select LAS File from your PC." Dialog.

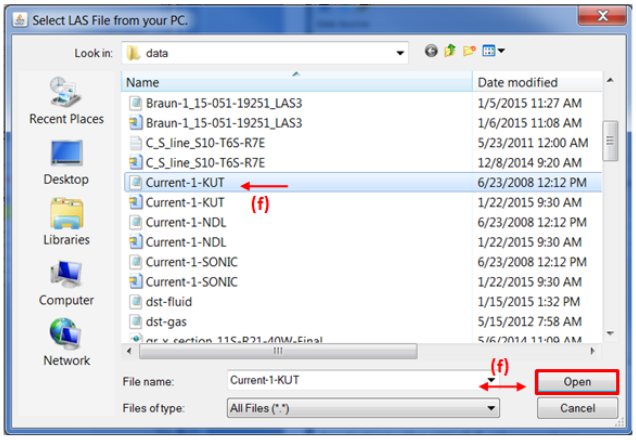



**Step d:** Select the Current-1-SONIC LAS File in the directory list. Notice that the "File name:" text field shows the filename selected. Select the "Open" button to load the ~Well, ~Parameters and ~Log data sections into the program.

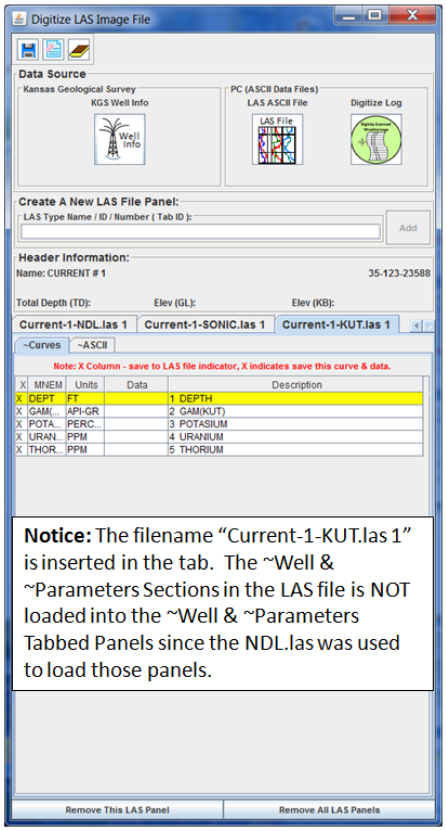



**Notice:** The filename "Curret-1-SONIC.las 1" is inserted in the tab. The ~Well & ~Parameters Sections in the LAS file is NOT loaded into the ~Well & ~Parameters Tabbed Panels since the NDL.las was used to load those panels.

**Step e:** Click on the "LAS ASCII File" Icon button in the "PC (ASCII Data Files) Panel to display the "Select LAS File from your PC." Dialog.



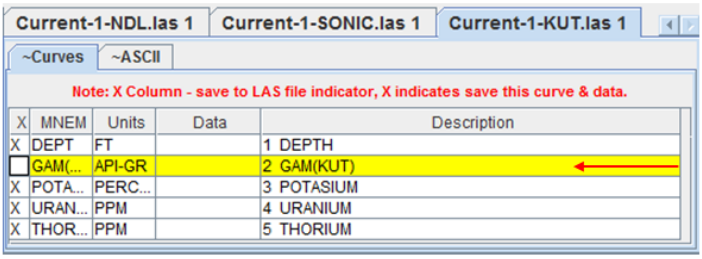

**Step f:** Select the Current-1-KUT LAS File in the directory list. Notice that the "File name:" text field shows the filename selected. Select the "Open" button to load the ~Well, ~Parameters and ~Log data sections into the program.




**Notice:** The filename "Current-1-KUT.las 1" is inserted in the tab. The ~Well & ~Parameters Sections in the LAS file is NOT loaded into the ~Well & ~Parameters Tabbed Panels since the NDL.las was used to load those panels.

**Turn off redundant curves as well as unnecessary curves.**

**Note:** The Curves Table is an Editable Table.



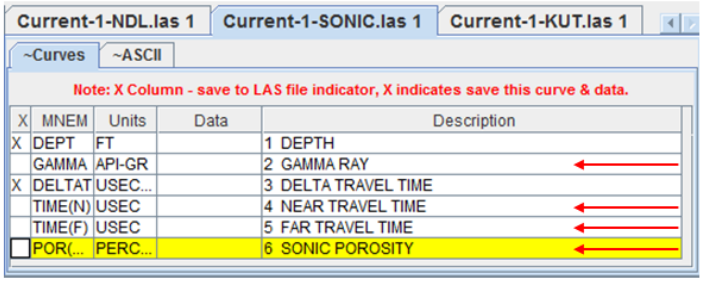
Current-1-NDL.las 1 | Current-1-SONIC.las 1 | Current-1-KUT.las 1

~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | FT | | 1 DEPTH |
| | GAM(... | API-GR | | 2 GAM(KUT) |
| X | POTA... | PERC... | | 3 POTASIUM |
| X | URAN... | PPM | | 4 URANIUM |
| X | THOR... | PPM | | 5 THORIUM |

**Step g:** Selecting the Current-1-KUT.las 1 Tab. Click into the X Column at the "2 GAM(KUT)" Row. Remove the X which will indicate that this curve will not be included in the final LAS file.



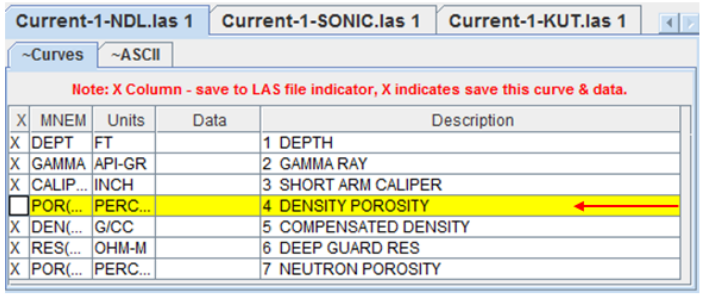
Current-1-NDL.las 1 | Current-1-SONIC.las 1 | Current-1-KUT.las 1

~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | FT | | 1 DEPTH |
| | GAMMA | API-GR | | 2 GAMMA RAY |
| X | DELTAT | USEC... | | 3 DELTA TRAVEL TIME |
| | TIME(N) | USEC | | 4 NEAR TRAVEL TIME |
| | TIME(F) | USEC | | 5 FAR TRAVEL TIME |
| | POR(... | PERC... | | 6 SONIC POROSITY |

**Step h:** Selecting the Current-1-SONIC.las 1 Tab. Click into the X Column at the "2 GAMMA RAY" Row. Remove the X which will indicate that this curve will not be included in the final LAS file. Do the same for rows 4,5,6 just to show in the final LAS file that the curves were not loaded.



Current-1-NDL.las 1 | Current-1-SONIC.las 1 | Current-1-KUT.las 1

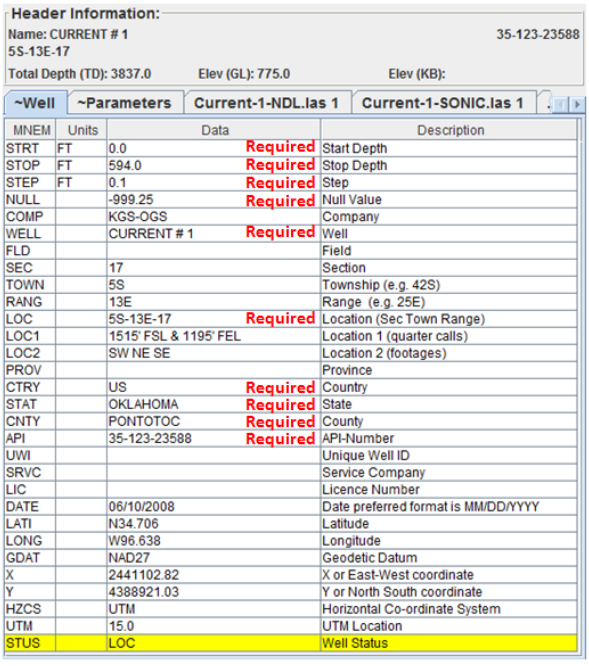
~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | FT | | 1 DEPTH |
| X | GAMMA | API-GR | | 2 GAMMA RAY |
| X | CALIP... | INCH | | 3 SHORT ARM CALIPER |
| | POR(... | PERC... | | 4 DENSITY POROSITY |
| X | DEN(... | G/CC | | 5 COMPENSATED DENSITY |
| X | RES(... | OHM-M | | 6 DEEP GUARD RES |
| X | POR(... | PERC... | | 7 NEUTRON POROSITY |

**Step I:** Selecting the Current-1-NDL.las 1 Tab. Click into the X Column at the "4 DENSITY POROSITY" Row. Remove the X which will indicate that this curve will not be included in the final LAS file.

**Step j:** Check the ~Well & ~Parameters Panel to verify that required data values are filled for a valid LAS file are present.



Header Information:

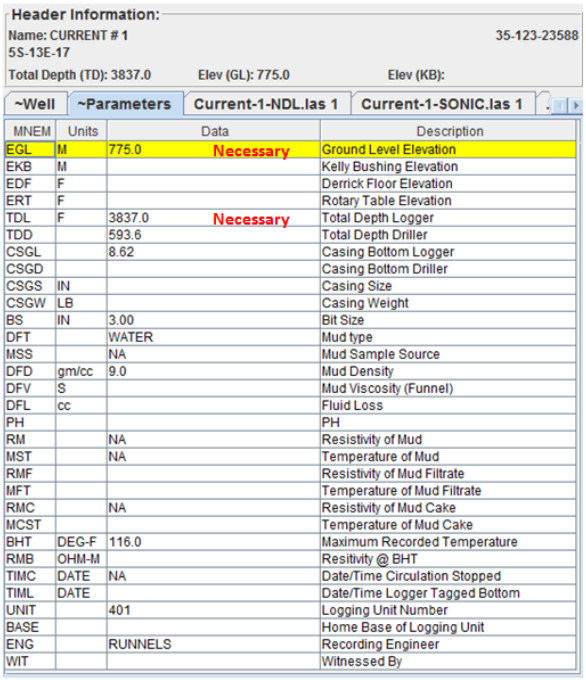
Name: CURRENT # 1 35-123-23588

5S-13E-17

Total Depth (TD): 3837.0 Elev (GL): 775.0 Elev (KB):

~Well | ~Parameters | Current-1-NDL.las 1 | Current-1-SONIC.las 1

| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| STRT | FT | 0.0 | Required | Start Depth |
| STOP | FT | 594.0 | Required | Stop Depth |
| STEP | FT | 0.1 | Required | Step |
| NULL | | -999.25 | Required | Null Value |
| COMP | | KGS-OGS | | Company |
| WELL | | CURRENT # 1 | Required | Well |
| FLD | | | | Field |
| SEC | | 17 | | Section |
| TOWN | | 5S | | Township (e.g. 42S) |
| RANG | | 13E | | Range (e.g. 25E) |
| LOC | | 5S-13E-17 | Required | Location (Sec Town Range) |
| LOC1 | | 1515' FSL & 1195' FEL | | Location 1 (quarter calls) |
| LOC2 | | SW NE SE | | Location 2 (footages) |
| PROV | | | | Province |
| CTRY | | US | Required | Country |
| STAT | | OKLAHOMA | Required | State |
| CNTY | | PONTOTOC | Required | County |
| API | | 35-123-23588 | Required | API-Number |
| UWI | | | | Unique Well ID |
| SRVC | | | | Service Company |
| LIC | | | | Licence Number |
| DATE | | 06/10/2008 | | Date preferred format is MM/DD/YYYY |
| LATI | | N34.706 | | Latitude |
| LONG | | W96.638 | | Longitude |
| GDAT | | NAD27 | | Geodetic Datum |
| X | | 2441102.82 | | X or East-West coordinate |
| Y | | 4388921.03 | | Y or North South coordinate |
| HZCS | | UTM | | Horizontal Co-ordinate System |
| UTM | | 15.0 | | UTM Location |
| STUS | | LOC | | Well Status |



Header Information:

Name: CURRENT # 1 35-123-23588

5S-13E-17

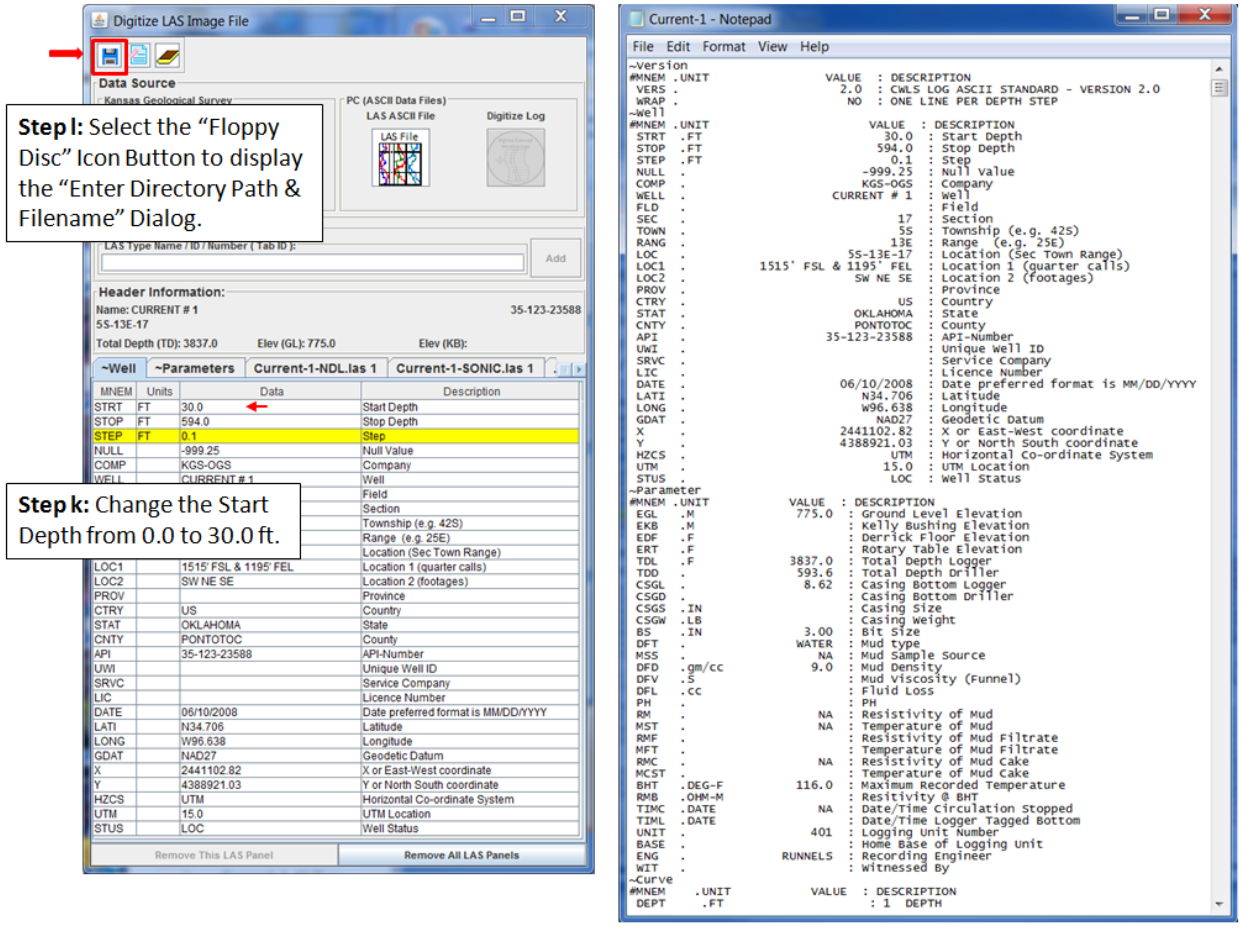
Total Depth (TD): 3837.0 Elev (GL): 775.0 Elev (KB):

~Well | ~Parameters | Current-1-NDL.las 1 | Current-1-SONIC.las 1

| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| EGL | M | 775.0 | Necessary | Ground Level Elevation |
| EKB | M | | | Kelly Bushing Elevation |
| EDF | F | | | Derrick Floor Elevation |
| ERT | F | | | Rotary Table Elevation |
| TDL | F | 3837.0 | Necessary | Total Depth Logger |
| TDD | | 593.6 | | Total Depth Driller |
| CSGL | | 8.62 | | Casing Bottom Logger |
| CSGD | | | | Casing Bottom Driller |
| CSGS | IN | | | Casing Size |
| CSGW | LB | | | Casing Weight |
| BS | IN | 3.00 | | Bit Size |
| DFT | | WATER | | Mud type |
| MSS | | NA | | Mud Sample Source |
| DFD | gm/cc | 9.0 | | Mud Density |
| DFV | S | | | Mud Viscosity (Funnel) |
| DFL | cc | | | Fluid Loss |
| PH | | | | PH |
| RM | | NA | | Resistivity of Mud |
| MST | | NA | | Temperature of Mud |
| RMF | | | | Resistivity of Mud Filtrate |
| MFT | | | | Temperature of Mud Filtrate |
| RMC | | NA | | Resistivity of Mud Cake |
| MCST | | | | Temperature of Mud Cake |
| BHT | DEG-F | 116.0 | | Maximum Recorded Temperature |
| RMB | OHM-M | | | Resitivity @ BHT |
| TIMC | DATE | NA | | Date/Time Circulation Stopped |
| TIML | DATE | | | Date/Time Logger Tagged Bottom |
| UNIT | | 401 | | Logging Unit Number |
| BASE | | | | Home Base of Logging Unit |
| ENG | | RUNNELS | | Recording Engineer |
| WIT | | | | Witnessed By |

## Saving Data as a Log ASCII Standard (LAS) version 2.0 file

Help: Save Data in a Log ASCII Standard (LAS) File, version 2.0




To view the output of this example, 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: Current 1, Pontotoc County, Oklahoma

| | |
|---|---|
| **LAS 2.0** | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1.las |
| **Zip File** | http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1.zip |

## Split Log ASCII Standard (LAS) version 3.0 Files

This help page is designed to show an example of splitting the 2 Log data sections in a Log ASCII Standard (LAS) version 3.0 File into 1 LAS version 2.0 file. The example is for the Kendrick 23-1 well in Stanton, Kansas. This log was selected to demonstrate separating the other well data from the LAS 3.0 file and saving only the log data to the 2.0 file.

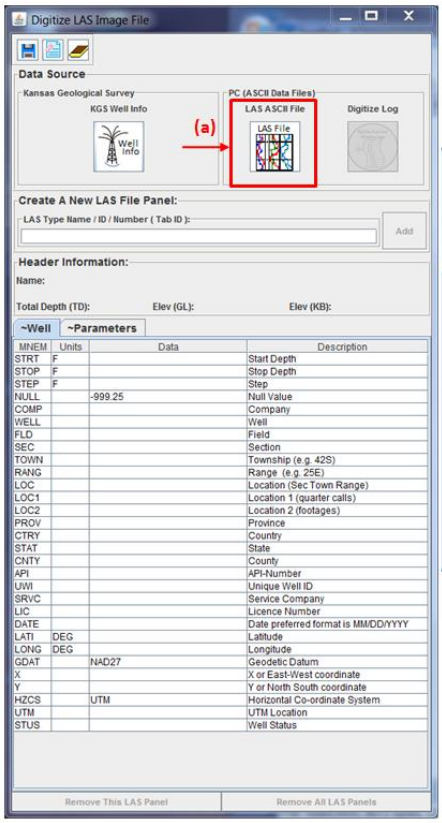
Download either the ASCII Text Files directly or the Zip files extracting the contents into a directory. The problem with the ASCII Text Files being downloaded directly from a web page is that the web page will alter the contents so it does not retain the basic structure and add HTML text to the file.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

Well Data: Kendrick 23-1, Stanton County, Kansas

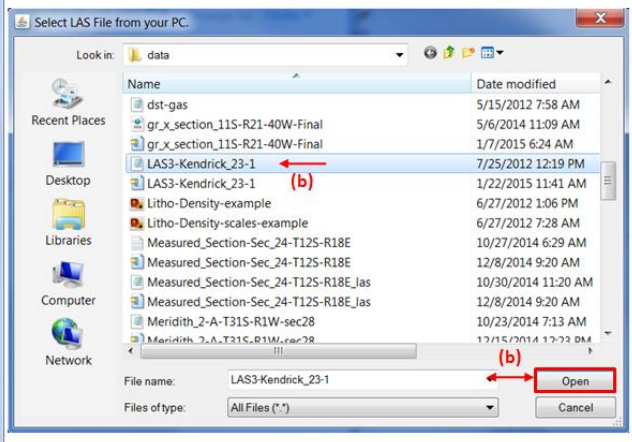
| | |
|---|---|
| **LAS 3.0** | http://www.kgs.ku.edu/Gemini/Tools/documentation/LAS3-Kendrick_23-1.las |
| **Zip File** | http://www.kgs.ku.edu/Gemini/Tools/documentation/LAS3-Kendrick_23-1.zip |

The LAS3-Kendrick_23-1.las file is a Log ASCII Standard (LAS) version 3.0 file with the following data sections,

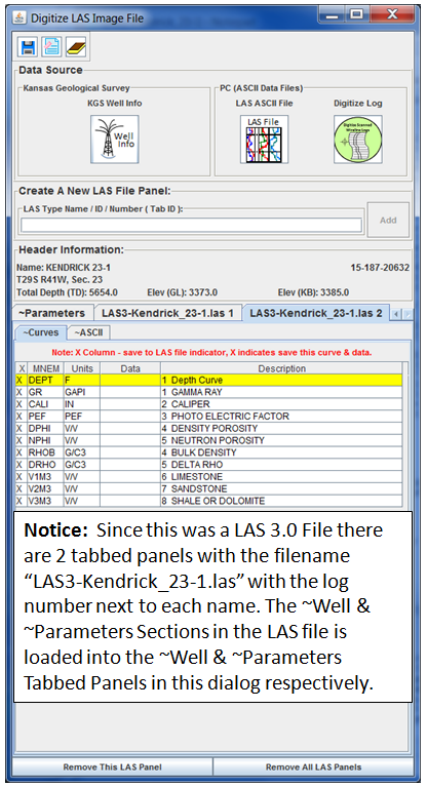
2 Log Data Sections,
Core Data Section,
4 Tops Data Sections,
Sequence Stratigraphy Data Section,
Perforation Data Section,
Profile Plot Control Data Section.




**Step a:** Click on the "LAS ASCII File" Icon button in the "PC (ASCII Data Files) Panel to display the "Select LAS File from your PC." Dialog.




**Step b:** Select the LAS3-Kendrick_23-1 LAS File in the directory list. Notice that the "File name:" text field shows the filename selected. Select the "Open" button to load the ~Well, ~Parameters and ~Log data sections into the program.




**Notice:** Since this was a LAS 3.0 File there are 2 tabbed panels with the filename "LAS3-Kendrick_23-1.las" with the log number next to each name. The ~Well & ~Parameters Sections in the LAS file is loaded into the ~Well & ~Parameters Tabbed Panels in this dialog respectively.

**Turn off redundant curve.**

**Note:** The Curves Table is an Editable Table.

LAS3-Kendrick_23-1.las 1 | LAS3-Kendrick_23-1.las 2

~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | F | | 1 Depth Curve |
| | GR | GAPI | | 1 GAMMA RAY |
| X | SP | MV | | 2 SPONTANEOUS POTENTIAL |
| X | QLRA | ---- | | 3 RX0/RT QUICK LOOK RATIO |
| X | ILD | OHMM | | 4 DEEP INDUCTION |
| X | ILM | OHMM | | 5 MEDIUM INDUCTION |
| X | SFL | OHMM | | 6 SPHERICALLY FOCUSED LOG |
| X | TENS | LBF | | 7 TENSION |

**Step c:** Selecting the LAS3-Kendrick_23-1.las 1 Tab. Click into the X Column at the "1 GAMMA RAY" Row. Remove the X which will indicate that this curve will not be included in the final LAS file.

LAS3-Kendrick_23-1.las 1 | LAS3-Kendrick_23-1.las 2

~Curves | ~ASCII

Note: X Column - save to LAS file indicator, X indicates save this curve & data.

| X | MNEM | Units | Data | Description |
|---|---|---|---|---|
| X | DEPT | F | | 1 Depth Curve |
| X | GR | GAPI | | 1 GAMMA RAY |
| X | CALI | IN | | 2 CALIPER |
| X | PEF | PEF | | 3 PHOTO ELECTRIC FACTOR |
| X | DPHI | V/V | | 4 DENSITY POROSITY |
| X | NPHI | V/V | | 5 NEUTRON POROSITY |
| X | RHOB | G/C3 | | 4 BULK DENSITY |
| X | DRHO | G/C3 | | 5 DELTA RHO |
| X | V1M3 | V/V | | 6 LIMESTONE |
| X | V2M3 | V/V | | 7 SANDSTONE |
| X | V3M3 | V/V | | 8 SHALE OR DOLOMITE |

**Step d:** Selecting the LAS3-Kendrick_23-1.las 2 Tab. All the these curves will be included so nothing needs to be done.

**Step e:** Check the ~Well & ~Parameters Panel to verify that required data values are filled for a valid LAS file are present.

~Well | ~Parameters | LAS3-Kendrick_23-1.las 1 | LAS3-Kendrick...

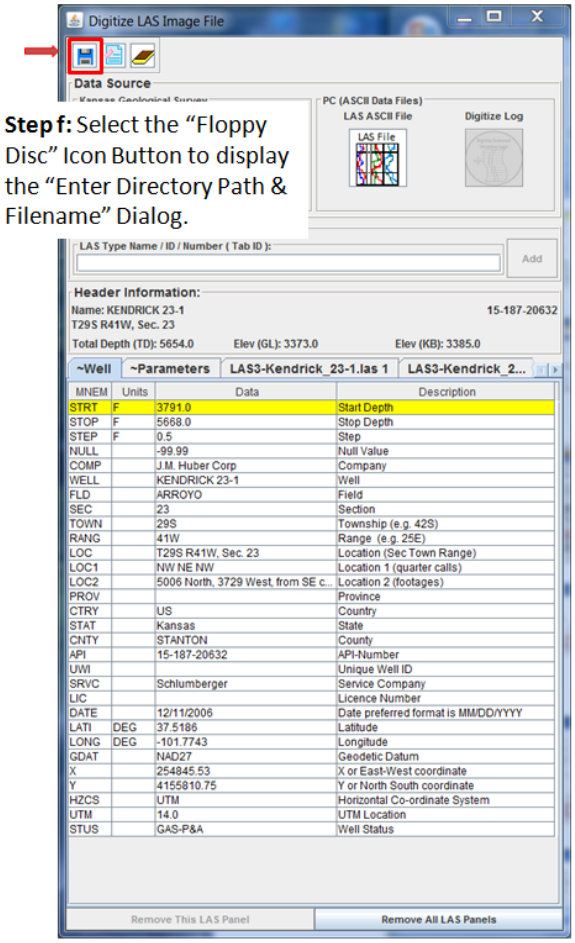
| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| STRT | F | 3791.0 | Required | Start Depth |
| STOP | F | 5668.0 | Required | Stop Depth |
| STEP | F | 0.5 | Required | Step |
| NULL | | -99.99 | Required | Null Value |
| COMP | | J.M. Huber Corp | | Company |
| WELL | | KENDRICK 23-1 | Required | Well |
| FLD | | ARROYO | | Field |
| SEC | | 23 | | Section |
| TOWN | | 29S | | Township (e.g. 42S) |
| RANG | | 41W | | Range (e.g. 25E) |
| LOC | | T29S R41W, Sec. 23 | Required | Location (Sec Town Range) |
| LOC1 | | NW NE NW | | Location 1 (quarter calls) |
| LOC2 | | 5006 North, 3729 West, from SE c... | | Location 2 (footages) |
| PROV | | | | Province |
| CTRY | | US | Required | Country |
| STAT | | Kansas | Required | State |
| CNTY | | STANTON | Required | County |
| API | | 15-187-20632 | Required | API-Number |
| UWI | | | | Unique Well ID |
| SRVC | | Schlumberger | | Service Company |
| LIC | | | | Licence Number |
| DATE | | 12/11/2006 | | Date preferred format is MM/DD/YYYY |
| LATI | DEG | 37.5186 | | Latitude |
| LONG | DEG | -101.7743 | | Longitude |
| GDAT | | NAD27 | | Geodetic Datum |
| X | | 254845.53 | | X or East-West coordinate |
| Y | | 4155810.75 | | Y or North South coordinate |
| HZCS | | UTM | | Horizontal Co-ordinate System |
| UTM | | 14.0 | | UTM Location |
| STUS | | GAS-P&A | | Well Status |

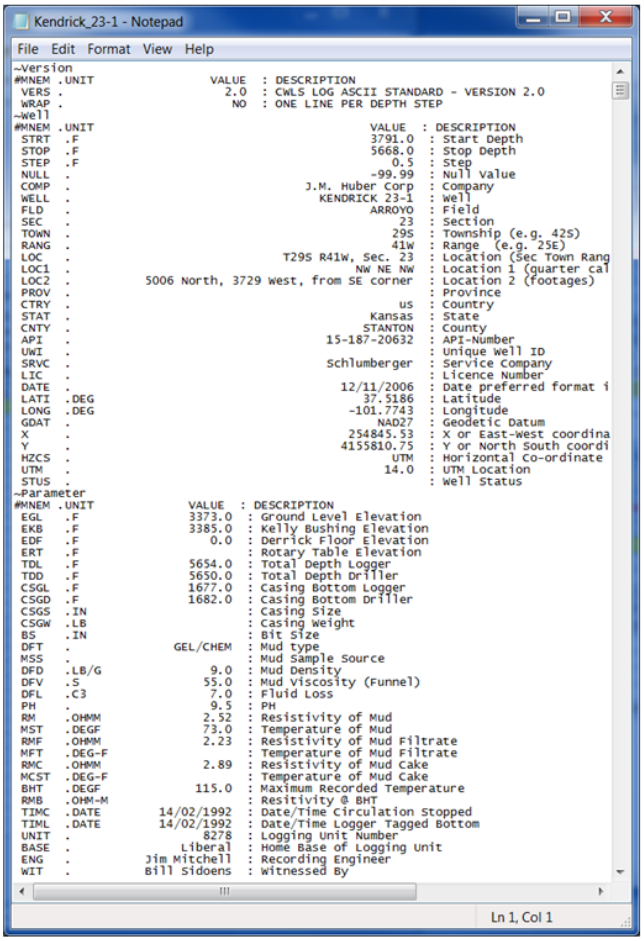
~Well | ~Parameters | LAS3-Kendrick_23-1.las 1 | LAS3-Kendrick_2...

| MNEM | Units | Data | | Description |
|---|---|---|---|---|
| EGL | F | 3373.0 | Necessary | Ground Level Elevation |
| EKB | F | 3385.0 | | Kelly Bushing Elevation |
| EDF | F | 0.0 | | Derrick Floor Elevation |
| ERT | F | | | Rotary Table Elevation |
| TDL | F | 5654.0 | Necessary | Total Depth Logger |
| TDD | F | 5650.0 | | Total Depth Driller |
| CSGL | F | 1677.0 | | Casing Bottom Logger |
| CSGD | F | 1682.0 | | Casing Bottom Driller |
| CSGS | IN | | | Casing Size |
| CSGW | LB | | | Casing Weight |
| BS | IN | | | Bit Size |
| DFT | | GEL/CHEM | | Mud type |
| MSS | | | | Mud Sample Source |
| DFD | LB/G | 9.0 | | Mud Density |
| DFV | S | 55.0 | | Mud Viscosity (Funnel) |
| DFL | C3 | 7.0 | | Fluid Loss |
| PH | | 9.5 | | PH |
| RM | OHMM | 2.52 | | Resistivity of Mud |
| MST | DEGF | 73.0 | | Temperature of Mud |
| RMF | OHMM | 2.23 | | Resistivity of Mud Filtrate |
| MFT | DEG-F | | | Temperature of Mud Filtrate |
| RMC | OHMM | 2.89 | | Resistivity of Mud Cake |
| MCST | DEG-F | | | Temperature of Mud Cake |
| BHT | DEGF | 115.0 | | Maximum Recorded Temperature |
| RMB | OHM-M | | | Resitivity @ BHT |
| TIMC | DATE | 14/02/1992 | | Date/Time Circulation Stopped |
| TIML | DATE | 14/02/1992 | | Date/Time Logger Tagged Bottom |
| UNIT | | 8278 | | Logging Unit Number |
| BASE | | Liberal | | Home Base of Logging Unit |
| ENG | | Jim Mitchell | | Recording Engineer |
| WIT | | Bill Sidoens | | Witnessed By |

## Saving Data as a Log ASCII Standard (LAS) version 2.0 file

Help: Save Data in a Log ASCII Standard (LAS) File, version 2.0




To view the output of this example, 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: Kendrick 23-1, Stanton County, Kansas

| | |
|---|---|
| **LAS 3.0** | http://www.kgs.ku.edu/Gemini/Tools/documentation/Kendrick_23-1.las |
| **Zip File** | http://www.kgs.ku.edu/Gemini/Tools/documentation/Kendrick_23-1.zip |