

Digitize Electric Log Well (E-Log) Image Applet

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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.

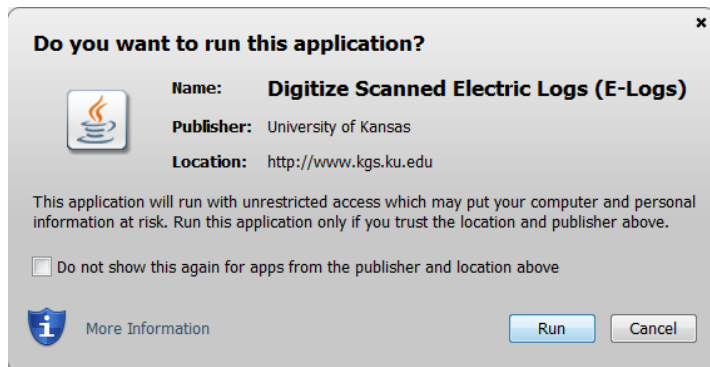
NOTE: The program cannot handle the complete well log image, only small image captures in the above image formats.

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,

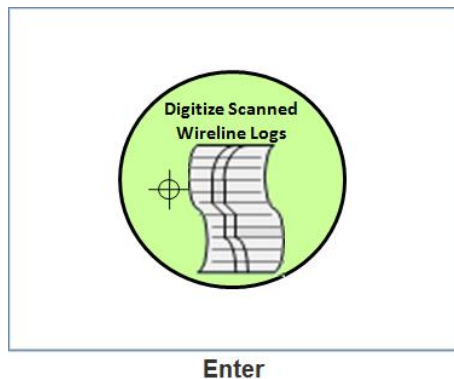


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Digitize LAS Image File Control Dialog

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

Kansas Geological Survey: KGS Well Info

PC (ASCII Data Files): LAS ASCII File, Digitize Log

Create A New LAS File Panel:

LAS Type Name / ID / Number (Tab ID): Add

Header Information:

Name: Shamar 1 15-131-20205
55-13E-17
Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

MNEI	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		55-13E-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

Remove This LAS Panel Remove All LAS Panels

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 in 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	.	aaaaaaaaaaaaaaaaaaaaa	: Company Name
WELL	.	aaaaaaaaaaaaaaaaaaaaa	: Well Name
FLD	.	aaaaaaaaaaaaaaaaaaaaa	: Field Name
LOC	.	aaaaaaaaaaaaaaaaaaaaa	: Well Location
PROV	.	aaaaaaaaaaaaaaaaaaaaa	: Province; Canadian
CTRY	.	aaaaaaaaaaaaaaaaaaaaa	: Country; Outside Canada
STAT	.	aaaaaaaaaaaaaaaaaaaaa	: State
CNTY	.	aaaaaaaaaaaaaaaaaaaaa	: County
UWI	.	aaaaaaaaaaaaaaaaaaaaa	: Unique Well ID; Within Canada 16 char string
API	.	aaaaaaaaaaaaaaaaaaaaa	: API-Number
SRVC	.	aaaaaaaaaaaaaaaaaaaaa	: Logging Company
LIC	.	aaaaaaaaaaaaaaaaaaaaa	: Regulatory License Number
DATE	.	aaaaaaaaaaaaaaaaaaaaa	: Date logged, preferred date MM/DD/YYYY

~Well				~Well			
~Parameters		Data		~Parameters		Data	
MNEM	Units	Data	Description	#MNEM	.UNIT	VALUE	DESCRIPTION
STRT	F	3500	Start Depth	STRT	.F	3500	: Start Depth
STOP	F	3581.0	Stop Depth	STOP	.F	3580	: Stop Depth
STEP	F	0.5	Step	STEP	.F	0.5	: Step
NULL		-999.25	Null Value	NULL	.	-999.25	: Null Value
COMP		Noble Petroleum, Inc	Company	COMP	.	Noble Petroleum, Inc.	: Company
WELL		Shamar 1	Well	WELL	.	Shamar 1	: Well
FLD		WILDCAT	Field	FLD	.	WILDCAT	: Field
SEC		17	Section	SEC	.	17	: Section
TOWN		5S	Township (e.g. 42S)	TOWN	.	5S	: Township (e.g. 42S)
RANG		13E	Range (e.g. 25E)	RANG	.	13E	: Range (e.g. 25E)
LOC		5S-13E-17	Location (Sec Town Range)	LOC	.	5S-13E-17	: Location (Sec Town Range)
LOC1		1515' FSL & 1195' FEL	Location 1 (quarter calls)	LOC1	.	1515' FSL & 1195' FEL	: Location 1 (quarter calls)
LOC2		SWNESE	Location 2 (footages)	LOC2	.	SWNESE	: Location 2 (footages)
PROV			Province	PROV	.		: Province
CTRY		US	Country	CTRY	.	US	: Country
STAT		Kansas	State	STAT	.	Kansas	: State
CNTY		NEMAHA	County	CNTY	.	NEMAHA	: County
API		15-131-20205	API-Number	API	.	15-131-20205	: API-Number
UWI			Unique Well ID	UWI	.		: Unique Well ID
SRVC		Log Tech	Service Company	SRVC	.	Log Tech	: Service Company
LIC			Licence Number	LIC	.		: Licence Number
DATE		02/06/2012	Date preferred format is MMDD/YYYY	DATE	.	02/06/2012	: Date preferred format is MM/DD/YYYY
LAT	DEG	39.6137073	Latitude	LAT	.DEG	39.6137073	: Latitude
LONG	DEG	-95.980802	Longitude	LONG	.DEG	-95.980802	: Longitude
GDAT		NAD27	Geodetic Datum	GDAT	.	NAD27	: Geodetic Datum
X		244102.82	X or East-West coordinate	X	.	244102.82	: X or East-West coordinate
Y		4388921.03	Y or North South coordinate	Y	.	4388921.03	: Y or North South coordinate
HZCS		UTM	Horizontal Co-ordinate System	HZCS	.	UTM	: Horizontal Co-ordinate System
UTM		15.0	UTM Location	UTM	.	15.0	: UTM Location
STUS			Well Status	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				~Parameter		
MNEM	Units	Data	Description	#MNEM	.UNIT	VALUE : DESCRIPTION
EGL	F	1294.0	Ground Level Elevation	EGL	.F	1294.0 : Ground Level Elevation
EKB	F	1303.0	Kelly Bushing Elevation	EKB	.F	1303.0 : Kelly Bushing Elevation
EDF	F		Derrick Floor Elevation	EDF	.F	: Derrick Floor Elevation
ERT	F		Rotary Table Elevation	ERT	.F	: Rotary Table Elevation
TDL	F	3837.0	Total Depth Logger	TDL	.F	3837.0 : Total Depth Logger
TDD	F	3832.0	Total Depth Driller	TDD	.F	3832.0 : Total Depth Drill
CSGL	F		Casing Bottom Logger	CSGL	.F	: Casing Bottom Logger
CSGD	F		Casing Bottom Driller	CSGD	.F	: Casing Bottom Driller
CSGS	IN		Casing Size	CSGS	.IN	: Casing Size
CSGW	LB		Casing Weight	CSGW	.LB	: Casing Weight
BS	IN	7.875	Bit Size	BS	.IN	7.875 : Bit Size
DFT		Chemical	Mud type	DFT	.	Chemical : Mud type
MSS			Mud Sample Source	MSS	.	: Mud Sample Source
DFD	gm/cc	9.0	Mud Density	DFD	.gm/cc	9.0 : Mud Density
DFV	s/qt		Mud Viscosity (Funnel)	DFV	.s/qt	: Mud Viscosity (Funnel)
DFL	cc		Fluid Loss	DFL	.cc	: Fluid Loss
PH			PH	PH	.	: PH
RM	OHM-M		Resistivity of Mud	RM	.OHM-M	: Resistivity of Mud
MST	DEG-F		Temperature of Mud	MST	.DEG-F	: Temperature of Mud
RMF	OHM-M		Resistivity of Mud Filtrate	RMF	.OHM-M	: Resistivity of Mud Filtrate
MFT	DEG-F		Temperature of Mud Filtrate	MFT	.DEG-F	: Temperature of Mud Filtrate
RMC	OHM-M		Resistivity of Mud Cake	RMC	.OHM-M	: Resistivity of Mud Cake
MCST	DEG-F		Temperature of Mud Cake	MCST	.DEG-F	: Temperature of Mud Cake
BHT	DEG-F	116.0	Maximum Recorded Temperature	BHT	.DEG-F	116.0 : Maximum Recorded Temperature
RMB	OHM-M		Resistivity @ BHT	RMB	.OHM-M	: Resistivity @ BHT
TIMC	DATE		Date/Time Circulation Stopped	TIMC	.DATE	: Date/Time Circulation Stopped
TIML	DATE		Date/Time Logger Tagged Bottom	TIML	.DATE	: Date/Time Logger Tagged Bottom
UNIT		10	Logging Unit Number	UNIT	.	10 : Logging Unit Number
BASE		Hays, Kansas	Home Base of Logging Unit	BASE	.	Hays, Kansas : Home Base of Logging Unit
ENG		Jason Wellbrock	Recording Engineer	ENG	.	Jason Wellbrock : Recording Engineer
WIT		Doug Davis	Witnessed By	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	NPPI	PU		Neutron porosity	
X	DPPI	PU		Density porosity	

~Curve		
#MNEM	.UNIT	VALUE : DESCRIPTION
DEPT	.F	: Depth
GR	.API	: Gamma Ray
NPPI	.PU	: Neutron porosity
DPPI	.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

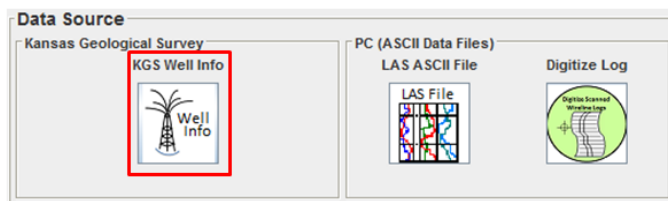
```

~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

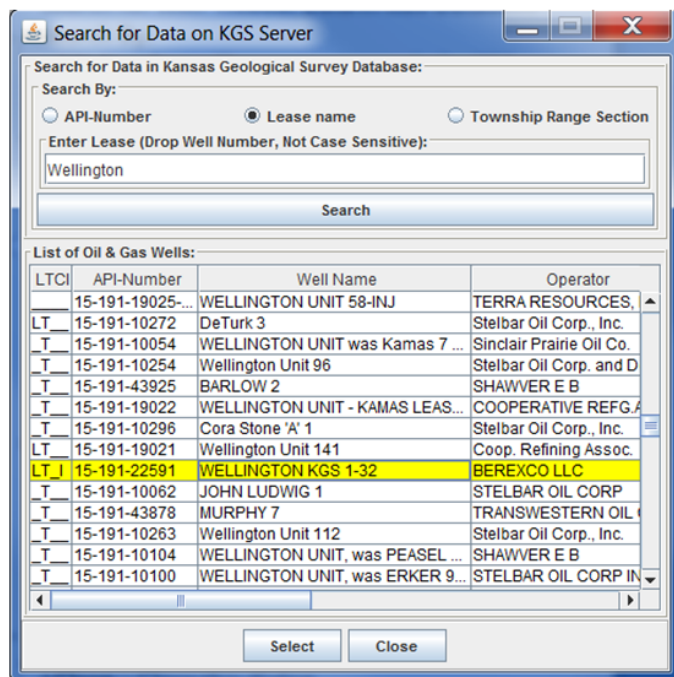
```


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.

Search for Data in Kansas Geological Survey Database:

Search By:

☒ API-Number ☐ Lease name ☐ Township Range Section

Enter API-Number :

- 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%".

Search for Data in Kansas Geological Survey Database:

Search By:

☐ API-Number ☒ Lease name ☐ Township Range Section

Enter Lease (Drop Well Number, Not Case Sensitive):

- 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.

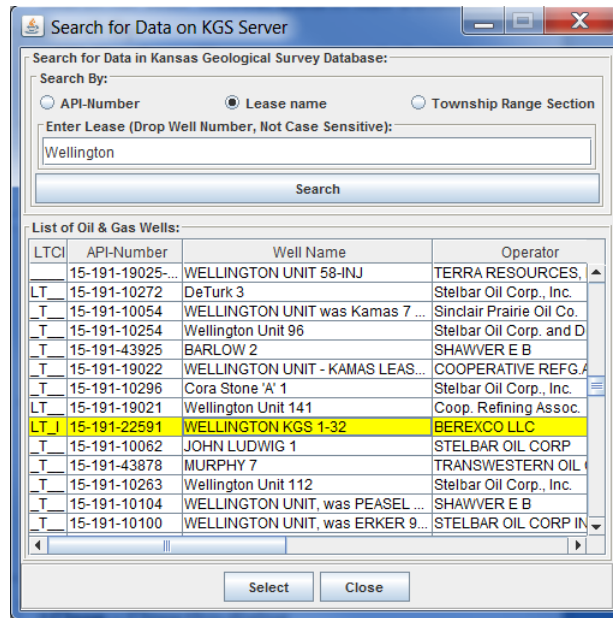
Search for Data in Kansas Geological Survey Database:

Search By:

☐ API-Number ☐ Lease name ☒ Township Range Section

Section: Township: ☐ N ☒ S Range: ☐ W ☒ E

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.

Data Source

Kansas Geological Survey
KGS Well Info

PC (ASCII Data Files)
LAS ASCII File
Digitize Log

Create A New LAS File Panel:
LAS Type Name / ID / Number (Tab ID): Add

Header Information:
Name: WELLINGTON KGS 1-32 15-191-22591
sec. 32 1W 31S
Total Depth (TD): 5240.0 Elev (GL): 1259.0 Elev (KB): 1272.0

~Well ~Parameters

MNEM	Units	Data	Description
STRT	F		Start Depth
STOP	F		Stop Depth
STEP	F		Step
NULL		-999.25	Null Value
COMP		BEREXCO LLC	Company
WELL		WELLINGTON KGS 1-32	Well
FLD		WELLINGTON	Field
SEC	32		Section
TOWN	31S		Township (e.g. 42S)
RANG	1W		Range (e.g. 25E)
LOC	31S-1W-32		Location (Sec Town Range)
LOC1			Location 1 (quarter calls)
LOC2	NESWNE		Location 2 (footages)
PROV			Province
CTRY			Country
STAT	Kansas		State
CNTY	SUMNER		County
API	15-191-22591		API-Number
UWI			Unique Well ID
SRVC			Service Company
LIC			Licence Number
DATE	08/21/2013		Date preferred format is MM/DD/YYYY
LAT	DEG	37.315444	Latitude
LONG	DEG	-97.442414	Longitude
GDAT		NAD27	Geodetic Datum
X		638021.23	X or East-West coordinate
Y		4130799.98	Y or North South coordinate
HZCS	UTM		Horizontal Co-ordinate System
UTM		14.0	UTM Location
STUS			Well Status

Remove This LAS Panel Remove All LAS Panels

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

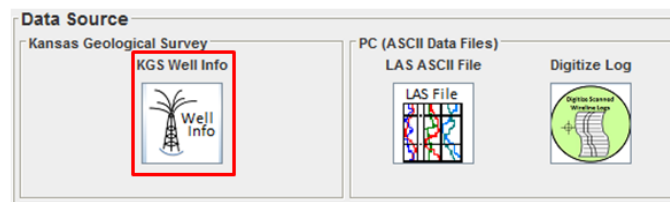
The first step is to load the well header information into the “Digitize LAS Image File” dialog. There are at least 3 methods for loading the well header information,

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.

Search for Kansas Wells on KGS Database

Search for Data in Kansas Geological Survey Database:

Search By:

☒ API-Number ☐ Lease name ☐ Township Range Section

Enter API-Number :

15-131-20205

Search

List of Oil & Gas Wells:

LTDCI	API-Number	Well Name	Operator
TD_	15-131-20205	Shamar 1	Noble Petroleum, Inc.

Select Close

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
G DAT		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  **Dual Compensated Porosity Log**

DIGITAL LOG (785) 625-3858

API No. 15-131-20,205-0000

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

Location 1550' FSL & 1195' FEL
15LS' 119S'

Sec: 17 Twp: 5S Rge: 13E

Permanent Datum 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 2800

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

Other Services DIL

Elevation 1294

K.C.B. 1303


G.L. 1294

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

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 ~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  **Dual Compensated Porosity Log**

DIGITAL LOG (785) 625-3858

API No. 15-131-20,205-0000

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

Location 1550' FSL & 1195' FEL
15LS' 119S'

Sec: 17 Twp: 5S Rge: 13E

Permanent Datum 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 2800

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

Other Services DIL

Elevation 1294

K.C.B. 1303

G.L. 1294

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

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 ~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		Resistivity @ 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 identifies 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.

The screenshot shows the homepage of the Kansas Geological Survey (KGS) website. The header features the KU logo and the text "KANSAS GEOLOGICAL SURVEY" and "The University of Kansas". A search bar is located in the top right corner. Below the header, there is a navigation menu with links to various sections: Water, Energy, Geology, Geophysics, Publications, Education, and About the KGS. The Energy section is highlighted with a red border. To the right of the navigation menu, there is a large image titled "Lithostratigraphy of Permian Red Beds and Evaporites in the Rebecca K. Bounds Core, Greeley County, Kansas". Below the image, there is a "News" section with several articles, including one about road construction and another about a lecture program. To the right of the news section, there is a "Links" section with logos for GeoKansas, DASE, and KU, and a list of links to various resources. At the bottom of the page, there is contact information for the Kansas Geological Survey and the Wichita Well Sample Library.

KU KANSAS GEOLOGICAL SURVEY
The University of Kansas

Search Search

Or visit our "Kansas by County" page

Water
High Plains/Ogallala Aquifer, WWCS, WIZARD, WIMAS, Publications, ...

Energy
Oil and Gas Wells, Production, Interactive Maps, Other Projects, ...

Geology
County Maps, County Bulletins, Publications, CMI, Nomenclature, ...

Geophysics
Russell 4D Seismic, Shallow Seismic, WinSeis, SurfSeis, ...

Publications
Bibliography, Open-file Reports, Maps/GIS, Software, ...

Education
GeoKansas, Photo Library, Annual Field Conferences, ...

About the KGS
Positions Available, News, Staff Listing, FAQ, KGS Staff Only, ...

Lithostratigraphy of Permian Red Beds and Evaporites in the Rebecca K. Bounds Core, Greeley County, Kansas

News

- ▶ **May 29-Aug. 1--Because of road construction, please use 21st St. instead of 19th St. to get to Lawrence offices.** Both 19th St. and parts of Constant Ave. will be closed. For a map of the proposed construction impacts, please refer to: [Constant_RoadClosureMap.pdf](#)
- ▶ **Kansas Geological Survey Scientist Selected for International Lecture Program**
- ▶ **Reservoir Characterization and Modeling of a Chester Incised Valley Fill Reservoir, Pleasant Prairie South Field, Haskell County, Kansas,** by Martin K. Dubois, Peter R. Senior, Eugene Williams, Dennis E. Hedke
- ▶ **Resources on Hydraulic Fracturing--** the KGS presents these links to help people learn about hydraulic fracturing of oil and gas wells.

Links

GeoKansas
DASE Data Access and Support Center
KU THE UNIVERSITY OF KANSAS

Kansas By County, State Geological Surveys, Kansas Sites, Universities, Professional Organizations, more...

Kansas Geological Survey,
1930 Constant Ave., Lawrence, KS 66047-3726
phone 785-864-3965, fax 785-864-5317,
<http://www.kgs.ku.edu/index.html> 785-864-4909

Wichita Well Sample Library,
4150 Monroe Street, Wichita, Kansas 67209
phone 316-943-2343, fax 316-943-1261

KANSAS GEOLOGICAL SURVEY
The University of Kansas

Or visit our "Kansas by County" page

▶ **Water**

▶ **Energy**

- ▶ Oil and Gas Wells
- ▶ Production Data
- ▶ Current Info
- ▶ Interactive Maps
- ▶ Publications, Reports
- ▶ Gemini Tools
- ▶ Tutorials and Courses
- ▶ Other Projects

▶ **Geology**

▶ **Geophysics**

▶ **Publications**

▶ **Education**

▶ **About the KGS**

Repository and Ordering Information

- [Data Resources Library](#) (logs, well forms, etc.)
- [Wichita Well Sample Library](#) (well drilling samples, publication sales)
- [Drill Core Library](#) (repository for core and rock samples)

Oil and Gas Production Data

Production data through March 2012 added July 2, 2012.

- [State Production and Historical Info](#)
- [County Production](#)
- [Field Production](#)--Info on oil and gas fields with interactive charts and maps
- [Gas Storage Fields in Kansas](#)
- [Lease Production](#)--Select leases based on Township-Range values.
- [Production by Operator](#)--Find total production based on operator name.
- [Top Ten lists of oil and gas production](#) Updated (April 10, 2012)

Wells, Logs, Core, and other databases

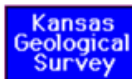
Master list of oil and gas wells

[All oil and gas wells in the KGS database](#). Can save lists of wells to a text file. Linked to the other types of data available (LAS files, cuttings, scans, tops, etc.).

These next searches are subsets of the master list, limited to wells containing the necessary attribute.

Wireline Logs and Geologist's Report	Wireline Log Headers --nearly complete list of paper logs stored in the KGS data library.	LAS Files Available --shows only logs that are Digital Log ASCII Standard (LAS) files.
	Scanned Wireline Logs --shows only wells with logs that have been scanned into TIF files.	
Core	Core Library Index --stored at the KGS Core Library in Lawrence	Images of core
	Scanned core analyses	
Other data linked to master list	Scanned ACO-1's, drillers logs, intents, plugging reports, etc. from the KGS	Rotary-cutting samples --stored at the KGS Wichita Office.


Next click on the "All oil and gas wells in the KGS database" link, which will take you to the "Master List of Oil and Gas Wells in Kansas."



Master List of Oil and Gas Wells in Kansas

Use this form to search our list of Oil and Gas Wells in Kansas.

In Kansas, Township values vary from 1 in the north to 35 in the south, and the values for Range are from 1-43 West and 1-25 East. Values for Section are 1 to 36. If you are selecting data from other states, ignore the county names associated with each code.



Enter values for **any or all** parameters

Township: South; Range: East: ☐ or West: ☒ ; Section:

Lease:
(Enter all or part of a lease name. Case doesn't matter.
Leave off well number.)

Operator:
(Enter all or part of an operator name. Case doesn't matter.)

State:

Nemaha--131

Neosho--133

Ness--135

Norton--137

 API Well No.:
(API Well No. is the 5-digit well number. Use the menus to select state and county.)

Other information online...

- [Show Horizontal or Slant Wells in Kansas](#)
- [File Format Tools](#)
- [Landgrid data](#)
- [FGDC Metadata for the Well Database](#)
- [Pre-created files of all the state's wells](#)

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.

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

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

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
<div>T5S R13E, Sec. 17, SW SW NE SE</div>	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 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

[View well on interactive map](#)

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):

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
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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 then 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.

Create A New LAS File Panel:

LAS Type Name / ID / Number (Tab ID):

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

Select the “Add” button.

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 **Data 1**

~Curves

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

X	MNEM	Units	Data	Description
X	DEPT	F		Depth

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.

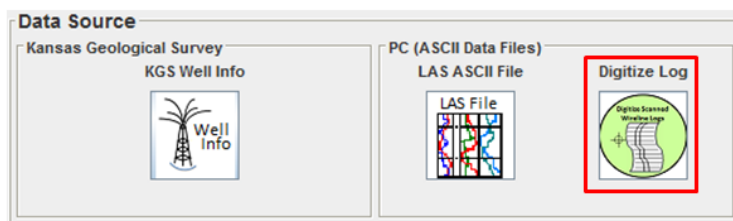
Shamar -1: Dual Compensated Porosity Electric Well Log:

<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.

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	Height (d): 293.0	Width (w): 362.0

#	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

Depth	Data	pixel-X	pixel-Y
3,499.181	3.149	492	23
3,500	2.928	494	26
3,501.992	3.702	487	30
3,502.73	2.707	496	36
3,504.642	1.823	504	43
3,504.915	1.823	504	44
3,506.826	1.05	511	51
3,508.454	2.265	500	57
3,509.283	2.044	502	60
3,511.468	-0.939	529	68
3,512.287	-1.05	530	71

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.

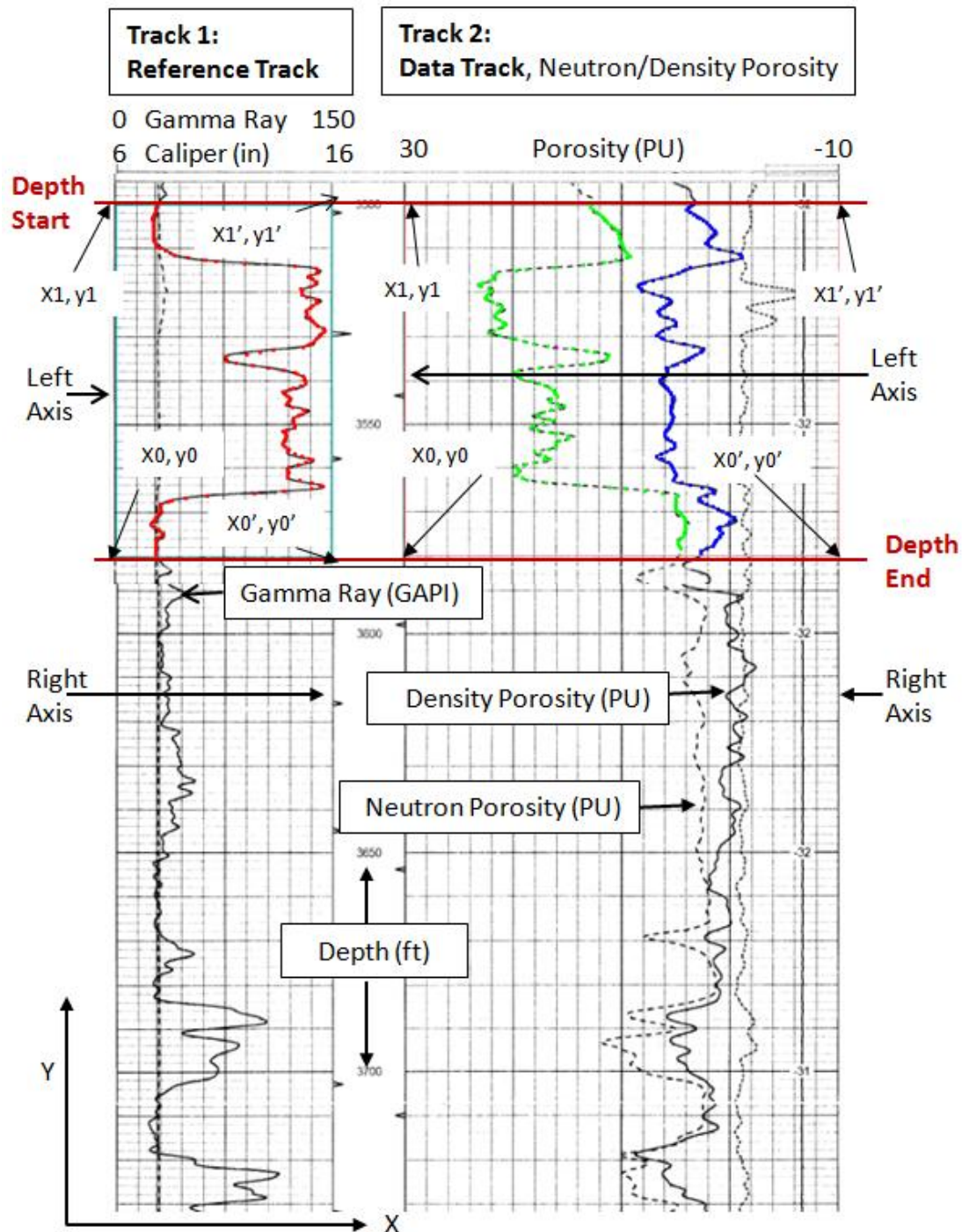
STEP 4: Digitized Each Curve. Each Mnemonic radio button will hold each digitized curve data. The program automatically computes the depth and data value for each pixel position. The program was designed to allow for scanned images that may be rotated from the vertical so the data is computed from a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

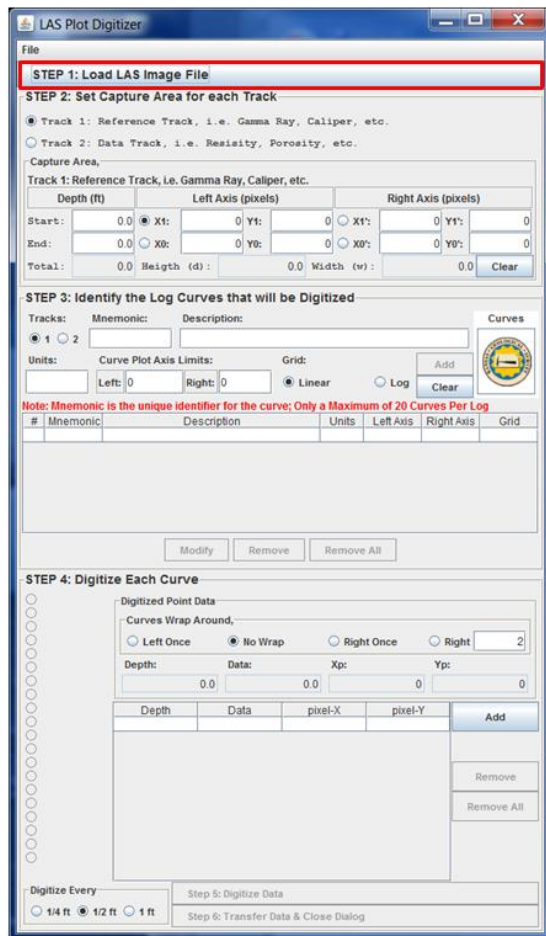
STEP 6: Transfer Data & Close Dialog. This button transfer the digitized data & curve list to the main dialog

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.

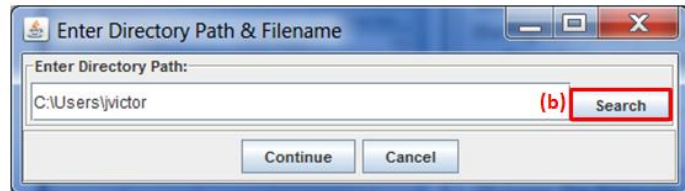
Note: The Electric Well Log Plot must be a PNG (Portable Network Graphics), JPEG (Joint Photographic Experts Group) or GIF (Graphics Interchange Format) image file.



Step 1: Loading Electric Well Log Plot Image

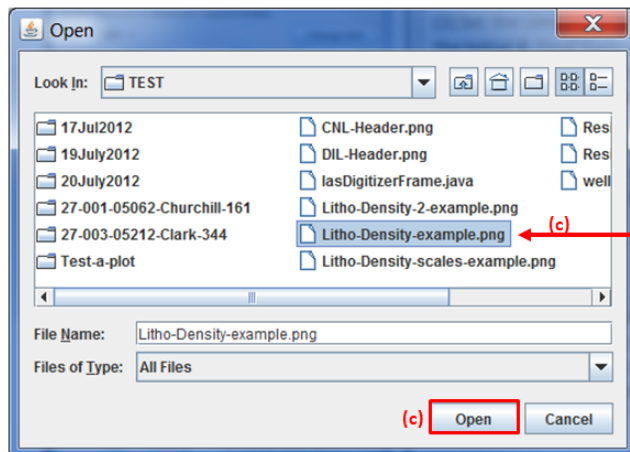


Step a: Select the “STEP 1: Load LAS Image File” Button to display the “Enter Directory Path & Filename” Dialog.



Step b: Select the Search Button to search your PC for the correct Electric Well Log Image Plot.

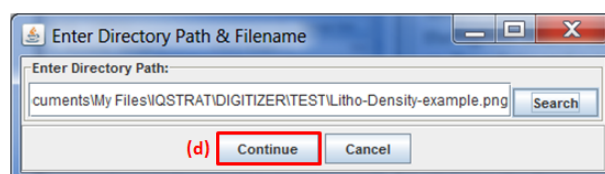
NOTE: The starting directory is your home directory.



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 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. Resistivity, Porosity, etc.

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

Depth (ft)	Left Axis (pixels)	Right Axis (pixels)
Start: 0.0	X1: 0 Y1: 0	X1: 0 Y1: 0
End: 0.0	X0: 0 Y0: 0	X0: 0 Y0: 0
Total: 0.0	Height (d): 0.0	Width (w): 0.0

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add Clear

Left: 0 Right: 0 Linear Log

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
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Modify Remove Remove All

STEP 4: Digitize Each Curve

Digitized Point Data

Curves Wrap Around:
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right 2

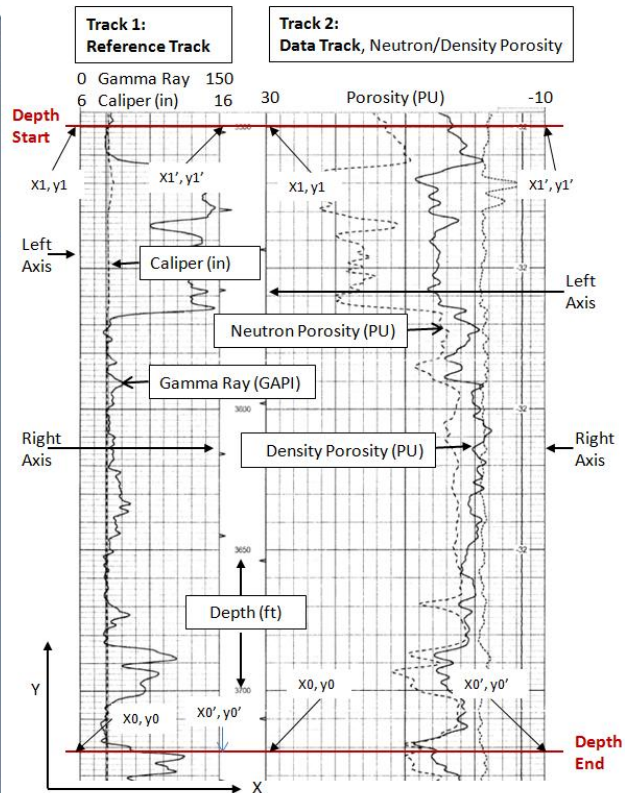
Depth: 0.0 Data: 0.0 Xp: 0 Yp: 0

Depth	Data	pixel-X	pixel-Y
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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 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. Resistivity, Porosity, etc.

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

Depth (ft)	Left Axis (pixels)	Right Axis (pixels)
Start: 3500.0	X1: 0 Y1: 0	X1: 0 Y1: 0
End: 3580.0	X0: 0 Y0: 0	X0: 0 Y0: 0
Total: 80.0	Height (d): 0.0	Width (w): 0.0

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add Clear

Left: 0 Right: 0 Linear Log

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
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Modify Remove Remove All

STEP 4: Digitize Each Curve

Digitized Point Data

Curves Wrap Around:
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right 2

Depth: 0.0 Data: 0.0 Xp: 0 Yp: 0

Depth	Data	pixel-X	pixel-Y
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Add Remove Remove All

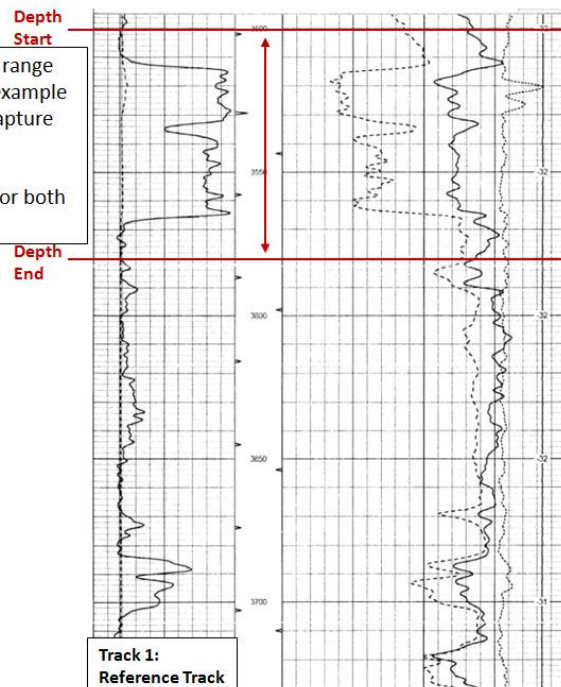
Digitize Every: ☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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

Step 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.



LAS Plot Digitizer

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. Resistivity, Porosity, etc.

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

Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	X1:	Y1:	X1':	Y1':
End:	X0:	Y0:	X0':	Y0':
Total:	80.0	Height (d):	0.0	Width (w):

Clear

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description:
 1 2

Units: Curve Plot Axis Limits: Grid:
 Left: 0 Right: 0 Linear

Note: Mnemonic is the unique identifier for the curve; Only a Max

#	Mnemonic	Description	Unit
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Modify Remove Remove All

STEP 4: Digitize Each Curve

Digitized Point Data:
 Curves Wrap Around,
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right 2

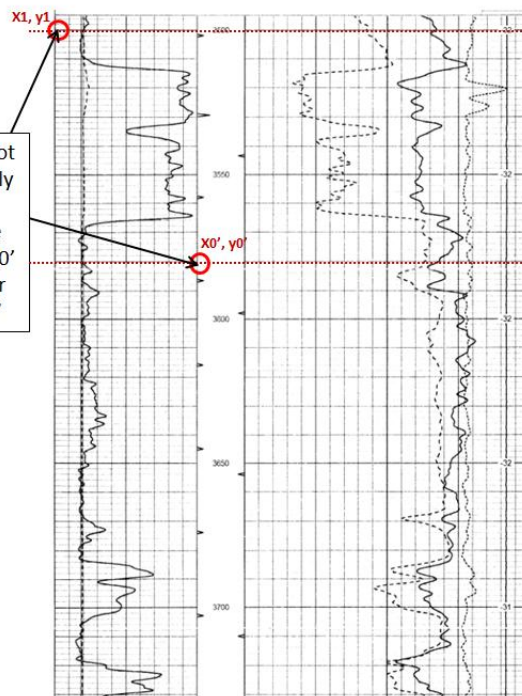
Depth: Data: Xps: Yps: 0.0 0.0 0 0

Depth	Data	pixel-X	pixel-Y
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Add Remove Remove All

Digitize Every ☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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



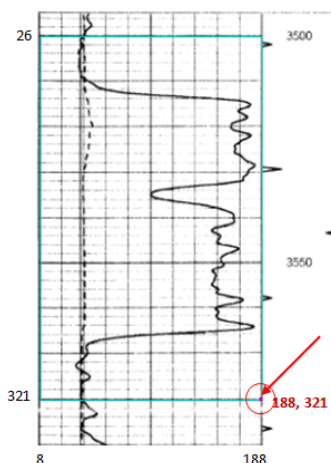
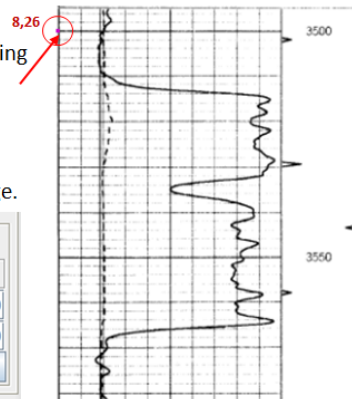
Step c: Since the scanned plot image is not rotated we really only need to enter the top left axis point X1, Y1 and the Lower Right Axis Point X0', y0' to mark the Capture Area for "Track 1: Reference Track ..."

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.

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

Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	X1:	Y1:	X1':	Y1':
End:	X0:	Y0:	X0':	Y0':
Total:	80.0	Height (d):	0.0	Width (w):

Clear



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.

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

Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	X1:	Y1:	X1':	Y1':
End:	X0:	Y0:	X0':	Y0':
Total:	80.0	Height (d):	295.0	Width (w):

Clear

LAS Plot Digitizer

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. Resistivity, Porosity, etc.

Capture Area,

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

Depth (ft)	Left Axis (pixels)	Right Axis (pixels)
Start: 3500.0	X1: 0 Y1: 0	X1: 0 Y1: 0
End: 3580.0	X0: 0 Y0: 0	X0: 0 Y0: 0
Total: 80.0	Height (d): 0.0	Width (w): 0.0

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description:

Units: Curve Plot Axis Limits: Grid: Linear

Note: Mnemonic is the unique identifier for the curve; Only a #

#	Mnemonic	Description
1		

STEP 4: Digitize Each Curve

Digitized Point Data

Curves Wrap Around:

Left Once No Wrap Right Once Right 2

Depth: 0.0 Data: 0.0 Xpc: 0.0 Ypc: 0.0

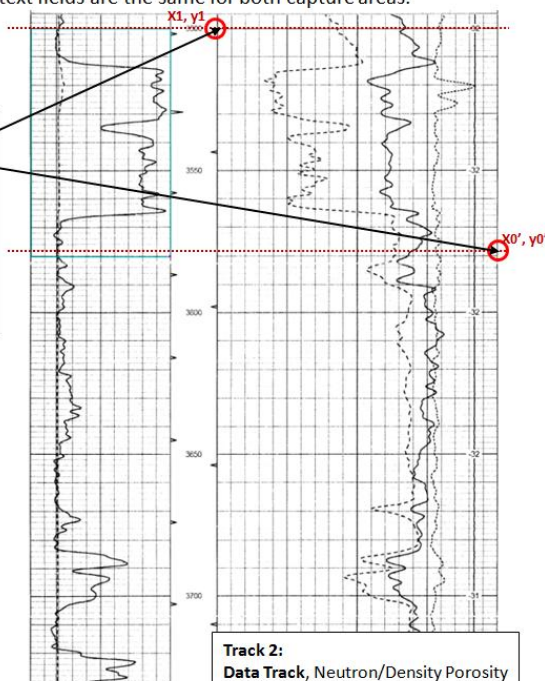
Depth	Data	pixel-X	pixel-Y

Digitize Every 1/4 ft 1/2 ft 1 ft

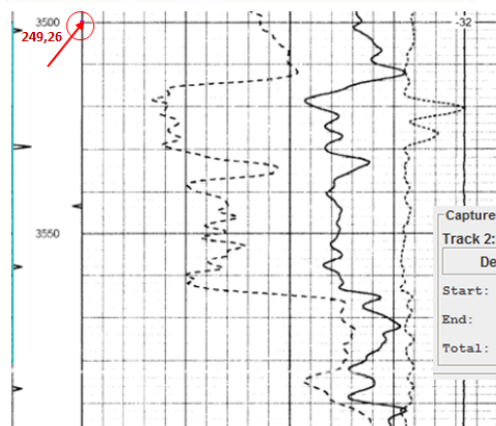
Step 5: Digitize Data

Step 6: Transfer Data & Close Dialog

Step f: 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 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 ..."



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. Resistivity, 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	Height (d): 0.0	Width (w): 0.0

Clear

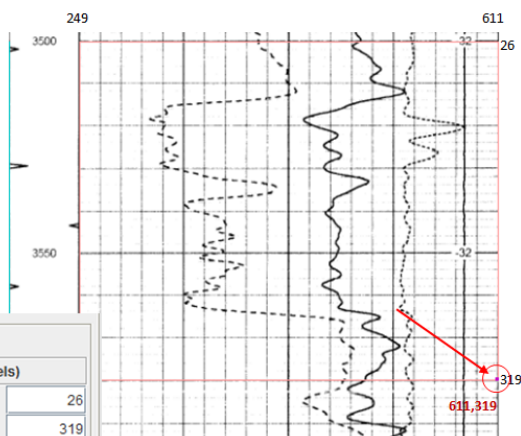
Step i: Make sure that the Radio button is selected for the Right Axis, Ending Depth. With the mouse pointed to the lower right point left click on the image and a reddish purple pixel will appear. This marks the second point of the capture area. Also notice that the pixel location will be entered in 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. Resistivity, 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	Height (d): 293.0	Width (w): 362.0

Clear



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

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. Resistivity, Porosity, etc.

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

Depth (ft) Left Axis (pixels) Right Axis (pixels)

Start: 0.0 X1: 0 Y1: 0 X1': 0 Y1': 0
 End: 0.0 X0: 0 Y0: 0 X0': 0 Y0': 0
 Total: 0.0 Height (d): 0.0 Width (w): 0.0 Clear

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add

Left: 0 Right: 0 Linear Log 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
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Modify Remove Remove All

STEP 4: Digitize Each Curve

Digitized Point Data:
 Curves Wrap Around:
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right 2

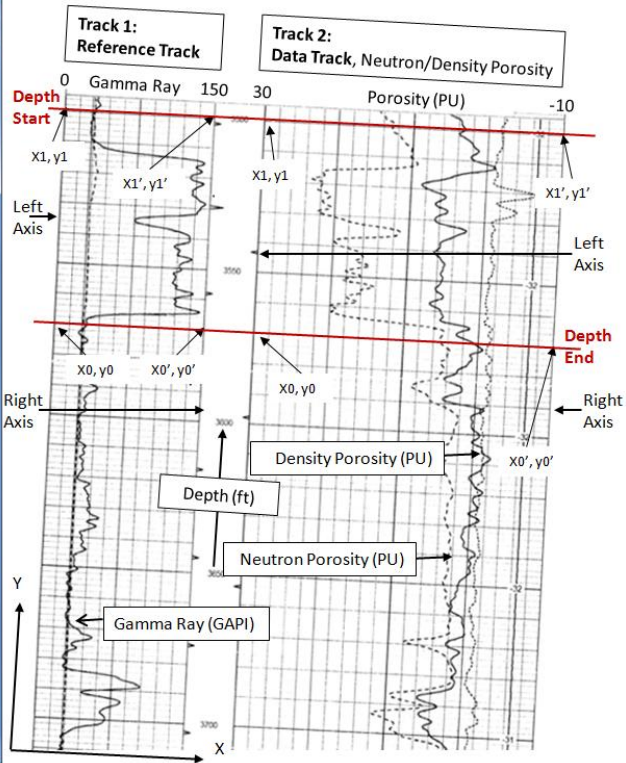
Depth: 0.0 Data: 0.0 Xp: 0 Yp: 0

Depth	Data	pixel-X	pixel-Y
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Add Remove Remove All

Digitize Every: ☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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



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. Resistivity, Porosity, etc.

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

Depth (ft) Left Axis (pixels) Right Axis (pixels)

Start: 3500.0 X1: 0 Y1: 0 X1': 0 Y1': 0
 End: 3580.0 X0: 0 Y0: 0 X0': 0 Y0': 0
 Total: 80.0 Height (d): 0.0 Width (w): 0.0 Clear

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add

Left: 0 Right: 0 Linear Log 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
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Modify Remove Remove All

STEP 4: Digitize Each Curve

Digitized Point Data:
 Curves Wrap Around:
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right 2

Depth: 0.0 Data: 0.0 Xp: 0 Yp: 0

Depth	Data	pixel-X	pixel-Y
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Add Remove Remove All

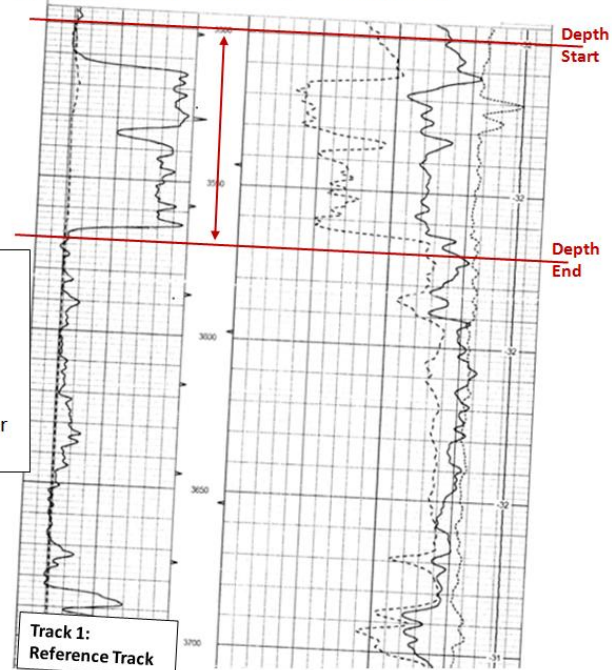
Digitize Every: ☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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

Step 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.



LAS Plot Digitizer

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. Resistivity, Porosity, etc.

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

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

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add

Left: 0 Right: 0 Linear Log 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
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Modify Remove Remove All

STEP 4: Digitize Each Curve

Digitized Point Data

Curves Wrap Around, Left Once No Wrap Right Once

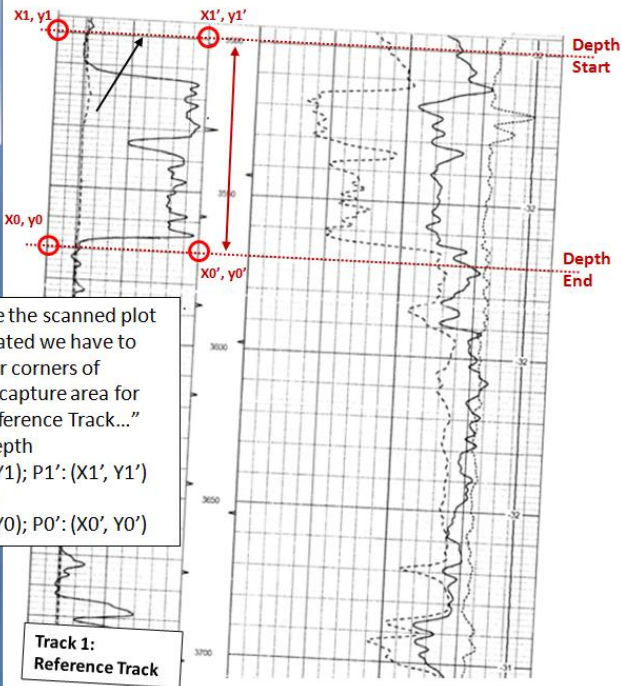
Depth: 0.0 Data: Xpc: 0.0

Depth	Data	pixel-X	pixel-Y
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Remove Remove All

Digitize Every 14 ft 12 ft 1 ft

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



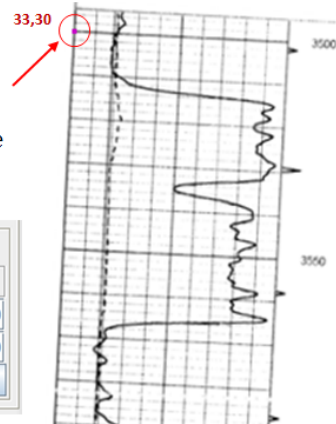
Step c: Since the scanned plot image is rotated we have to enter all four corners of rectangular capture area for "Track 1: Reference Track..."

- 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.

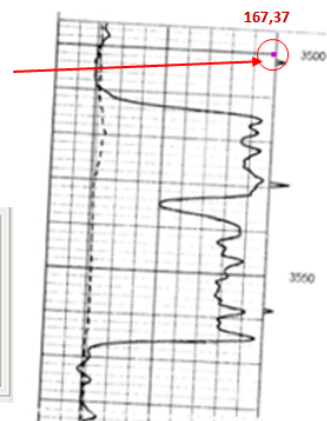
Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	X1: 33	Y1: 30	X1': 0	Y1': 0
End:	X0: 0	Y0: 0	X0': 0	Y0': 0
Total:	80.0	Height (d): 0.0	Width (w): 0.0	Clear



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.

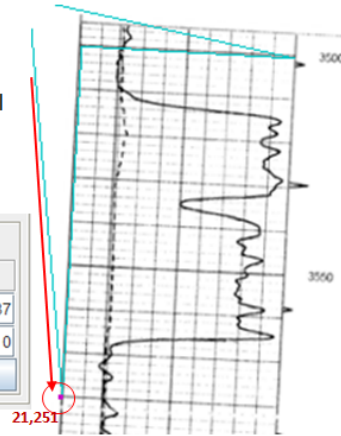
Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	X1: 33	Y1: 30	X1': 167	Y1': 37
End:	X0: 0	Y0: 0	X0': 0	Y0': 0
Total:	80.0	Height (d): 0.0	Width (w): 0.0	Clear



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.

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

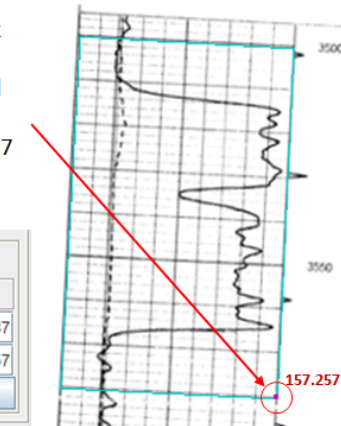
Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	3500.0	X1: 33 Y1: 30	X1': 167 Y1': 37	
End:	3580.0	X0: 21 Y0: 251	X0': 0 Y0': 0	
Total:	80.0	Height (d): 0.0	Width (w): 0.0	Clear



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.

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: 21 Y0: 251	X0': 157 Y0': 257	
Total:	80.0	Height (d): 221.0	Width (w): 134.0	Clear



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. Resistivity, Porosity, etc.

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

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

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

1 2

Units: Curve Plot Axis Limits: Grid: Add Clear

Left: 0 Right: 0 Linear Log

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						

STEP 4: Digitize Each Curve

Digitized Point Data

Curves Wrap Around: Left Once No W

Depth: 0.0 Data:

Depth: Data

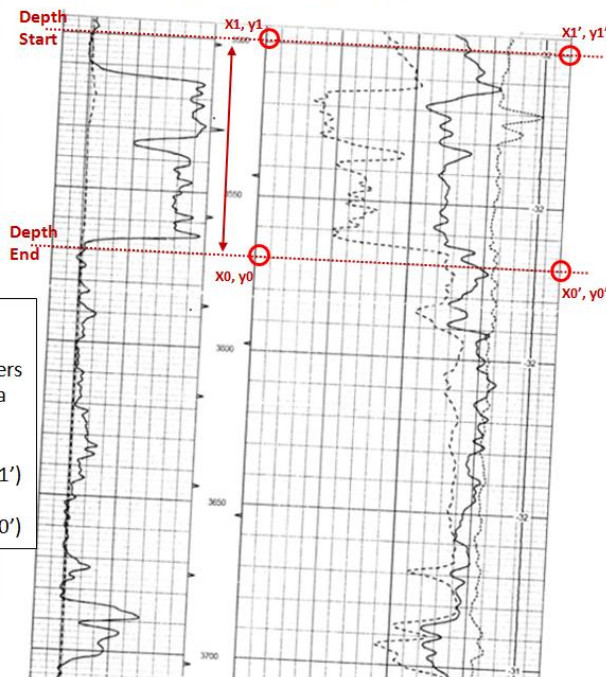
Remove All

Digitize Every 1/4 ft 1/2 ft 1 ft

Step 5: Digitize Data

Step 6: Transfer Data & Close Dialog

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.



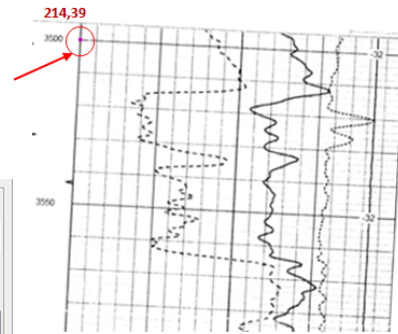
Step i: Since the scanned plot image is rotated we have to enter all four corners of rectangular capture area for "Track 2: Data Track..."

- 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.

Depth (ft)		Left Axis (pixels)		Right Axis (pixels)	
Start:	3500.0	<input checked="" type="radio"/> X1:	214	Y1:	39
End:	3580.0	<input type="radio"/> X0:	0	Y0:	0
Total:	80.0	Height (d):	0.0	Width (w):	0.0

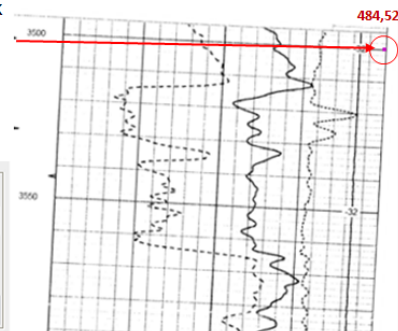
Clear



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.

Depth (ft)		Left Axis (pixels)		Right Axis (pixels)	
Start:	3500.0	<input type="radio"/> X1:	214	Y1:	39
End:	3580.0	<input type="radio"/> X0:	0	Y0:	0
Total:	80.0	Height (d):	0.0	Width (w):	0.0

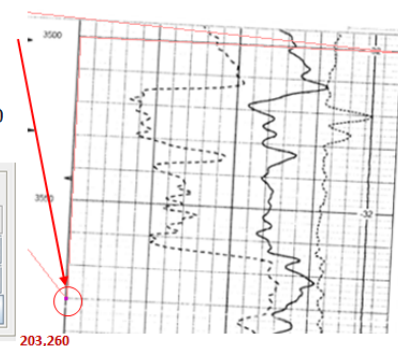
Clear



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.

Depth (ft)		Left Axis (pixels)		Right Axis (pixels)	
Start:	3500.0	<input type="radio"/> X1:	214	Y1:	39
End:	3580.0	<input checked="" type="radio"/> X0:	203	Y0:	260
Total:	80.0	Height (d):	0.0	Width (w):	0.0

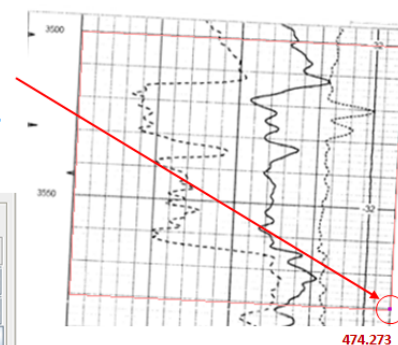
Clear



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.

Depth (ft)		Left Axis (pixels)		Right Axis (pixels)	
Start:	3500.0	<input type="radio"/> X1:	214	Y1:	39
End:	3580.0	<input type="radio"/> X0:	203	Y0:	260
Total:	80.0	Height (d):	221.0	Width (w):	270.0

Clear

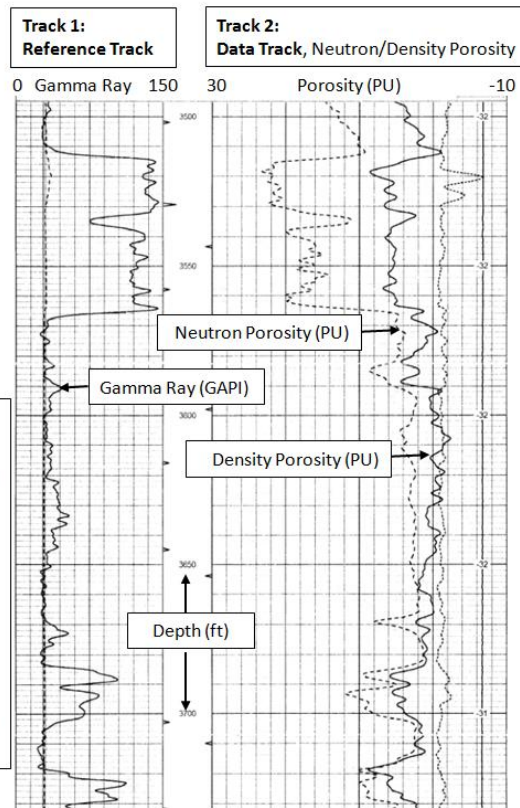


Step 3: Identify the Log Curves that will be Digitized

[illegible]

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.



Mnemonic	Description	Units	Minimum	Maximum
GR	Gamma Ray	API	0	150
CGR	Gamma Ray Minus Uranium	API	0	150
SP	Spontaneous Potential	MV	0	1
CAL	Caliper	BINS	6	12
PHI	Photoelectric factor	BARRE	0	20
RHOB	Bulk Density	GMCC	2	3
DRHO	Bulk Density Correction	GMCC	-1.5	0.5
DPHI	Density porosity	PU	-0.1	0.3
NPHI	Neutron porosity	PU	-0.1	0.3
SPHI	Sonic porosity	PU	-0.1	0.3
DT	Acoustic transit time	USEC/FT	40	140
COND	Conductivity	MMH-OH	0	2,000
CILD	Deep Induction Conductivity	MMH-OH	0	2,000
CILM	Medium Induction Conductivity	MMH-OH	0	2,000
RES	Resistivity	OHM-M	0.2	2,000
RDEP	Deep Resistivity	OHM-M	0.2	2,000
RMED	Medium Resistivity	OHM-M	0.2	2,000
RSHAL	Shallow Resistivity	OHM-M	0.2	2,000
ILD	Deep Induction Resistivity	OHM-M	0.2	2,000
ILM	Medium Induction Resistivity	OHM-M	0.2	2,000
SFLU	Spherically Focused Resistivity	OHM-M	0.2	2,000
LL	Deep Laterolog Resistivity	OHM-M	0.2	2,000
MLL	Micro Laterolog Resistivity	OHM-M	0.2	2,000
LL8	Shallow Laterolog Resistivity	OHM-M	0.2	2,000
LN	Long Normal Resistivity	OHM-M	0.2	2,000
SN	Shallow Normal Resistivity	OHM-M	0.2	2,000
MINOR	Micro Normal Resistivity	OHM-M	0.2	2,000
MSFL	Micro Spherically Focused Resistivity	OHM-M	0.2	2,000
MINV	Micro Inverse Resistivity	OHM-M	0.2	2,000
AHT10	Array Induction Resistivity-10	OHM-M	0.2	2,000
AHT20	Array Induction Resistivity-20	OHM-M	0.2	2,000
AHT30	Array Induction Resistivity-30	OHM-M	0.2	2,000
AHT60	Array Induction Resistivity-60	OHM-M	0.2	2,000
AHT90	Array Induction Resistivity-90	OHM-M	0.2	2,000
THOR	Thorium Concentration	PPM	-10	10

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 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description:

☒ 1 ☐ 2 GR Gamma Ray

Units: Curve Plot Axis Limits: Grid:

API Left: 0.0 Right: 150.0 ☒ Linear ☐ Log

(c) 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

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

Modify Remove Remove All

Stepd: To add the next curve select the “KGS” Icon button to display the KGS Standard Tools List.

Select KGS Standard Tools

Mnemonic	Description	Units	Minimum	Maximum
GR	Gamma Ray	API	0	150
CGR	Gamma Ray Minus Uranium	API	0	150
SP	Spontaneous Potential	MV	0	1
CAL	Caliper	IN	6	12
PE	Photoelectric factor	BARNS/E	0	20
RHOB	Bulk Density	GM/CC	2	3
DRHO	Bulk Density Correction	GM/CC	-1.5	0.5
DPHI	Density porosity	PU	-0.1	0.3
NPHI	Neutron porosity	PU	-0.1	0.3
SPHI	Sonic porosity	PU	-0.1	0.3
DT	Acoustic transit time	USEC/FT	40	140
COND	Conductivity	MMHO/M	0	2,000
CILD	Deep Induction Conductivity	MMHO/M	0	2,000
CILM	Medium Induction Conductivity	MMHO/M	0	2,000
RES	Resistivity	OHM-M	0.2	2,000
RDEP	Deep Resistivity	OHM-M	0.2	2,000
RMED	Medium Resistivity	OHM-M	0.2	2,000
RSHAL	Shallow Resistivity	OHM-M	0.2	2,000
ILD	Deep Induction Resistivity	OHM-M	0.2	2,000
ILM	Medium Induction Resistivity	OHM-M	0.2	2,000
SFLU	Spherically Focused Resistivity	OHM-M	0.2	2,000
LL	Deep Laterolog Resistivity	OHM-M	0.2	2,000
MLL	Micro Laterolog Resistivity	OHM-M	0.2	2,000
LLS	Shallow Laterolog Resistivity	OHM-M	0.2	2,000
LN	Long Normal Resistivity	OHM-M	0.2	2,000
SN	Shallow Normal Resistivity	OHM-M	0.2	2,000
MINOR	Micro Normal Resistivity	OHM-M	0.2	2,000
MSFL	Micro Spherically Focused Resistivity	OHM-M	0.2	2,000
MINV	Micro Inverse Resistivity	OHM-M	0.2	2,000
AHT10	Array Induction Resistivity-10	OHM-M	0.2	2,000
AHT20	Array Induction Resistivity-20	OHM-M	0.2	2,000
AHT30	Array Induction Resistivity-30	OHM-M	0.2	2,000
AHT60	Array Induction Resistivity-60	OHM-M	0.2	2,000
AHT90	Array Induction Resistivity-90	OHM-M	0.2	2,000
THOR	Thorium Concentration	PPM	-10	

(e) **Select** Cancel

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 3: Identify the Log Curves that will be Digitized

Tracks: ☐ 1 ☒ 2 Mnemonic: NPHI Description: Neutron porosity

Units: PU Curve Plot Axis Limits: Left: 30.0 Right: -10.0 Grid: ☒ Linear ☐ Log

(f) **Add** Clear

(g) 

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

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

Modify Remove Remove All

Select KGS Standard Tools

Mnemonic	Description	Units	Minimum	Maximum
GR	Gamma Ray	API	0	150
CGR	Gamma Ray Minus Uranium	API	0	150
SP	Spontaneous Potential	MV	0	1
CAL	Caliper	IN	6	12
PE	Photoelectric factor	BARNS/E	0	20
RHOB	Bulk Density	GM/CC	2	3
DRHO	Bulk Density Correction	GM/CC	-1.5	0.5
DPHI	Density porosity	PU	-0.1	0.3
NPHI	Neutron porosity	PU	-0.1	0.3
SPHI	Sonic porosity	PU	-0.1	0.3
DT	Acoustic transit time	USEC/FT	40	140
COND	Conductivity	MMHO/M	0	2,000
CILD	Deep Induction Conductivity	MMHO/M	0	2,000
CILM	Medium Induction Conductivity	MMHO/M	0	2,000
RES	Resistivity	OHM-M	0.2	2,000
RDEP	Deep Resistivity	OHM-M	0.2	2,000
RMED	Medium Resistivity	OHM-M	0.2	2,000
RSHAL	Shallow Resistivity	OHM-M	0.2	2,000
ILD	Deep Induction Resistivity	OHM-M	0.2	2,000
ILM	Medium Induction Resistivity	OHM-M	0.2	2,000
SFLU	Spherically Focused Resistivity	OHM-M	0.2	2,000
LL	Deep Laterolog Resistivity	OHM-M	0.2	2,000
MLL	Micro Laterolog Resistivity	OHM-M	0.2	2,000
LLS	Shallow Laterolog Resistivity	OHM-M	0.2	2,000
LN	Long Normal Resistivity	OHM-M	0.2	2,000
SN	Shallow Normal Resistivity	OHM-M	0.2	2,000
MINOR	Micro Normal Resistivity	OHM-M	0.2	2,000
MSFL	Micro Spherically Focused Resistivity	OHM-M	0.2	2,000
MINV	Micro Inverse Resistivity	OHM-M	0.2	2,000
AHT10	Array Induction Resistivity-10	OHM-M	0.2	2,000
AHT20	Array Induction Resistivity-20	OHM-M	0.2	2,000
AHT30	Array Induction Resistivity-30	OHM-M	0.2	2,000
AHT60	Array Induction Resistivity-60	OHM-M	0.2	2,000
AHT90	Array Induction Resistivity-90	OHM-M	0.2	2,000
THOR	Thorium Concentration	PPM	-10	

(h) **Select** Cancel

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.

STEP 3: Identify the Log Curves that will be Digitized

Tracks: ☐ 1 ☒ 2 Mnemonic: DPHI Description: Density porosity

Units: PU Curve Plot Axis Limits: Left: 30.0 Right: -10.0 Grid: ☒ Linear ☐ Log

(i) **Add** Clear

(g) 

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

Modify Remove Remove All

Step 4: Digitize Each Curve

STEP 4: Digitize Each Curve

Digitized Point Data

Curves Wrap Around,

☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: 0.0 Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y

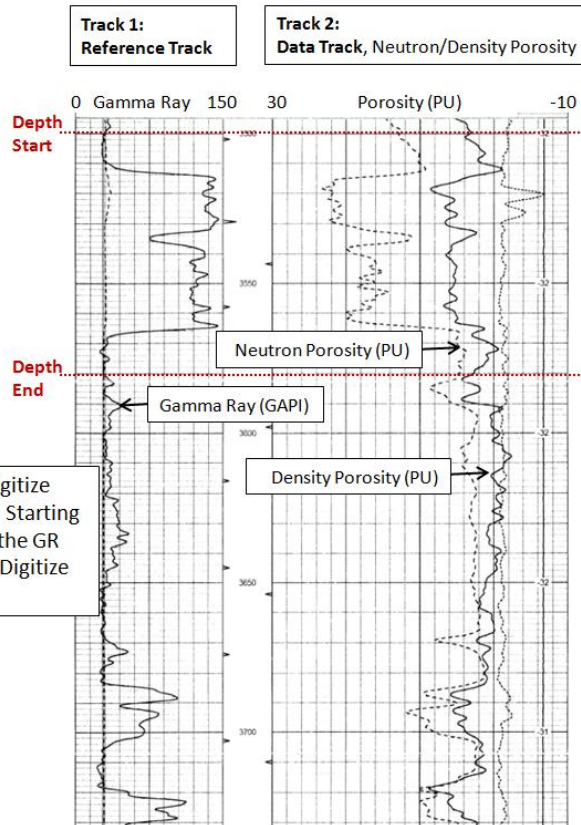
Add Remove Remove All

Digitize Every ☐ 14 ft ☒ 1/2 ft ☐ 1 ft

Step 5: Digitize Data

Step 6: Transfer Data & Close Dialog

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 4: Digitize Each Curve

☒ GR ☐ NPHI ☐ DPHI

Digitized Point Data

Curves Wrap Around,

☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: 3499.186 Data: 31.667 Xp: 46 Yp: 23

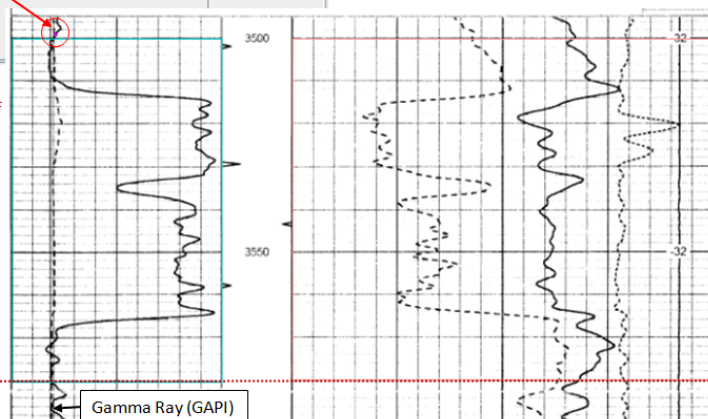
Depth	Data	pixel-X	pixel-Y

Add Remove Remove All

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.

Depth End



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.

STEP 4: Digitize Each Curve

GR
NPHI
DPHI

Digitized Point Data

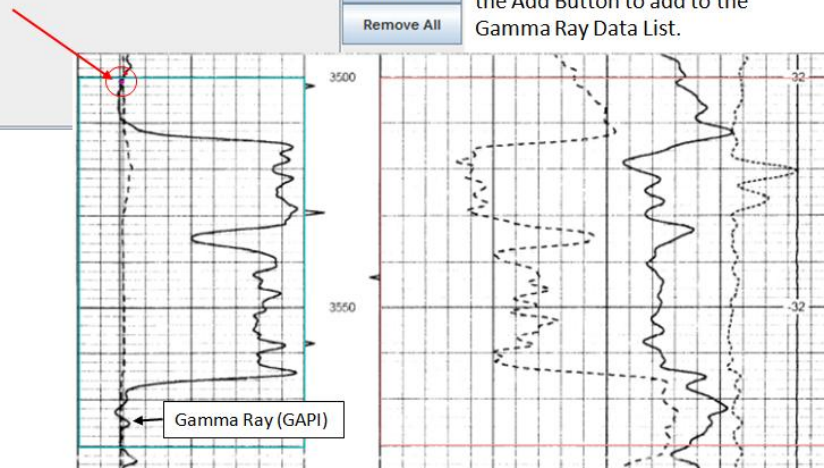
Curves Wrap Around,
☐ Left Once
☒ No Wrap
☐ Right Once
☐ Right

Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
3,499.186	31.667	46	23

Add
Remove
Remove All

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 4: Digitize Each Curve

GR
NPHI
DPHI

Digitized Point Data

Curves Wrap Around,
☐ Left Once
☒ No Wrap
☐ Right Once
☐ Right

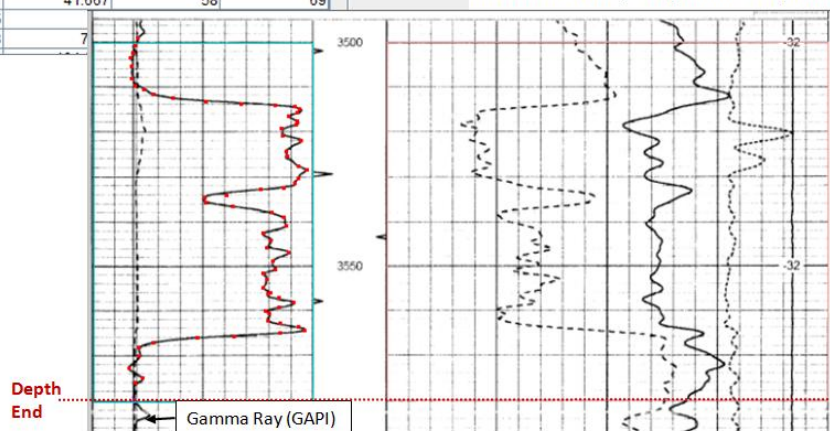
Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
3,499.186	30.833	45	23
3,500.814	29.167	43	29
3,502.441	27.5	41	35
3,503.525	25.833	39	39
3,505.424	26.667	40	46
3,508.136	26.667	40	56
3,509.763	29.167	43	62
3,510.576	35	50	65
3,511.661	41.667	58	69
3,512.475			
3,513.288			

Add
Remove
Remove All

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

LAS Plot Digitizer

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. Resistivity, Porosity, etc.

Capture Area, Track 2: Data Track, i.e. Resistivity, 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	Height (d): 293.0	Width (w): 362.0

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add

Left: 0 Right: 0 Linear Log 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

Digitized Point Data

Curves Wrap Around: Left Once No Wrap Right Once Right 2

Depth: 0.0 Data: 0.0 Xp: 0 Yp: 0.0

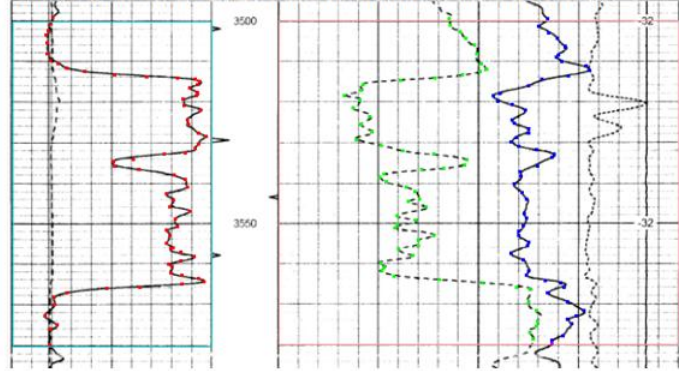
Depth	Data	pixel-X	pixel-Y
3.499.181	3.149	492	23
3.500	2.928	494	26
3.501.092	3.702	487	30
3.502.73	2.707	496	36
3.504.642	1.823	504	43
3.504.915	1.823	504	44
3.506.826	1.05	511	51
3.508.464	2.265	500	57
3.509.283	2.044	502	60
3.511.468	-0.939	529	68
3.512.287	-1.05	530	71

Remove Remove All

Digitize Every: 1/4 ft 1/2 ft 1 ft

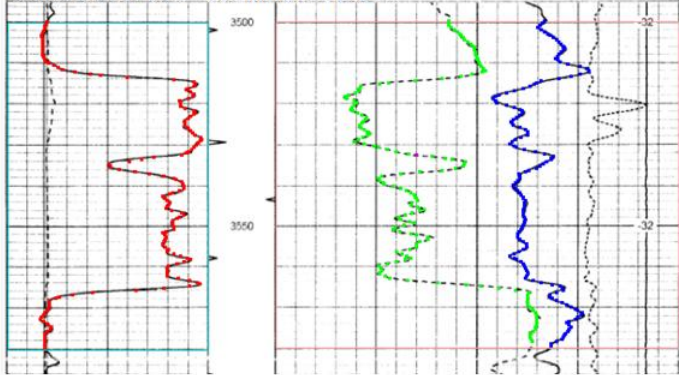
Step 5: Digitize Data Step 6: Transfer Data & Close Dialog

Step 4: Digitize Each Curve – 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.

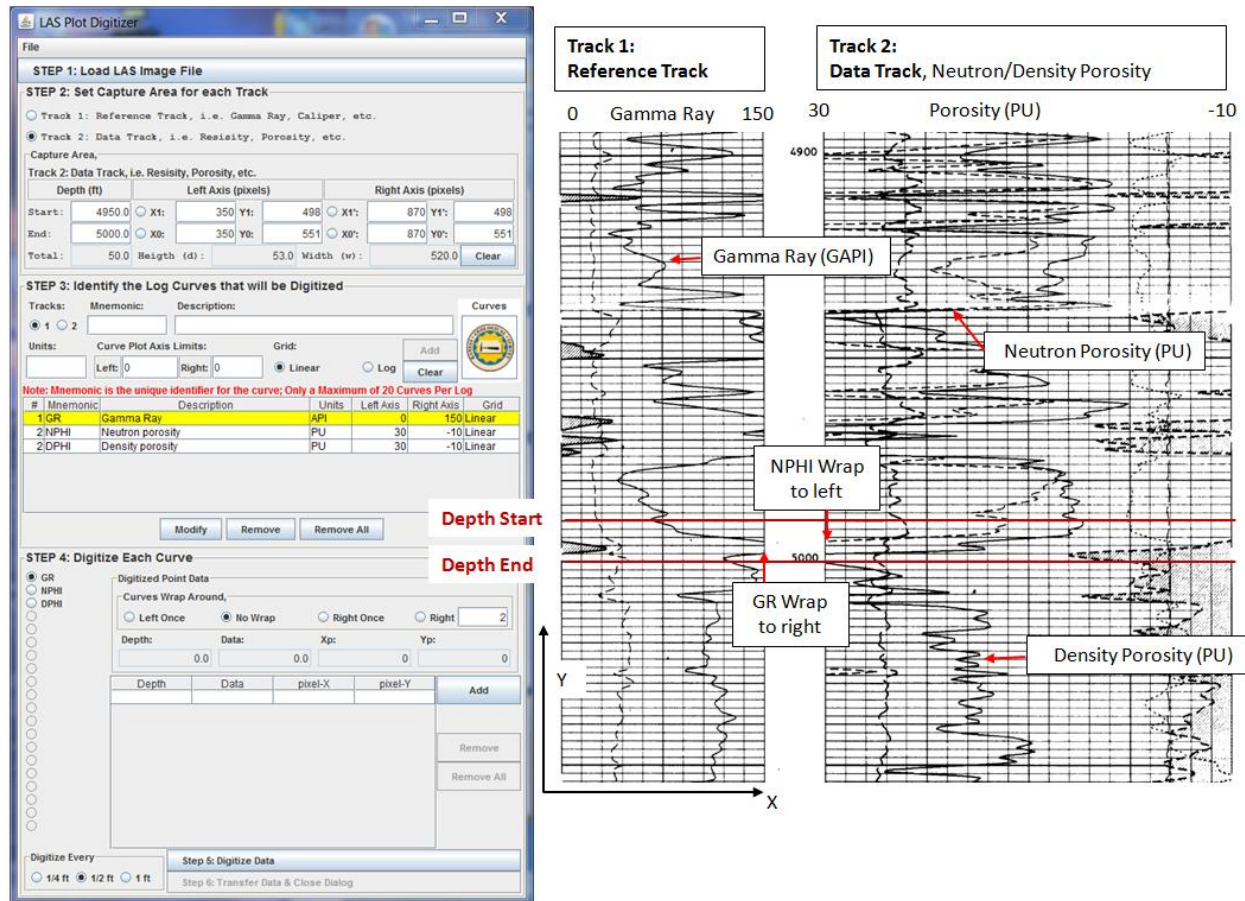
X	MNEM	Units	Data	Description
X	DEPT	F		Depth
X	GR	API		Gamma Ray
X	NPHI	PU		Neutron porosity
X	DPHI	PU		Density porosity

~Curves ~ASCII

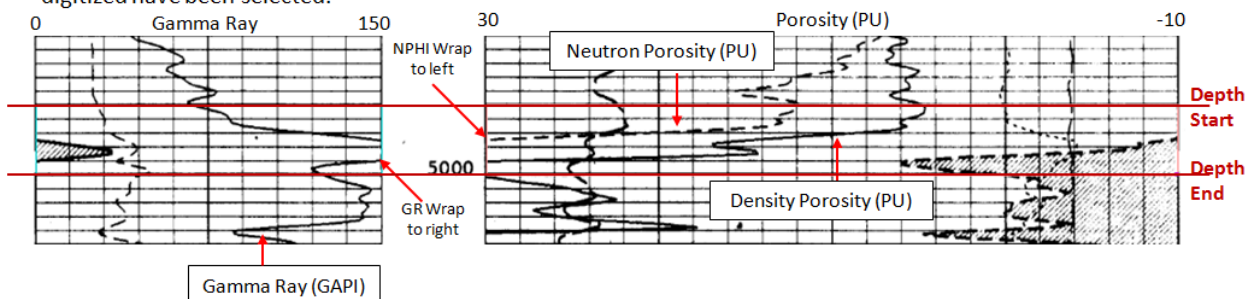
DEPT	GR	NPHI	DPHI
3.500	30	12.855	3.165
3.500.5	29.488	12.821	3.397
3.501	28.976	12.787	3.629
3.501.5	28.464	12.677	3.861
3.502	27.952	12.373	3.699
3.502.5	27.409	12.068	3.394
3.503	26.64	11.766	3.09
3.503.5	25.871	11.596	2.775
3.504	26.042	11.427	2.451
3.504.5	26.261	11.258	2.126
3.505	26.481	11.013	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 determined and the curves that will be digitized have been selected.



STEP 4: Digitize Each Curve

GR
NPHI
DPHI

Digitized Point Data

Curves Wrap Around,
☐ Left Once
☒ No Wrap
☐ Right Once
☐ Right

Depth: Data: Xp: Yp:

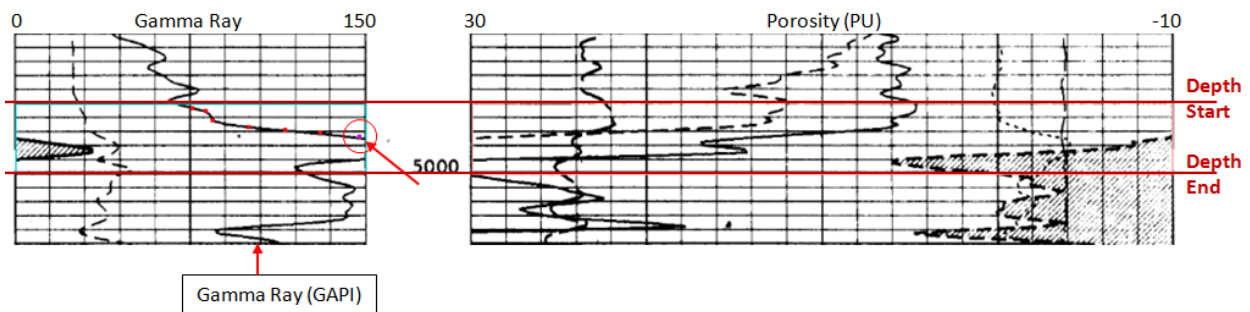
Depth	Data	pixel-X	pixel-Y
4,949.02	66.346	126	498
4,953.922	76.154	143	503
4,955.882	81.923	153	505
4,962.745	84.808	158	512
4,967.647	100.385	185	517
4,969.608	115.962	212	519
4,971.569	130.962	238	521

Add
Remove
Remove All

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 4: Digitize Each Curve

GR
NPHI
DPHI

Digitized Point Data

Curves Wrap Around,
☐ Left Once
☐ No Wrap
☒ Right Once
☐ Right

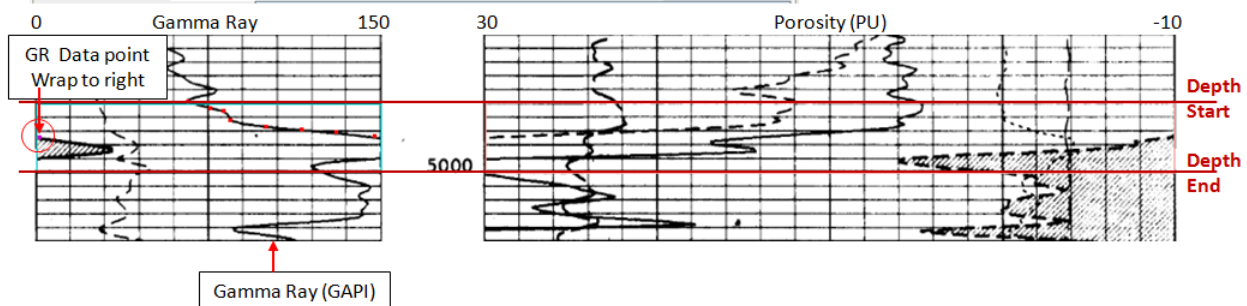
Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
4,949.02	66.346	126	498
4,953.922	76.154	143	503
4,955.882	81.923	153	505
4,962.745	84.808	158	512
4,967.647	100.385	185	517
4,969.608	115.962	212	519
4,971.569	130.962	238	521
4,974.51	147.692	267	524

Add
Remove
Remove All

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 4: Digitize Each Curve

☒ GR
☐ NPHI
☐ DPHI

Digitized Point Data

Curves Wrap Around,
☐ Left Once ☐ No Wrap ☒ Right Once ☐ Right

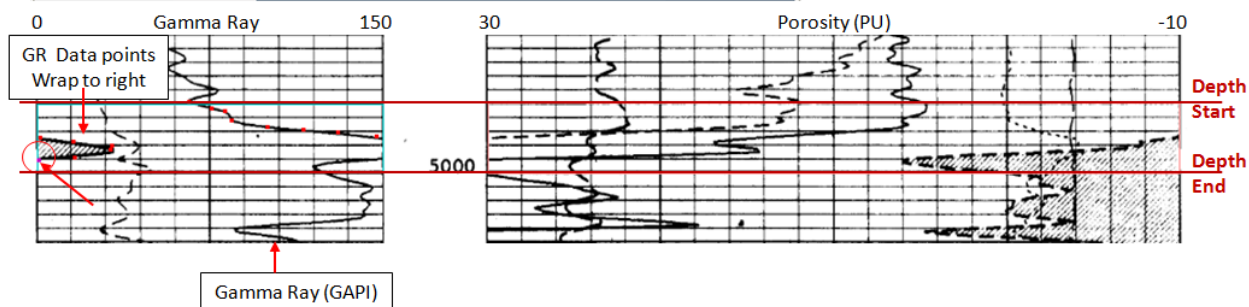
Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
4,955.882	81.923	153	505
4,962.745	84.808	158	512
4,967.647	100.385	185	517
4,969.608	115.962	212	519
4,971.569	130.962	238	521
4,974.51	147.692	267	524
4,975.49	151.731	14	525
4,978.431	166.154	39	528
4,981.373	182.885	68	531
4,984.314	182.308	67	534
4,990.196	166.731	40	540

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 4: Digitize Each Curve

☒ GR
☐ NPHI
☐ DPHI

Digitized Point Data

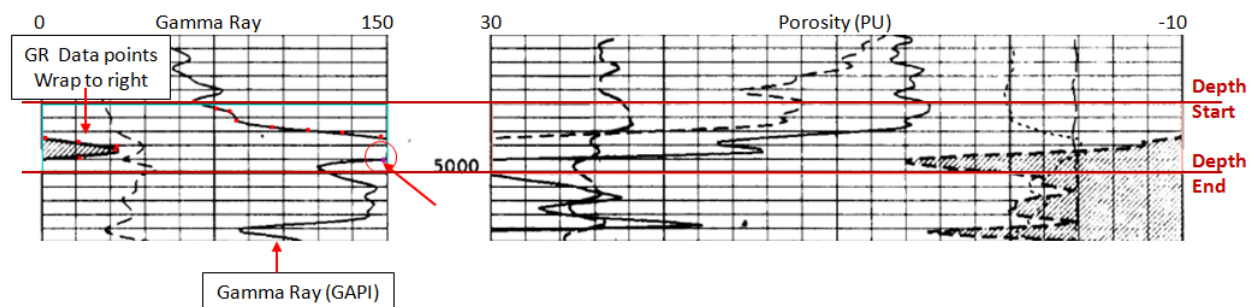
Curves Wrap Around,
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
4,955.882	81.923	153	505
4,962.745	84.808	158	512
4,967.647	100.385	185	517
4,969.608	115.962	212	519
4,971.569	130.962	238	521
4,974.51	147.692	267	524
4,975.49	151.731	14	525
4,978.431	166.154	39	528
4,981.373	182.885	68	531
4,984.314	182.308	67	534
4,990.196	166.731	40	540

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 4: Digitize Each Curve

GR
☒ NPHI
 DPHI

Digitized Point Data

Curves Wrap Around,
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: 4974.528 Data: 29.692 Xp: 354 Yp: 524

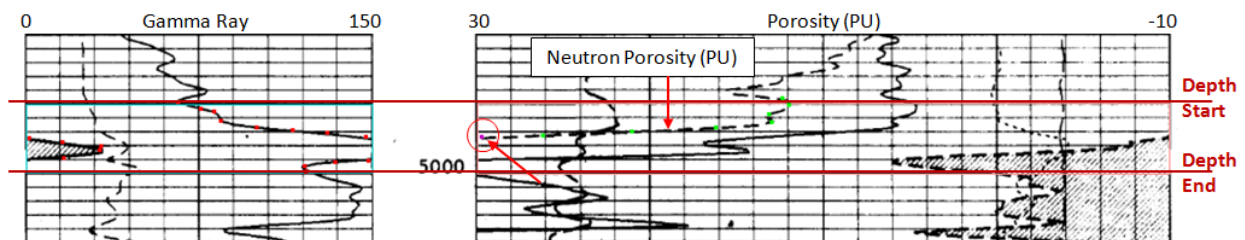
Depth	Data	pixel-X	pixel-Y
4,947.17	12.308	580	495
4,951.887	11.923	585	500
4,958.491	13.077	570	507
4,964.151	12.923	572	513
4,967.925	16.154	530	517
4,970.755	21	467	520
4,973.585	26.154	400	523

Add Remove Remove All

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 4: Digitize Each Curve

GR
☒ NPHI
 DPHI

Digitized Point Data

Curves Wrap Around,
☒ Left Once ☐ No Wrap ☐ Right Once ☐ Right

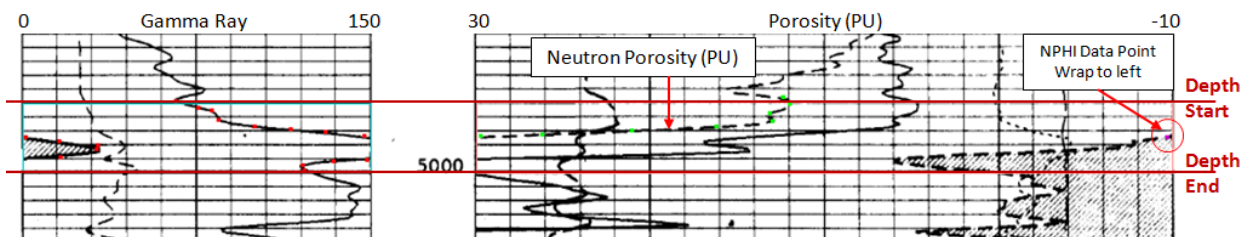
Depth: 4975.472 Data: 30.231 Xp: 867 Yp: 525

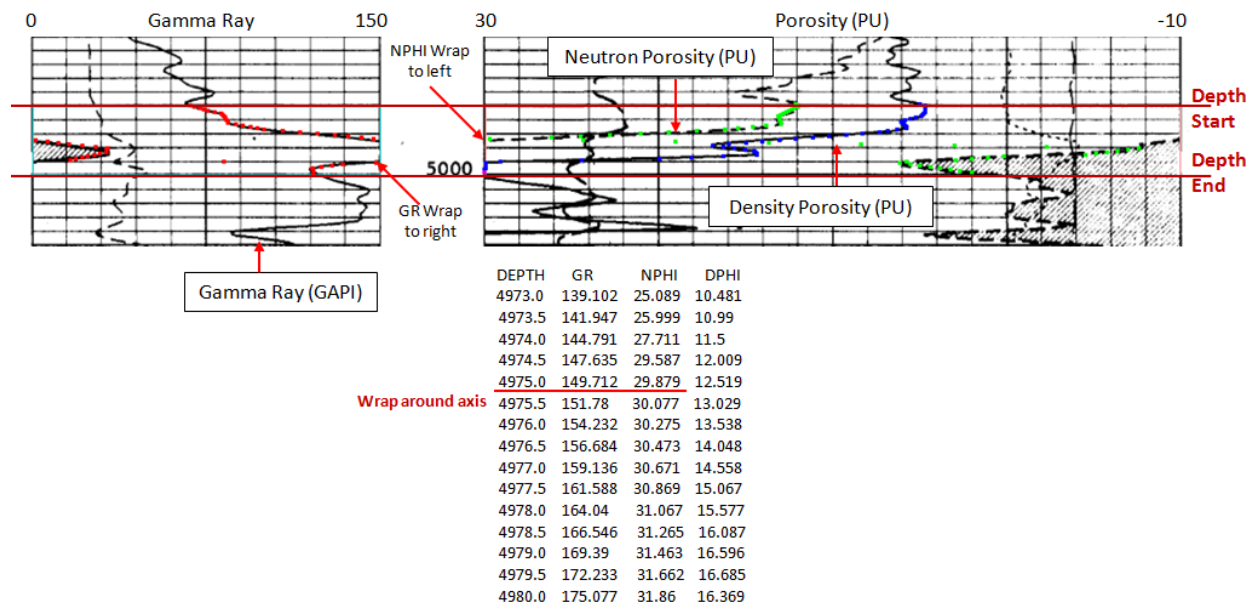
Depth	Data	pixel-X	pixel-Y
4,947.17	12.308	580	495
4,951.887	11.923	585	500
4,958.491	13.077	570	507
4,964.151	12.923	572	513
4,967.925	16.154	530	517
4,970.755	21	467	520
4,973.585	26.154	400	523
4,974.528	29.692	354	524
4,975.472	30.231	867	525

Add Remove Remove All

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.





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
sec. 17 13E 5S
Total Depth (TD): 3837.0
Elev (GL): 1294.0
Elev (KB): 1303.0

15-131-20205

Header Information:

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

15-131-20205

~Well ~Parameters Shamar-1.las 1

~Well ~Parameters Shamar-1.las 1

MNEM Units Data Description

MNEM Units Data Description

STRT F 3500 Required Start Depth

EGL F 1294.0 Necessary Ground Level Elevation

STOP F 3581.0 Required Stop Depth

EKB F 1303.0 or Necessary Kelly Bushing Elevation

STEP F 0.5 Required Step

EDF F Derrick Floor Elevation

NULL -999.25 Required Null Value

ERT F Rotary Table Elevation

COMP Noble Petroleum, Inc Company

TDL F 3837.0 Necessary Total Depth Logger

WELL Shamar 1 Required Well

TDD F 3832.0 Total Depth Driller

FLD WILDCAT Field

CSGL F Casing Bottom Logger

SEC 17 Section

CSGD F Casing Bottom Driller

TOWN 5S Township (e.g. 42S)

CSGS IN Casing Size

RANG 13E Range (e.g. 25E)

CSGW LB Casing Weight

LOC 5S-13E-17 Required Location (Sec Town Range)

BS IN 7.875 Bit Size

LOC1 1515' FSL & 1195' FEL Location 1 (quarter calls)

DFT Chemical Mud type

LOC2 SWNESE Location 2 (footages)

MSS Mud Sample Source

PROV Province

DFD gm/cc 9.0 Mud Density

CTRY US Required Country

DFV s/qt Mud Viscosity (Funnel)

STAT Kansas Required State

DFL cc Fluid Loss

CNTY NEMAHA Required County

PH PH

API 15-131-20205 Required or Required API-Number

RM OHM-M Resistivity of Mud

UWI Unique Well ID

MST DEG-F Temperature of Mud

SRVC Log Tech Service Company

RMF OHM-M Resistivity of Mud Filtrate

LIC Licence Number

MFT DEG-F Temperature of Mud Filtrate

DATE 02/06/2012 Date preferred format is MM/DD/YYYY

RMC OHM-M Resistivity of Mud Cake

LATI DEG 39.6137073 Latitude

MCST DEG-F Temperature of Mud Cake

LONG DEG -95.980802 Longitude

BHT DEG-F 116.0 Maximum Recorded Temperature

GDAT NAD27 Geodetic Datum

RMB OHM-M Resistivity @ BHT

X 244102.82 X or East-West coordinate

TIMC DATE Date/Time Circulation Stopped

Y 4388921.03 Y or North South coordinate

TIML DATE Date/Time Logger Tagged Bottom

HZCS UTM Horizontal Co-ordinate System

UNIT 10 Logging Unit Number


UTM 15.0 UTM Location

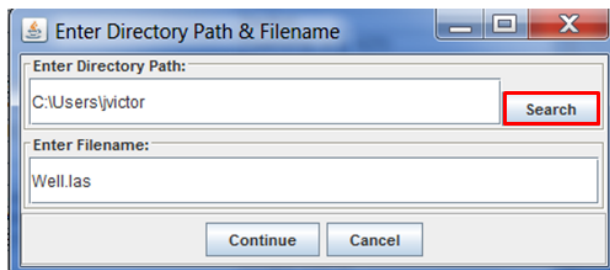
BASE Hays, Kansas Home Base of Logging Unit

STUS D&A Well Status

ENG Jason Wellbrock Recording Engineer

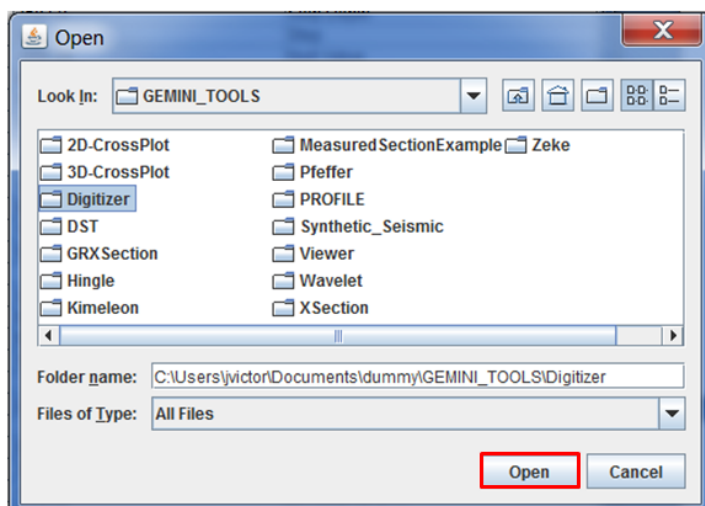
WIT Doug Davis Witnessed By

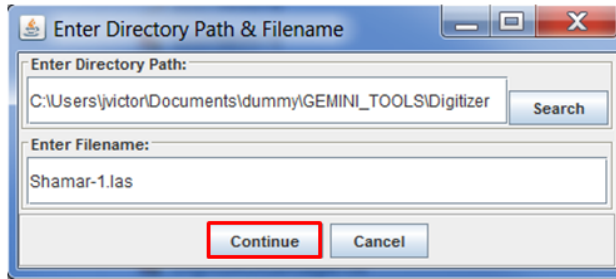
Select the Floppy Disk Image  to Open the “LAS File Data Types” Dialog. This dialog allows the user to make changes or additions to the data before it is saved to a Log ASCII Standard (LAS) version 3.0 File.



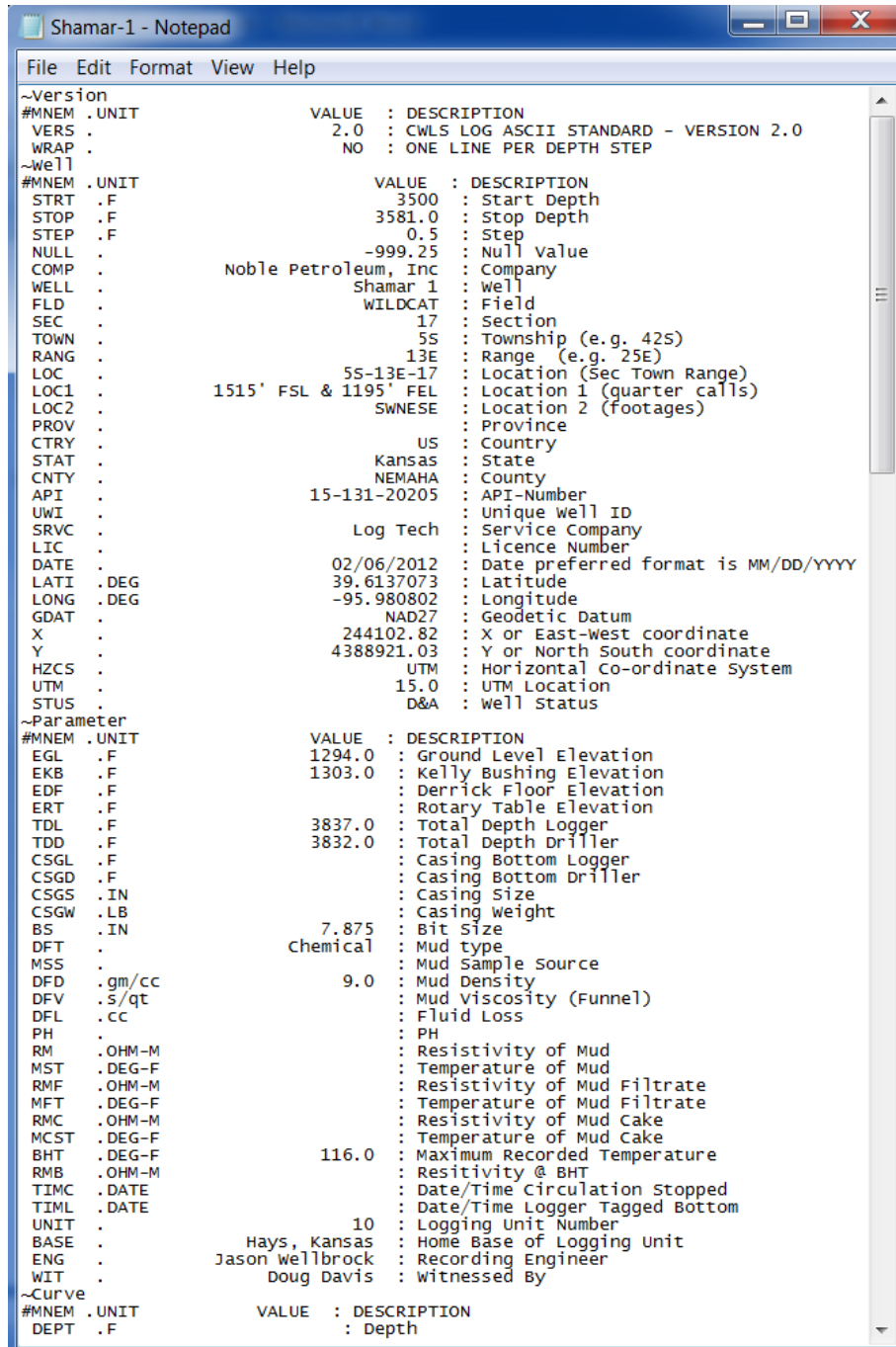
The default directory is your Home Directory. The user can search their PC for the desired directory path by selecting the “Search” button. This will display the “Open” dialog.

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.



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>

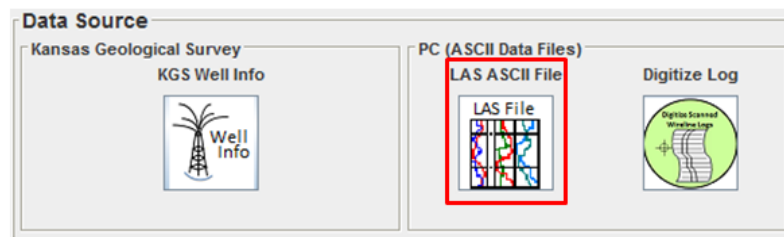
Download the following Portable Network Graphics (PNG) image files.

Shamar -1: Dual Compensated Porosity Electric Well Log Segment:

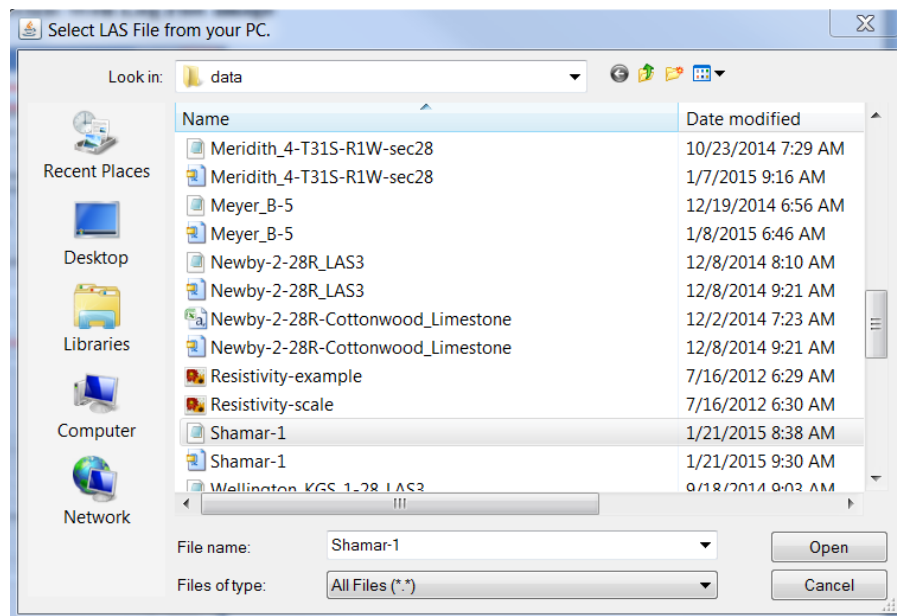
<http://www.kgs.ku.edu/Gemini/Tools/documentation/Litho-Density-example.png>

Electric Well Log Scale:

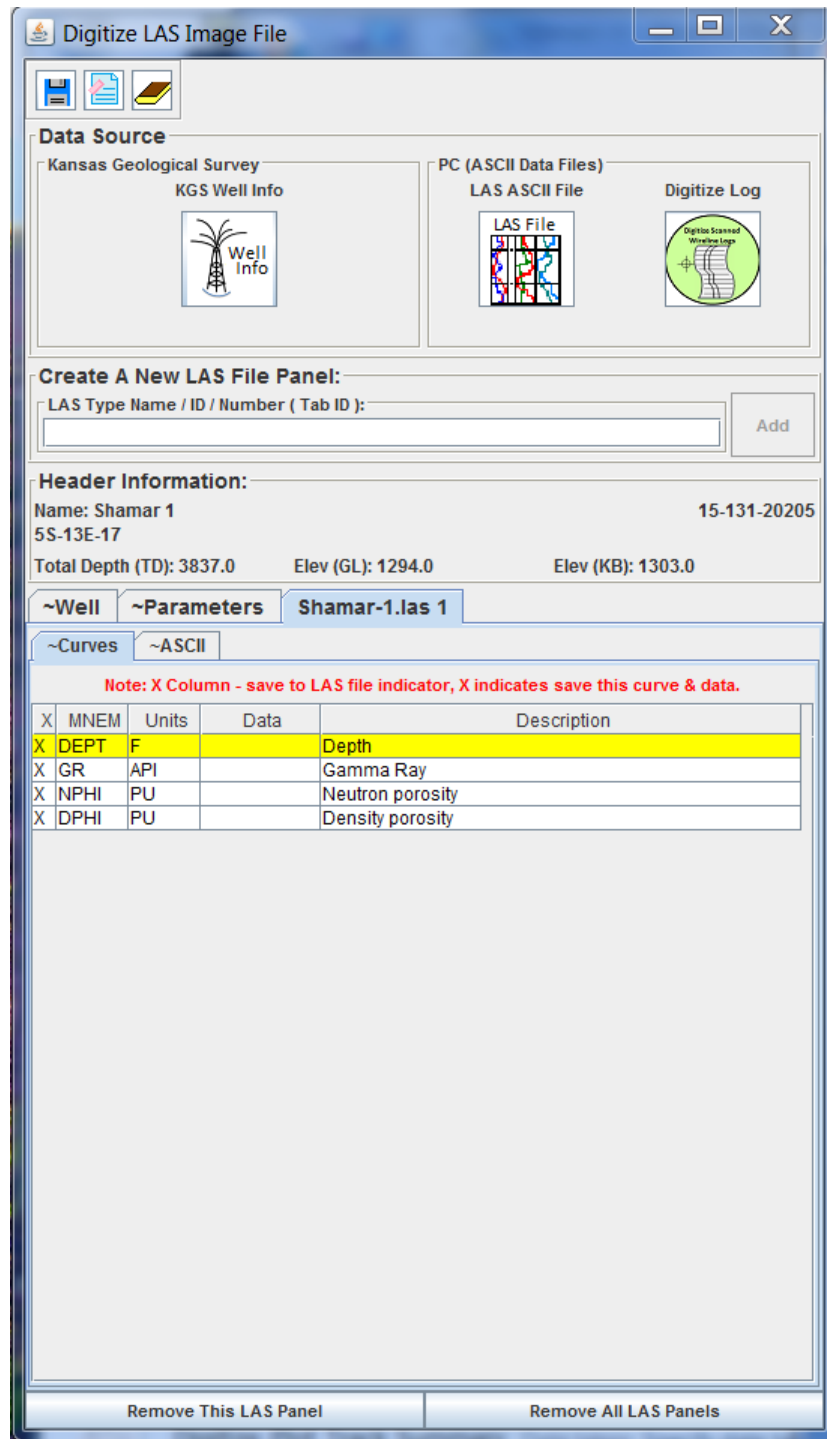
<http://www.kgs.ku.edu/Gemini/Tools/documentation/Litho-Density-scales-example.png>



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

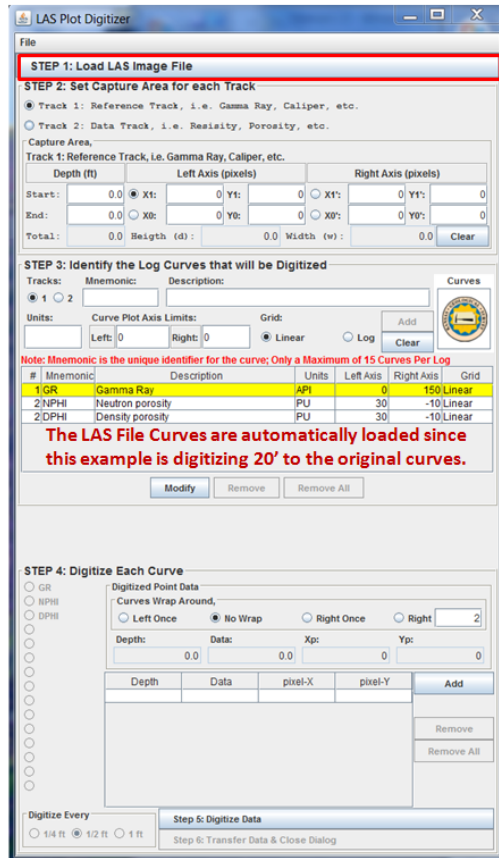


Select the “Open” button to open and parse the contents of the LAS file into the Digitizer web app. Notice that the “Shamar-1.las 1” tab is automatically added and the “Digitize Log” icon button enabled.

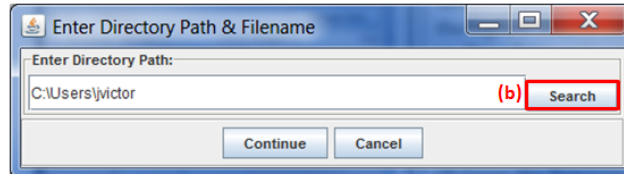


This icon button is only enabled when the Data tab is selected, because it will take the contents of the “Curves” tab panel in the data tab panel and transfer it to the Digitizer Control dialog. Click the “Digitizer Log” icon button to display the “LAS Plot Digitizer” dialog.

Step 1: Loading Electric Well Log Plot Image

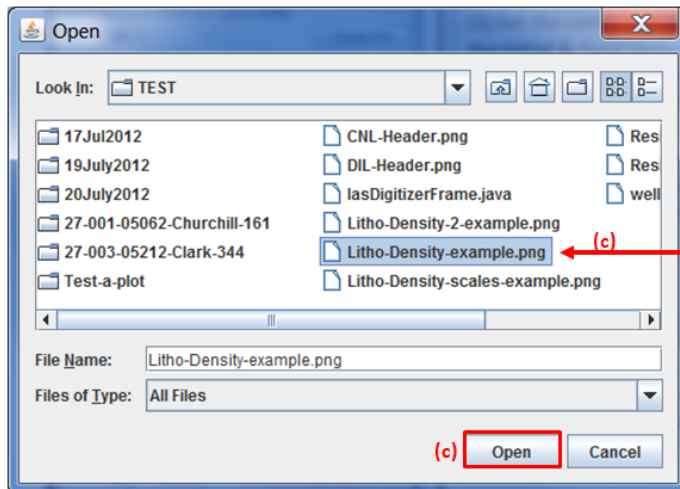


(a) **Step a:** Select the “STEP 1: Load LAS Image File” Button to display the “Enter Directory Path & Filename” Dialog.



Step b: Select the Search Button to search your PC for the correct Electric Well Log Image Plot.

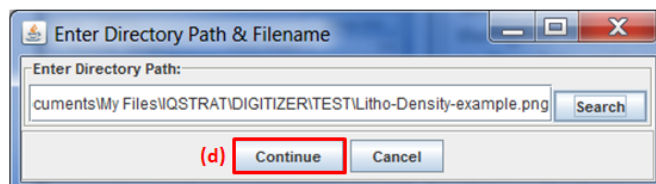
NOTE: The starting directory is your home directory.



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

LAS Plot Digitizer

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. Resistivity, 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: 0 Y1: 0	X1: 0 Y1: 0	
End:	3600.0	X0: 0 Y0: 0	X0: 0 Y0: 0	
Total:	20.0	Height (d): 0.0	Width (w): 0.0	Clear

STEP 3: Identify the Log Curves that will be Digitized

Tracks: Mnemonic: Description: Units Left Axis Right Axis Grid

#	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

Note: Mnemonic is the unique identifier for the curve; Only a Maximum of 15 Curves Per Log

The LAS File Curves are automatically loaded since this example is digitizing 20' to the original curves.

Buttons: Modify Remove Remove All

STEP 4: Digitize Each Curve

☐ GR
☐ NPHI
☐ DPHI

Digitized Point Data
☐ Curves Wrap Around
☐ Left Once ☒ No Wrap

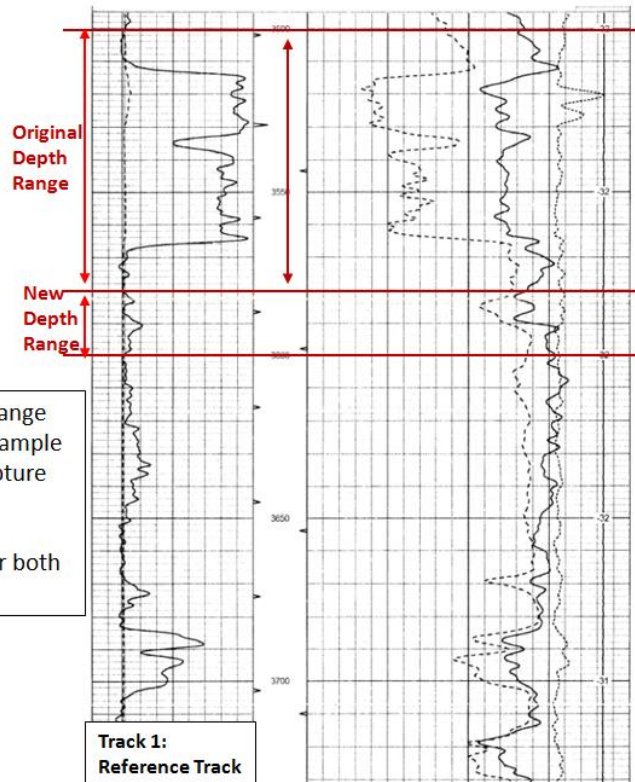
Depth: 0.0 Data: 0.0

Buttons: Remove Remove All

Digitize Every
☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

Buttons: Step 5: Digitize Data Step 6: Transfer Data & Close Dialog

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.

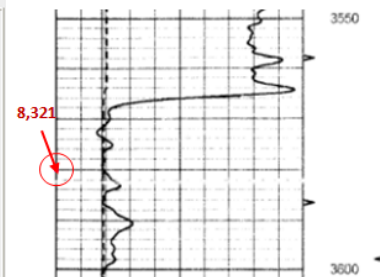
Step c: Make sure that the Radio button is selected for the Left Axis, Starting Depth. With the mouse pointed to the upper left point left click on the image and a reddish purple pixel will appear. This marks the first point of the capture area. Also notice that the pixel location will be entered in 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 2: Set Capture Area for each Track

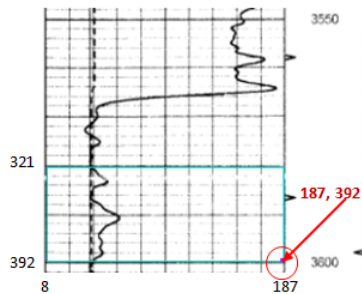
☒ Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.
☐ Track 2: Data Track, i.e. Resistivity, Porosity, etc.

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: 0 Y1: 0	
End:	3600.0	X0: 0 Y0: 0	X0: 0 Y0: 0	
Total:	20.0	Height (d): 0.0	Width (w): 0.0	Clear



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.



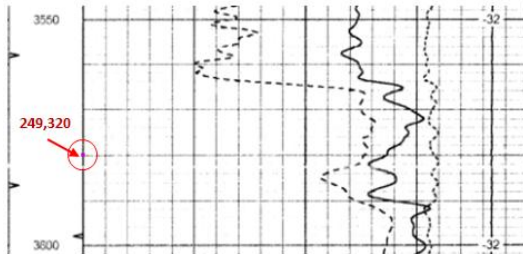
STEP 2: Set Capture Area for each Track

☒ 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	Height (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

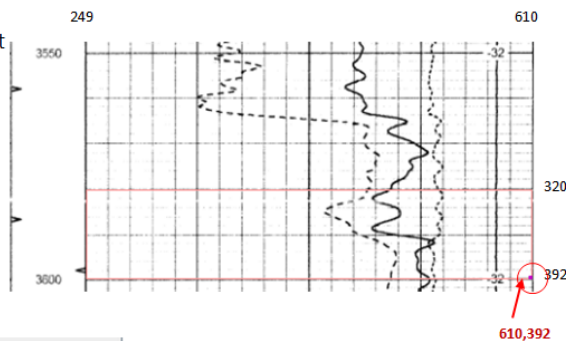
☐ Track 1: Reference Track, i.e. Gamma Ray, Caliper, etc.

☒ 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	Height (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	Height (d): 72.0	Width (w): 361.0	Clear

Step 4: Digitize Each Curve

STEP 4: Digitize Each Curve

☒ GR ☐ NPHI ☐ DPHI

Digitized Point Data

Curves Wrap Around, ☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: Data: Xp: Yp:

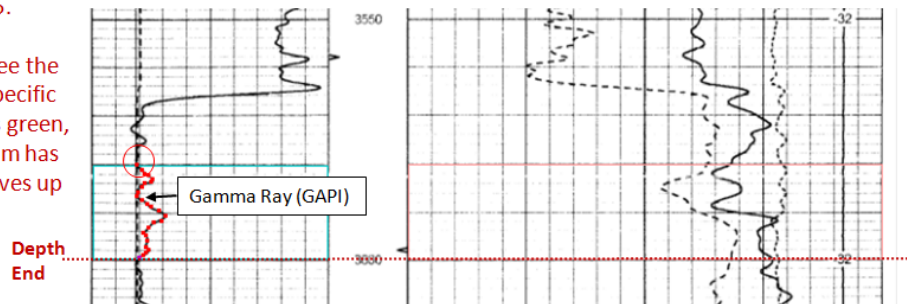
Depth	Data	pixel-X	pixel-Y
3.580	28.492	42	321
3.581.127	31.844	46	325
3.581.972	33.52	48	328
3.582.254	36.034	51	329
3.583.099	38.547	54	332
3.583.662	37.709	53	334
3.583.944	33.52	48	335
3.584.789	31.844	46	338
3.585.915	29.33	43	342

Digitize Every ☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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

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.



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.

STEP 4: Digitize Each Curve

☐ GR
☒ **NPHI** ←
☐ DPHI

Digitized Point Data

Curves Wrap Around,
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
3,580	4.696	478	320
3,581.944	5.249	473	327
3,582.778	6.243	464	330
3,583.333	7.348	454	332
3,584.444	8.343	445	336
3,585	8.453	444	338
3,586.389	7.901	449	343
3,587.222	6.906	458	346
3,588.611	6.243	464	351

Digitize Every
☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

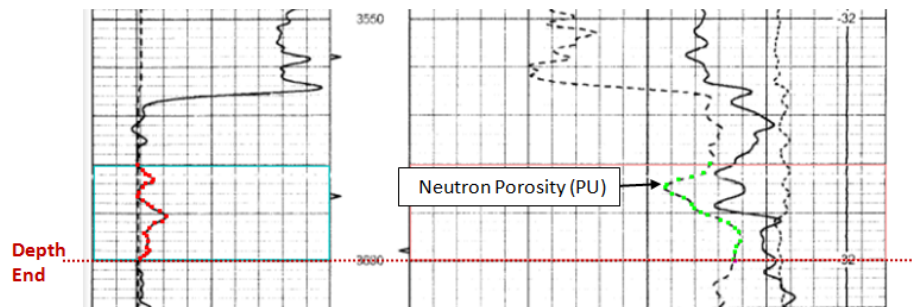
Step 5: Digitize Data
 Step 6: Transfer Data & Close Dialog

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.



STEP 4: Digitize Each Curve

☐ GR
☐ NPHI
☒ **DPHI** ←

Digitized Point Data

Curves Wrap Around,
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
3,580	2.707	496	320
3,581.111	3.591	488	324
3,581.944	4.144	483	327
3,582.5	4.033	484	329
3,583.333	3.481	489	332
3,583.611	2.597	497	333
3,584.444	1.934	503	336
3,585.556	1.823	504	340
3,586.389	2.155	501	343

Digitize Every
☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

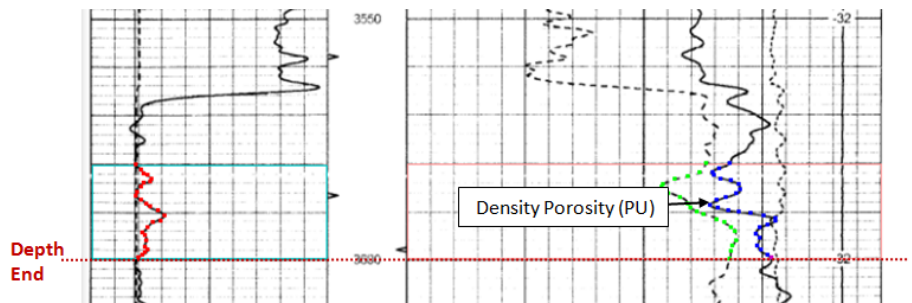
Step 5: Digitize Data
 Step 6: Transfer Data & Close Dialog

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.

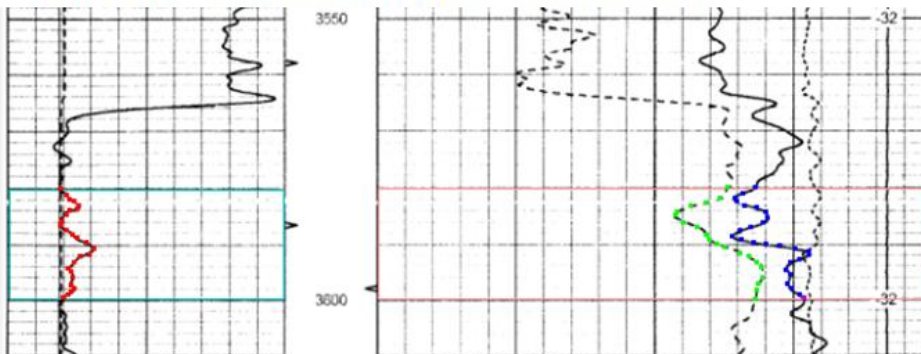
Notice the blue color points on the Density Porosity curve, these are the digitize points selected to represent the Density Porosity curve response within the Track 2 capture area.

NOTE: Do NOT go beyond the Depth End.



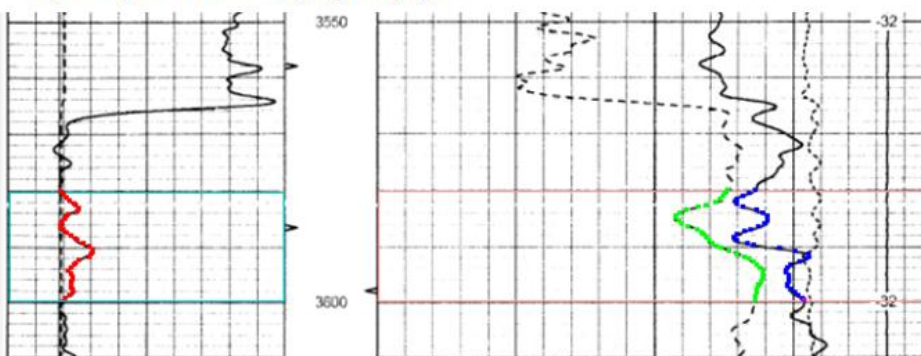
Step 5: Digitize Data & Step 6: Transfer Data & Close

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
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
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
3574.5	32.7	4.035	0.853
3575	33.462	4.078	0.649
3575.5	31.158	4.129	0.726
3576	29.152	4.288	0.873
3576.5	29.042	4.491	1.021
3577	28.932	4.694	1.169
3577.5	28.823	4.762	1.316
3578	28.713	4.66	1.464
3578.5	28.603	4.559	1.903
3579	28.493	-999.25	2.41
3579.5	28.383	-999.25	2.597
3580	28.492	4.696	2.707
3580.5	29.979	4.838	3.105
3581	31.466	4.98	3.503
3581.5	32.584	5.123	3.849
3582	33.77	5.316	4.133
3582.5	36.766	5.912	4.033
3583	38.253	6.685	3.702
3583.5	37.95	7.498	2.95
3584	33.409	7.945	2.287
3584.5	32.417	8.354	1.928
3585	31.373	8.453	1.878
3585.5	30.257	8.254	1.829
3586	29.246	8.056	2
3586.5	28.751	7.768	2.273
3587	29.44	7.171	2.803
3587.5	31.424	6.773	3.426
3588	33.407	6.535	3.923
3588.5	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 115-131-20205

5S-13E-17

Total Depth (TD): 3837.0Elev (GL): 1294.0Elev (KB): 1303.0

~Well~ParametersShamar-1.las 1

MNEM	Units	Data	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

Header Information:

Name: Shamar 115-131-20205

5S-13E-17


Total Depth (TD): 3837.0Elev (GL): 1294.0Elev (KB): 1303.0

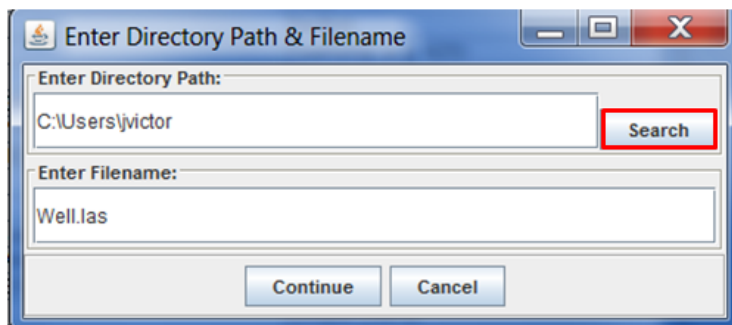
~Well~ParametersShamar-1.las 1

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		Resistivity @ 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

NOTE: The STOP Depth has been changed to 3600.0

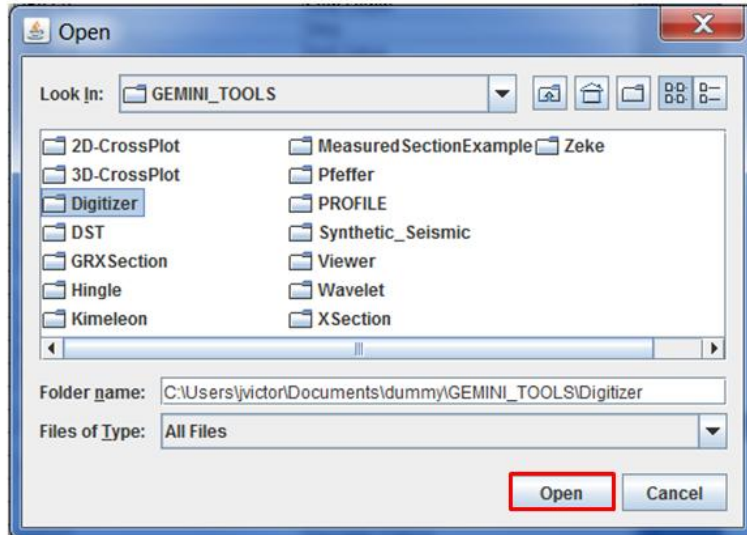
NOTE: The STOP Depth has been changed to 3600.0.

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 .         55     : Township (e.g. 42S)
RANG .         13E    : Range (e.g. 25E)
LOC .          55-13E-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 .           : 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
TMC .DATE       : Date/Time Circulation Stopped
TML .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>

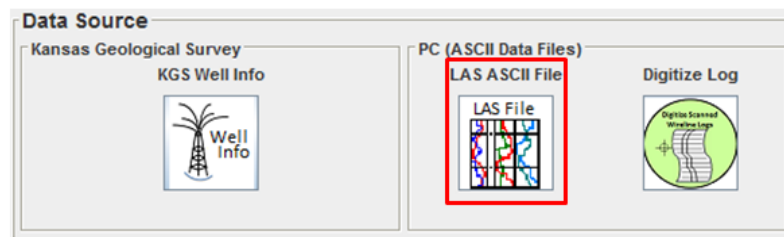
Download the following Portable Network Graphics (PNG) image files.

Shamar -1: Dual Induction Electric Well Log Segment:

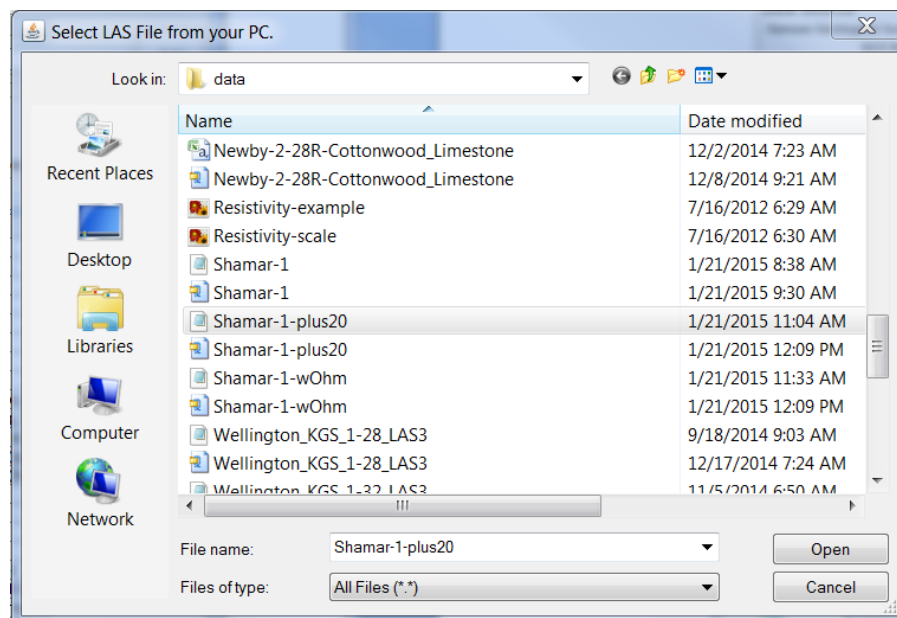
<http://www.kgs.ku.edu/Gemini/Tools/documentation/Resistivity-example.png>

Electric Well Log Scale:

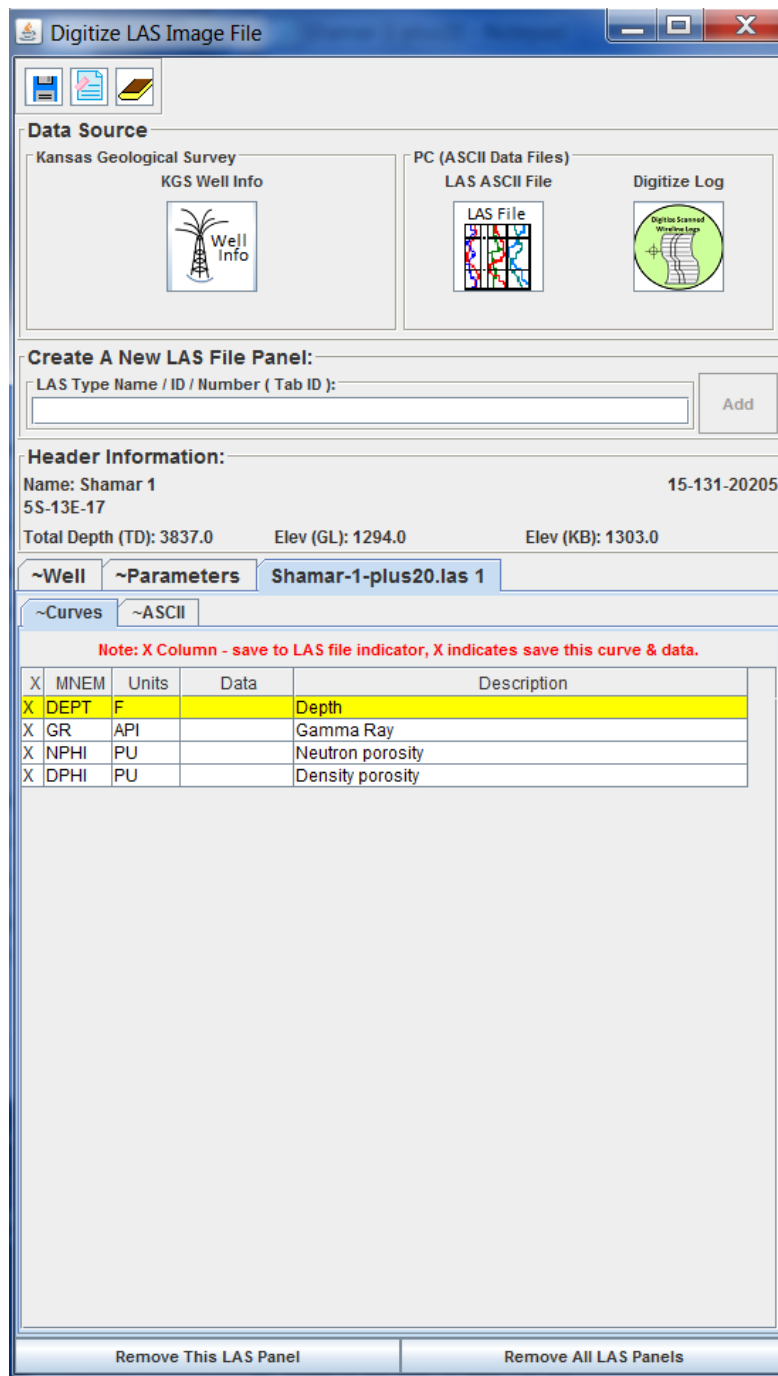
<http://www.kgs.ku.edu/Gemini/Tools/documentation/Resistivity-scale.png>



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 then 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.

Create A New LAS File Panel:

LAS Type Name / ID / Number (Tab ID):

Data 2

Add

Header Information:

Name: Shamar 1 15-131-20205
5S-13E-17

Total Depth (TD): 3837.0 Elev (GL): 1294.0 Elev (KB): 1303.0

Select the “Add” button.

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-plus20.las 1 Data 2

~Curves

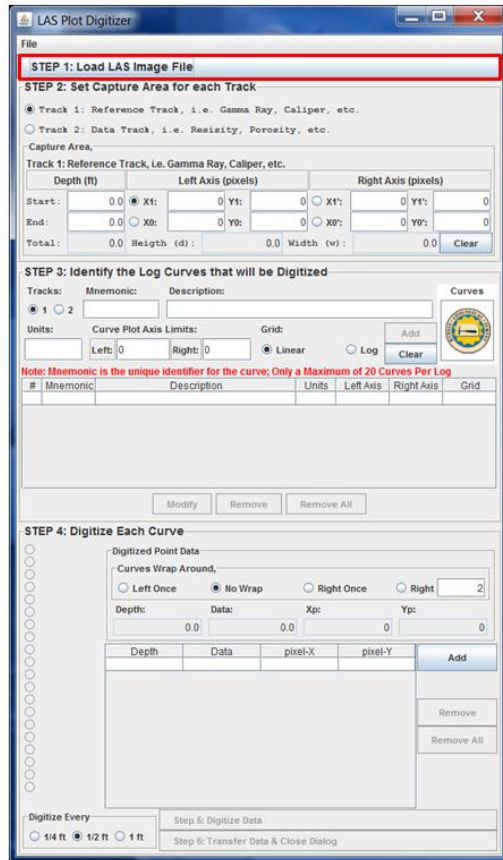
Note: X Column - save to LAS file indicator, X indicates save this curve & data.

X	MNEM	Units	Data	Description
X	DEPT	F		Depth

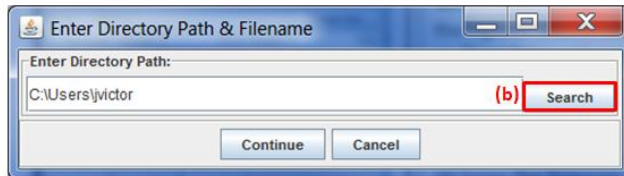
Notice that the “Data 2” tab is next to the “Shamar-1-plus20.las” Tab, with only the “Curves” tab present. This is just a place holding for the expected data that will be digitized from an Electric Well Log Image file.

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

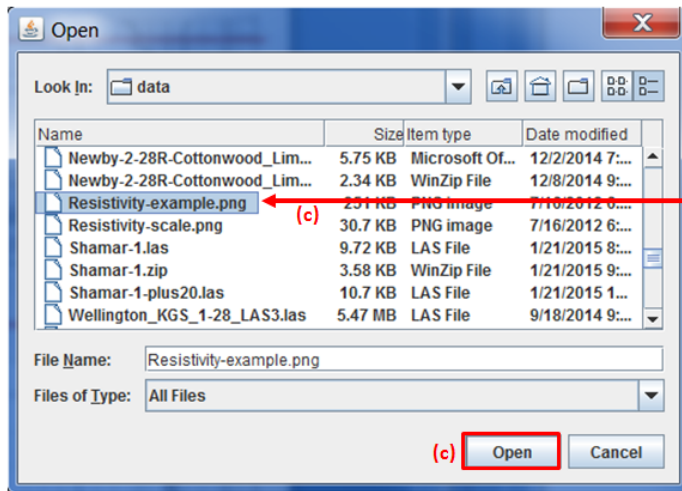
Step 1: Loading Electric Well Log Plot Image



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



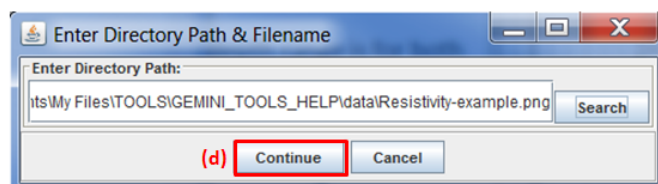
Step b: Select the Search Button to search your PC for the correct Electric Well Log Image Plot.
NOTE: The starting directory is your home directory.



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.

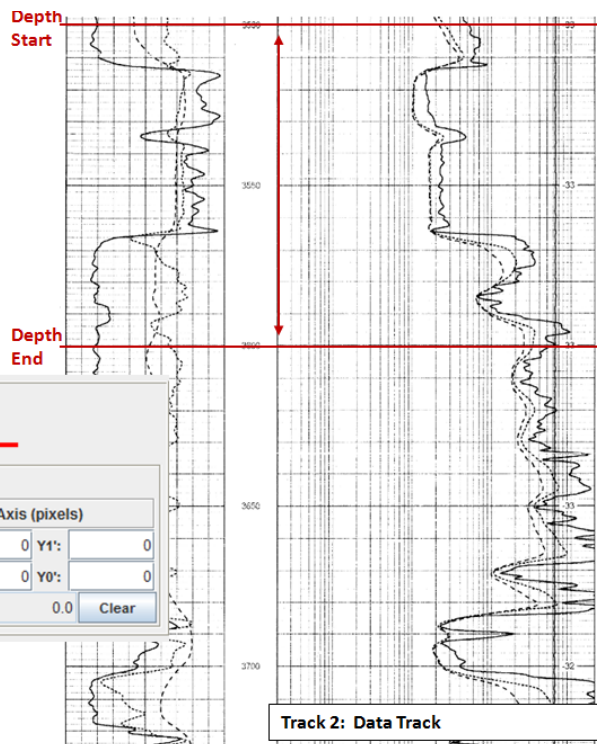
STEP 2: Set Capture Area for each Track

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

☒ Track 2: Data Track, i.e. Resistivity, Porosity, etc.

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

Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	<input type="radio"/> X1:	<input type="radio"/> Y1:	<input type="radio"/> X1':	<input type="radio"/> Y1':
End:	<input type="radio"/> X0:	<input type="radio"/> Y0:	<input type="radio"/> X0':	<input type="radio"/> Y0':
Total:	100.0	Height (d): 0.0	Width (w): 0.0	<input type="button" value="Clear"/>



STEP 2: Set Capture Area for each Track

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

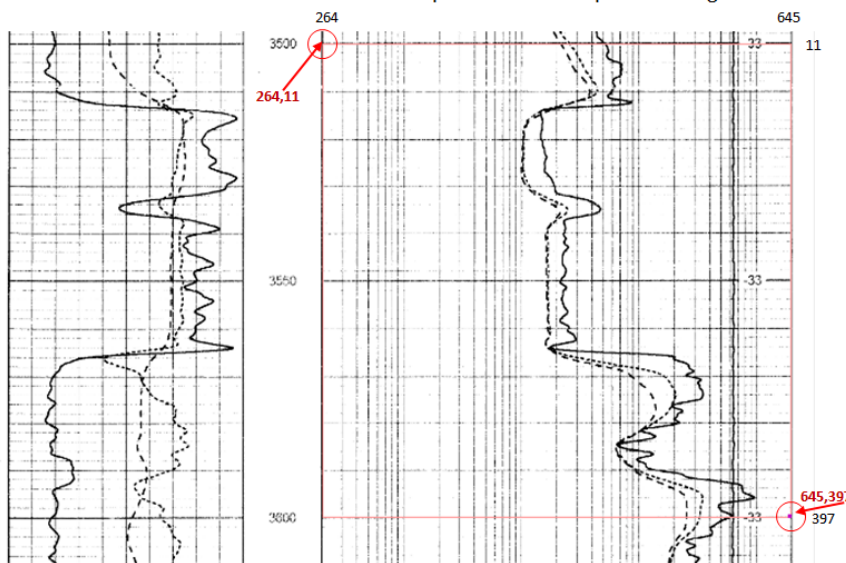
☒ Track 2: Data Track, i.e. Resistivity, Porosity, etc.

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

Depth (ft)	Left Axis (pixels)		Right Axis (pixels)	
Start:	<input type="radio"/> X1:	<input type="radio"/> Y1:	<input type="radio"/> X1':	<input type="radio"/> Y1':
End:	<input type="radio"/> X0:	<input type="radio"/> Y0:	<input checked="" type="radio"/> X0':	<input type="radio"/> Y0':
Total:	100.0	Height (d): 386.0	Width (w): 381.0	<input type="button" value="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 11 pixels 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 3: Identify the Log Curves that will be Digitized

Tracks: ☐ 1 ☒ 2 Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add Clear

OHM-M Left: 0.2 Right: 2000.0 ☐ Linear ☒ Log

Note: Mnemonic is the unique identifier for the curve; Only a Maximum of 15 Curves Per Log

#	Mnemonic	Description	Units	Left Axis	Right Axis	Grid

Modify Remove Remove All

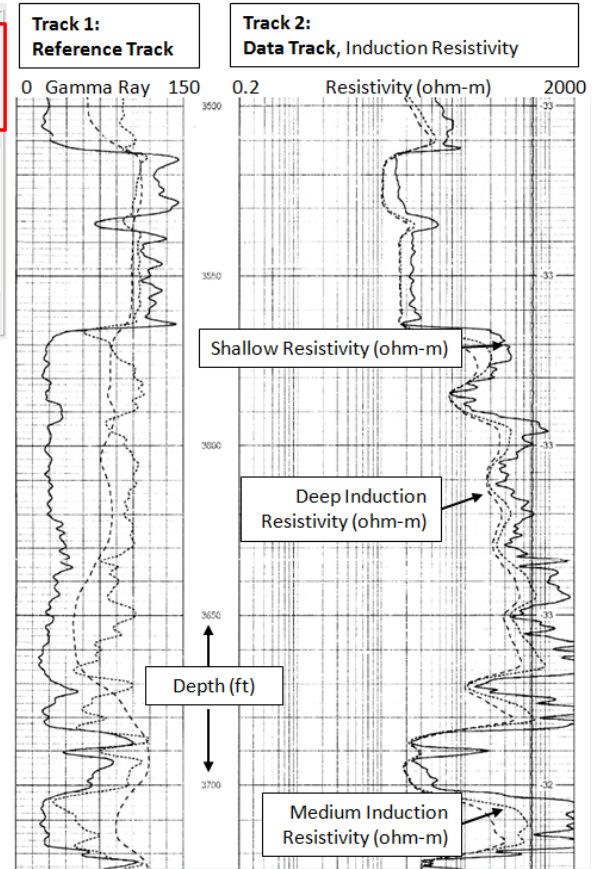
Step a: The next step is to add the curve you wish to digitize in this session. For this example the Electric Well Log Image, Deep Induction Resistivity will be digitized.

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 3: Identify the Log Curves that will be Digitized

Tracks: ☒ 1 ☐ 2 Mnemonic: Description: Curves

Units: Curve Plot Axis Limits: Grid: Add Clear

Left: 0 Right: 0 ☒ Linear ☐ Log

Note: Mnemonic is the unique identifier for the curve; Only a Maximum of 15 Curves Per Log

#	Mnemonic	Description	Units	Left Axis	Right Axis	Grid
2	ILD	Deep Induction Resistivity	OHM-M	0.2	2,000	Log

Modify Remove Remove All

Step 4: Digitize the Deep Induction Resistivity Curve

STEP 4: Digitize Each Curve

☒ ILD ←

Digitized Point Data

Curves Wrap Around,
☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
3,562.694	16.684	447	253
3,563.731	16.684	447	257
3,565.026	18.377	451	262
3,566.58	23.403	461	268
3,567.617	37.046	480	272
3,568.394	51.967	494	275
3,569.171	69.456	506	278
3,570.984	92.832	518	285
3,572.539	112.638	526	291

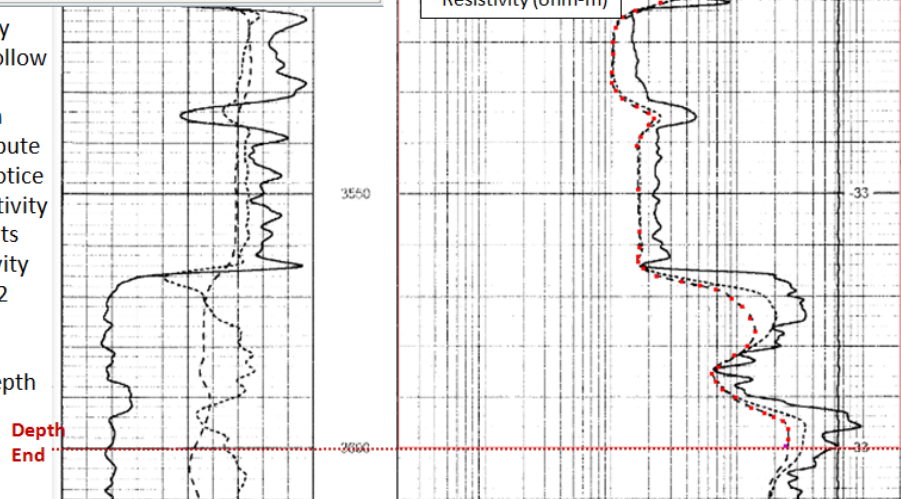
Digitize Every
☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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

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 4: Digitize Each Curve

☒ ILD

Digitized Point Data

Curves Wrap Around,

☐ Left Once ☒ No Wrap ☐ Right Once ☐ Right

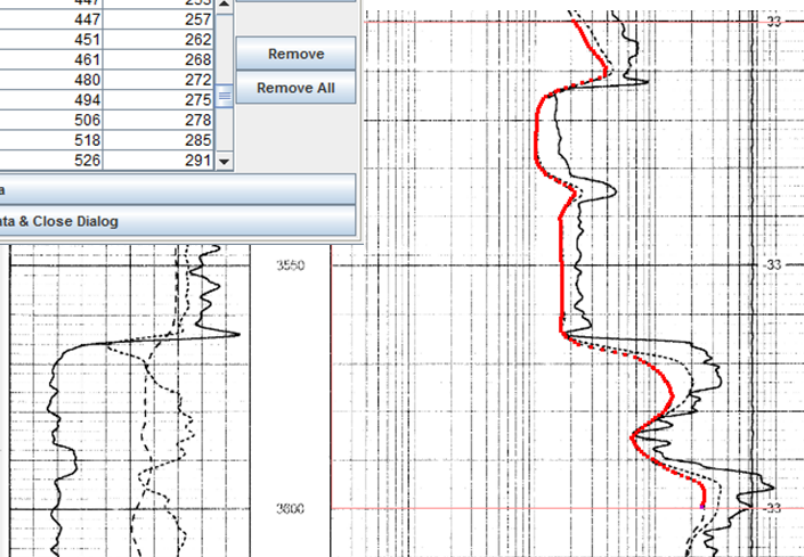
Depth: Data: Xp: Yp:

Depth	Data	pixel-X	pixel-Y
3,562.694	16.684	447	253
3,563.731	16.684	447	257
3,565.026	18.377	451	262
3,566.58	23.403	461	268
3,567.617	37.046	480	272
3,568.394	51.967	494	275
3,569.171	69.456	506	278
3,570.984	92.832	518	285
3,572.539	112.638	526	291

Digitize Every

☐ 1/4 ft ☒ 1/2 ft ☐ 1 ft

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-plus20.las 1 Data 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		Depth
X	ILD	OHM-M		Deep Induction Resistivity

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-plus20.las 1 Data 2

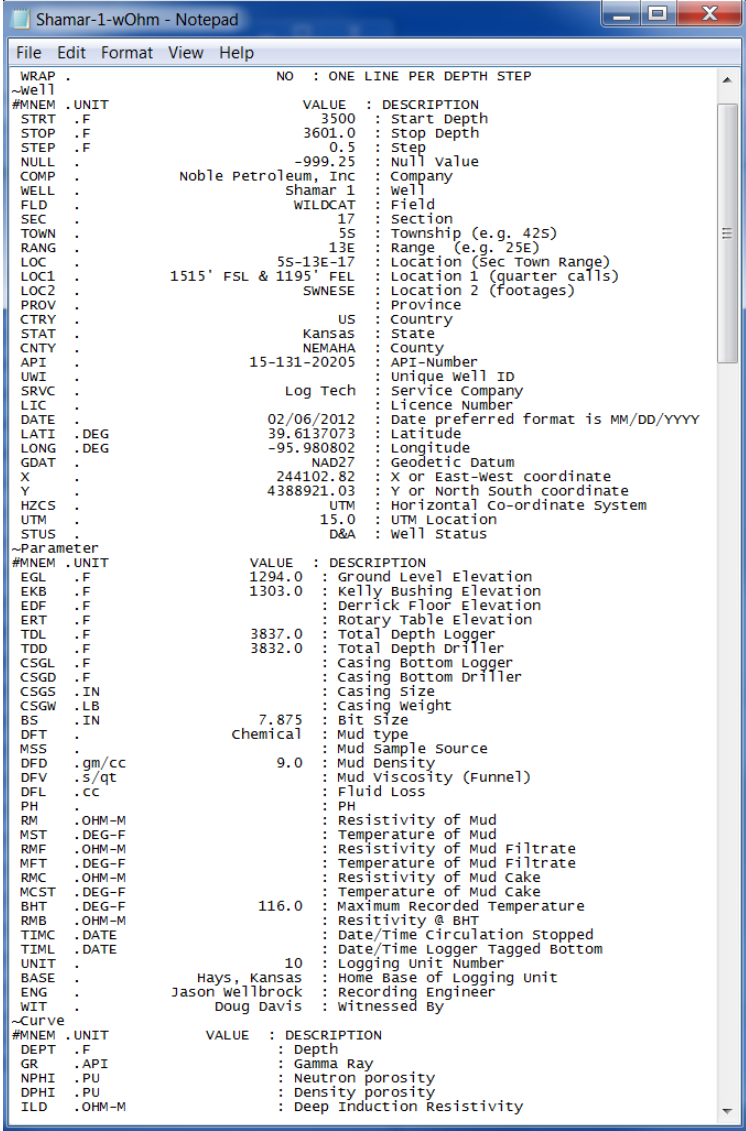
~Curves ~ASCII

DEPT	ILD
3,500	21.246
3,500.5	21.966
3,501	22.711
3,501.5	23.481
3,502	24.202
3,502.5	24.818
3,503	25.449
3,503.5	26.097
3,504	26.76
3,504.5	27.441
3,505	28.139
3,505.5	29.109
3,506	30.263
3,506.5	31.463
3,507	32.711
3,507.5	34.007
3,508	35.356
3,508.5	36.637
3,509	37.794
3,509.5	38.988
3,510	39.737
3,510.5	39.429
3,511	39.124
3,511.5	37.585
3,512	31.772
3,512.5	26.858
3,513	22.988
3,513.5	19.832
3,514	17.109

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.



```
Shamar-1-wOhm - Notepad
File Edit Format View Help

~Well
WRAP . NO : ONE LINE PER DEPTH STEP
#MNEM .UNIT VALUE : DESCRIPTION
START .F 3500 : Start Depth
STOP .F 3601.0 : 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 . 55 : Township (e.g. 42S)
RANG . 13E : Range (e.g. 25E)
LOC . 55-13E-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 : Resistivity @ BHT
TIMC .DATE : Date/Time Circulation Stopped
TIWL .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
GR .API : Gamma Ray
NPHI .PU : Neutron porosity
DPHI .PU : Density porosity
ILD .OHM-M : Deep Induction Resistivity
```

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.

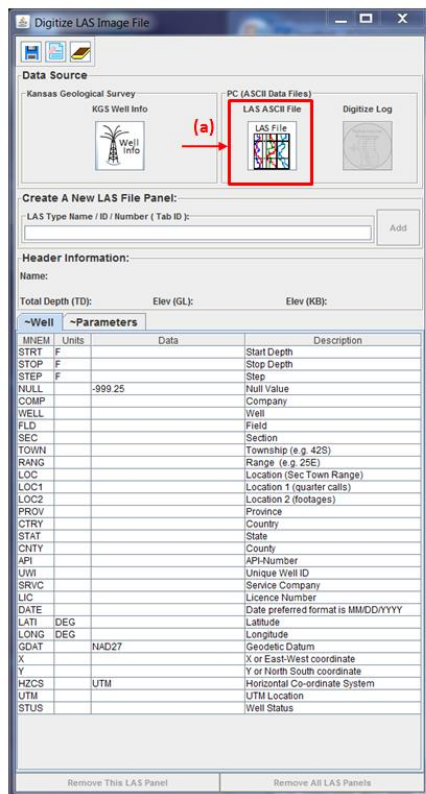
Download either the ASCII Text Files directly or the Zip files extracting the contents into a directory. The problem with the ASCII Text Files being downloaded directly from a web page is that the web page will alter the contents so it does not retain the basic structure and add HTML text to the file. 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

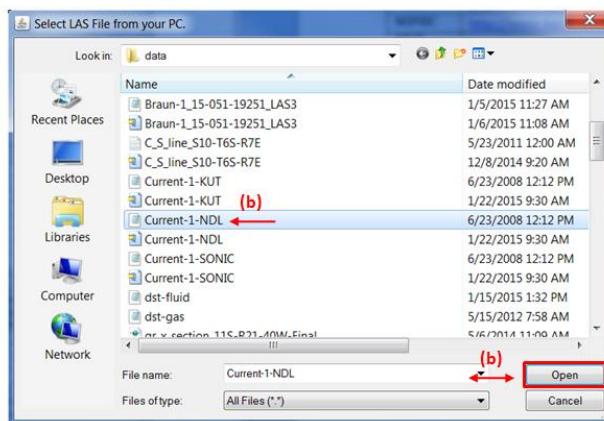
Type	Log ASCII Standard (LAS) Text Files
NDL	http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-NDL.las
SONIC	http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-SONIC.las
KUT	http://www.kgs.ku.edu/Gemini/Tools/documentation/Current-1-KUT.las

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

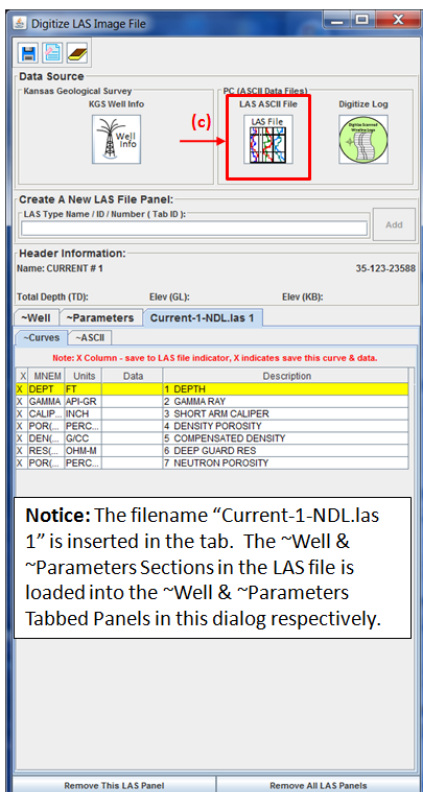
Read the three LAS files into the program.



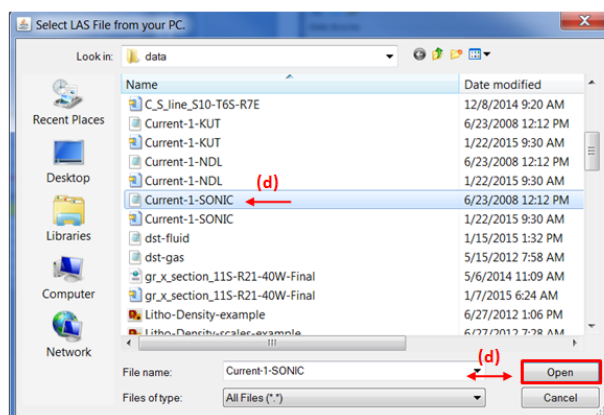
Step a: Click on the “LAS ASCII File” Icon button in the “PC (ASCII Data Files) Panel to display the “Select LAS File from your PC.” Dialog.



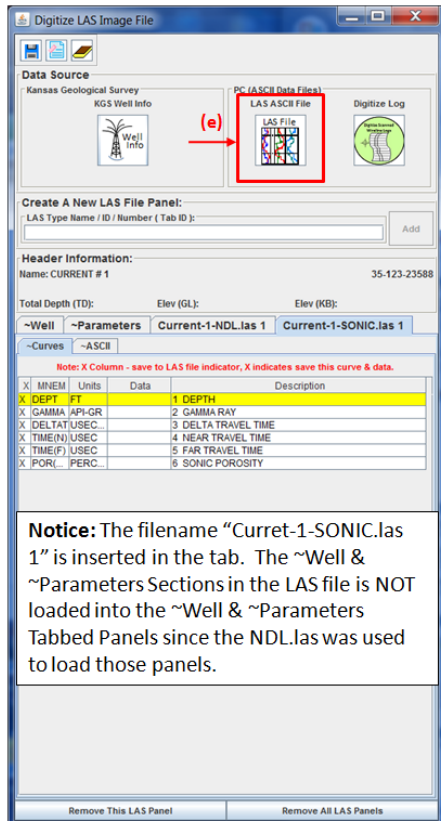
Step b: Select the Current-1-NDL LAS File in the directory list. Notice that the “File name:” text field shows the filename selected. Select the “Open” button to load the ~Well, ~Parameters and ~Log data sections into the program.



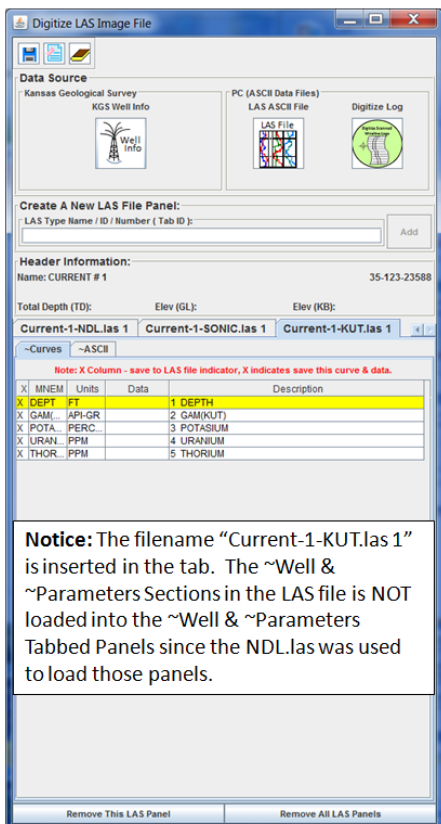
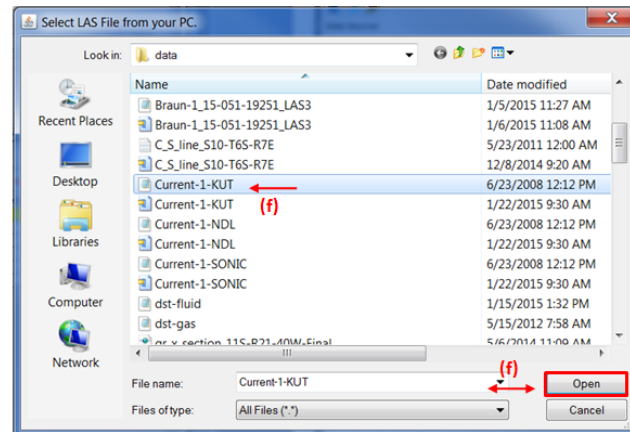
Step c: Click on the “LAS ASCII File” Icon button in the “PC (ASCII Data Files) Panel to display the “Select LAS File from your PC.” Dialog.



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.



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.



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
<input type="checkbox"/>	GAM(	API-GR		2 GAM(KUT)
X	POTA	PERC...		3 POTASIUUM
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
<input type="checkbox"/>	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
<input type="checkbox"/>	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
<input type="checkbox"/>	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	Start Depth
STOP	FT	594.0	Stop Depth
STEP	FT	0.1	Step
NULL		-999.25	Null Value
COMP		KGS-OGS	Company
WELL		CURRENT # 1	Well
FLD			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		SW NE SE	Location 2 (footages)
PROV			Province
CTRY		US	Country
STAT		OKLAHOMA	State
CNTY		PONTOTOC	County
API		35-123-23588	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	Ground Level Elevation
EKB	M		Kelly Bushing Elevation
EDF	F		Derrick Floor Elevation
ERT	F		Rotary Table Elevation
TDL	F	3837.0	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		Resistivity @ 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

Step I: Select the "Floppy Disc" Icon Button to display the "Enter Directory Path & Filename" Dialog.

Step k: Change the Start Depth from 0.0 to 30.0 ft.

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.

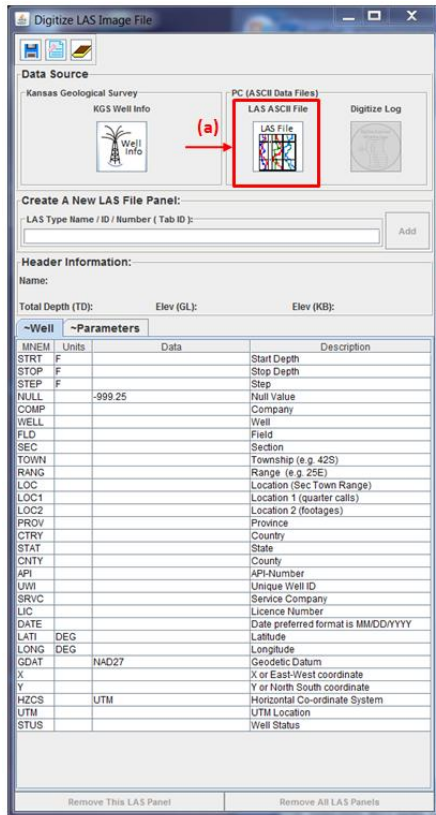
Download either the ASCII Text Files directly or the Zip files extracting the contents into a directory. The problem with the ASCII Text Files being downloaded directly from a web page is that the web page will alter the contents so it does not retain the basic structure and add HTML text to the file. 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

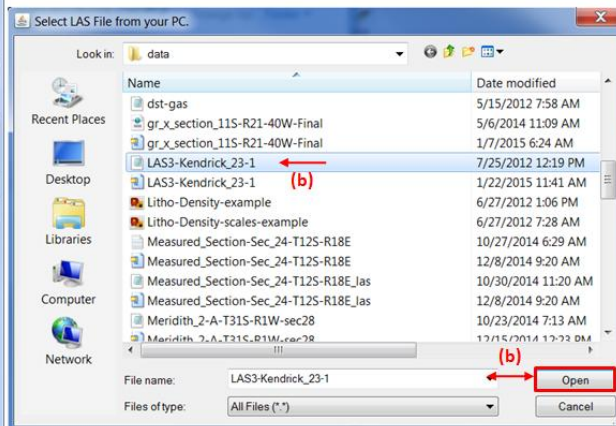
LAS 3.0	http://www.kgs.ku.edu/Gemini/Tools/documentation/LAS3-Kendrick_23-1.las
Zip File	http://www.kgs.ku.edu/Gemini/Tools/documentation/LAS3-Kendrick_23-1.zip

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

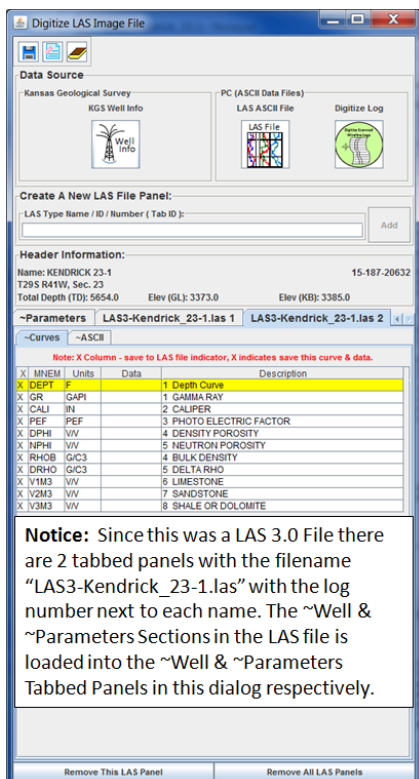
2 Log Data Sections,
Core Data Section,
4 Tops Data Sections,
Sequence Stratigraphy Data Section,
Perforation Data Section,
Profile Plot Control Data Section.



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.



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_23-1.las 2
MNEM	Units	Data			
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_23-1.las 2
MNEM	Units	Data			
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	DEGF			Temperature of Mud Filtrate	
RMC	OHMM	2.89		Resistivity of Mud Cake	
MCST	DEGF			Temperature of Mud Cake	
BHT	DEGF	115.0		Maximum Recorded Temperature	
RMB	OHMM-M			Resistivity @ 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

Step f: Select the “Floppy Disc” Icon Button to display the “Enter Directory Path & Filename” Dialog.

Digitize LAS Image File

Data Source

PC (ASCII Data Files)

LAS ASCII File

Digitize Log

LAS Type Name / ID / Number (Tab ID):

Header Information:

Name: KENDRICK 23-1 15-187-20632

T29S R41W, Sec. 23

Total Depth (TD): 5654.0 Elev (GL): 3373.0 Elev (KB): 3385.0

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

MNEM	Units	Data	Description
STRT	F	3791.0	Start Depth
STOP	F	5668.0	Stop Depth
STEP	F	0.5	Step
NULL		-99.99	Null Value
COMP		J.M. Huber Corp	Company
WELL		KENDRICK 23-1	Well
FLD		ARROYO	Field
SEC		23	Section
TOWN		T29S	Township (e.g. 42S)
RANG		41W	Range (e.g. 25E)
LOC		T29S R41W, Sec. 23	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	Country
STAT		Kansas	State
CNTY		STANTON	County
API		15-187-20632	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

Remove This LAS Panel Remove All LAS Panels

Kendrick_23-1 - Notepad

File Edit Format View Help

```

--VERSION
#MNEM .UNIT      VALUE : DESCRIPTION
VERS .          2.0 : CWS LOG ASCII STANDARD - VERSION 2.0
WRAP .          NO : ONE LINE PER DEPTH STEP

--WELL
#MNEM .UNIT      VALUE : DESCRIPTION
STRT .F          3791.0 : Start Depth
STOP .F          5668.0 : Stop Depth
STEP .F          0.5 : Step
NULL .          -99.99 : Null Value
COMP .          J.M. Huber Corp : Company
WELL .          KENDRICK 23-1 : well
FLD .          ARROYO : Field
SEC .          23 : Section
TOWN .          29S : Township (e.g. 42S)
RANG .          41W : Range (e.g. 25E)
LOC .          T29S R41W, Sec. 23 : Location (Sec Town Rang
LOC1 .          NW NE NW : Location 1 (quarter cal
LOC2 .          5006 North, 3729 West, from SE corner : Location 2 (footages)
PROV .          : Province
CTRY .          US : Country
STAT .          Kansas : State
CNTY .          STANTON : County
API .          15-187-20632 : API-Number
UWI .          : Unique well ID
SRVC .          Schlumberger : Service Company
LIC .          : Licence Number
DATE .          12/11/2006 : Date preferred format i
LATI .DEG       37.5186 : Latitude
LONG .DEG      -101.7743 : Longitude
GDAT .          NAD27 : Geodetic Datum
X .            254845.53 : X or East-west coordina
Y .            4155810.75 : Y or North south coordi
HZCS .          UTM : Horizontal Co-ordinate
UTM .          14.0 : UTM Location
STUS .          : well Status

--Parameter
#MNEM .UNIT      VALUE : DESCRIPTION
EGL .F          3373.0 : 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 : 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 .          : Mud type
MSS .LB/G       9.0 : Mud Sample Source
DFD .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-F     2.23 : Resistivity of Mud Filtrate
MFT .DEG-F      2.89 : Temperature of Mud Filtrate
RMC .OHMM       2.89 : Resistivity of Mud Cake
MCST .DEG-F     115.0 : Temperature of Mud Cake
BHT .DEG        : Maximum Recorded Temperature
RMB .OHMM-M     14/02/1992 : Resistivity @ 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
  
```

Ln 1, Col 1

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