

POWER CURVE

Version 8.0 Imperial Tutorial



The Intelligent Geological Software Solution

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Introduction

Power*Curve™ (Petrographical Office Wellsite Evaluation and Reporting) is a chip and core logging management program that utilizes single-entry data capturing to produce geological striplogs. The geological data is entered into the system through the use of intuitive data entry forms to ensure standardization of data. This data is stored in an RDBMS (Relational Database Management System) to allow data manipulation using SQL access tools.

Power*Curve™ software consists of four (4) main parts:

- 1.) A horizontal log editor module that allows you to change the striplogs to suit your needs and preferences.
- 2.) A data transfer module.
- 3.) Report printing modules.
- 4.) An on-line help system that is designed to familiarize you with the commands and functions available in **Power*Curve™** and lead you through many of the processes involved in creating welllogs.

A note about navigating through Power*Curve™ Reports:

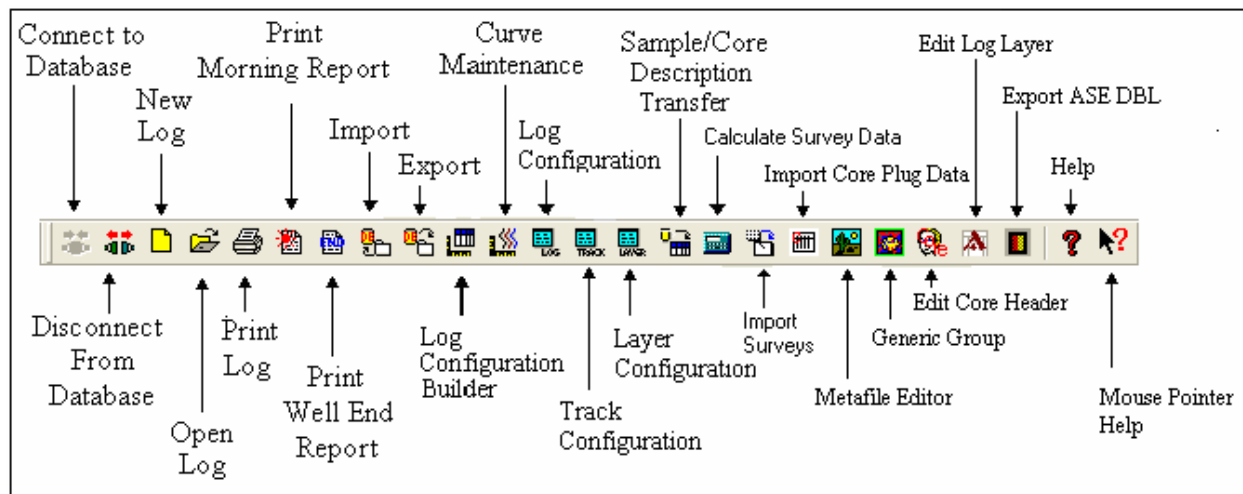
When you are entering information into data forms, you may move between boxes/fields by **pressing the Tab key** to go forward and **Shift +Tab keys** to move backwards. To exit forms that do not have an **Exit**, **OK**, or **Cancel** button, **press the Esc key** on the keyboard.

To access the On-line Help System in Power*Curve™:

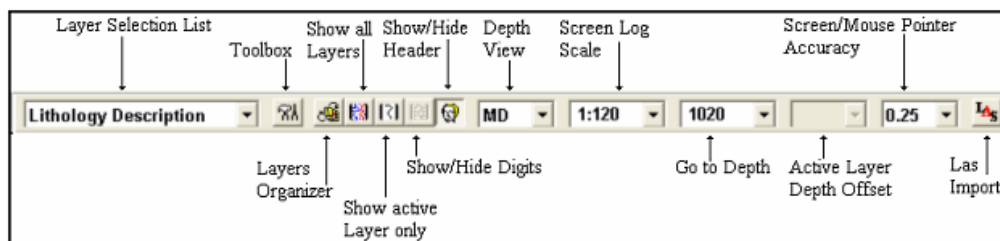
You can make use of the context sensitive help by **pressing the F1 key** when you are in a dialogue box. A pertinent help file will appear, opened to the topic relevant to the dialogue box you are in.

Below are some examples of common features within Power*Curve™:

The Toolbar



The Selection Bar...



The Status Bar...

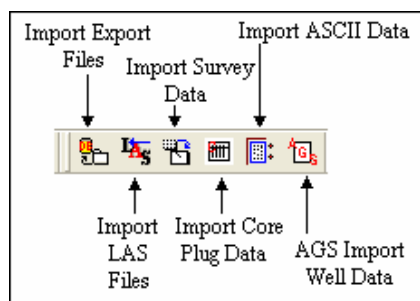


The **Status Bar** displays system status messages and any error message (associated with a field entry), in the far left corner. The KB elevation is displayed in the lower right corner of the **Status Bar**.

Import Toolbar

This toolbar is dock able and can be moved to different places on the screen.

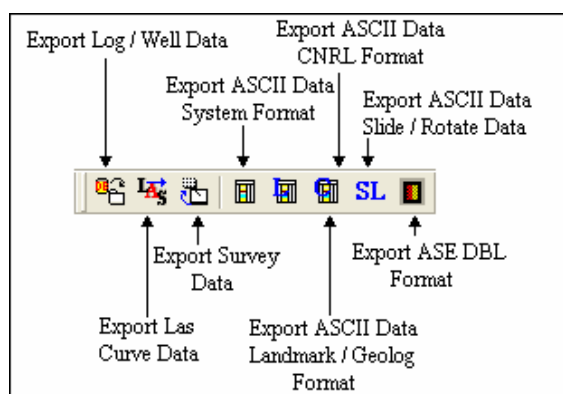
The Power*Log / Core & Curve™ Import Toolbar...

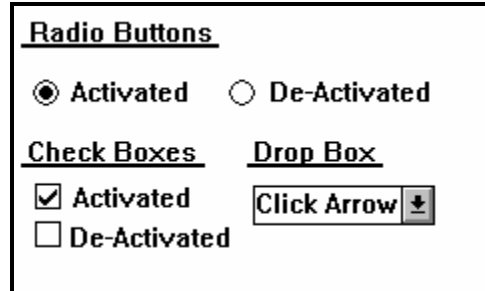


Export Toolbar

This toolbar is dock able and can be moved to different places on the screen.

The Power*Log / Core & Curve™ Export Toolbar...





The On-line Help is divided into four(4) main categories:

Commands - Descriptions of each menu command within **Power*Log™**.

Toolbar - Shortcuts to common commands are explained.

Database Table Operations - Commands/functions related to the Database Table are described.

Quick Reference Guide - The portion of the **On-line Help System**, that quickly refers you to some of the more commonly performed tasks.

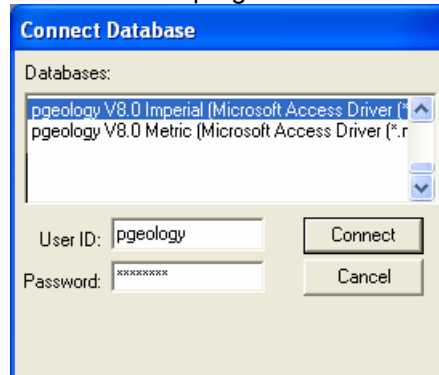
This tutorial will guide you through the process of creating and editing a new horizontal striplog (hereafter referred to simply as a log), with curves and interpreted lithology.

Connecting to the Database




PowerCurve
V8.0

- 1.) **Double click** on the **PowerCurve V8.0 Icon**. Acknowledge the Security Information window by **clicking** on the **OK** button. This will initiate the program and activate a **Connect Database** window.



- 2.) Highlight the **pgeology V8 Imperial (Microsoft Access Driver [*mdb])** database by **clicking** on it once.
- 3.) Move your mouse pointer to the **User ID** field and **click**. This will activate a flashing cursor in the **User ID** field. **Type "pgeology"** in the **User ID** field. **Press the Tab** key on the keyboard to move to the **Password** field.
- 4.) **Type "pgeology"** in the **Password** field and then **click** on the **Connect** button. The program will now load various dictionaries and then activate an **Open Log** window.
- 5.) **Click** on the **Cancel** button in the **Open Log** window to close the **Open Log** window.

The first step in creating a new log is to click on the  **New Log** button on the **Toolbar** or to select **New** under **File** on the **Selection Bar**. This will open the **New Log** window on the next page.

This more than likely will appear after connecting to the Database without you have to do the above procedure if this was the first time you have activated Power*Curve.

Starting A New Well / Log

- 1.) The **Well/Log Name** field is where you enter the name of the well (no more than 50 characters long). Type “**Horizontal Tutorial Well**” into the **Well / Log Name** field.

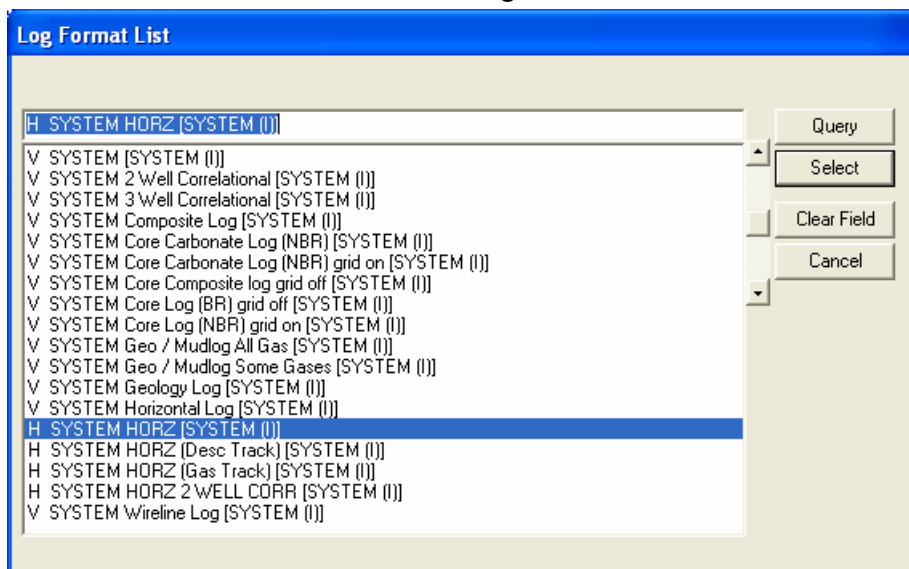
Note: In most cases, the user would click on the **Well List** button first and then select the **Well** that was previously used for building the vertical portion of the striplog. The log name would then be automatically placed in the **Well/Log Name** field and when the horizontal log is created the log name will be appended with the letter “**H**” to indicate its status as a horizontal log. However, any and all information pertinent to the original vertical log/well would then be associated with the new horizontal log.

- 2.) Click on the  button to activate the **UWI Format** window.

- 3.) The default or flashing caret is in the API Code / Name field. **Type** in “**24001201300000**”. The 24 is a State Code, the 001 is a County Code, the 20130 is the Unique Well ID, the 00 is for the sidetrack code, and the last 00 is for the Event Sequence.

- 4.) Click on the  button when you have finished entering the **API**.

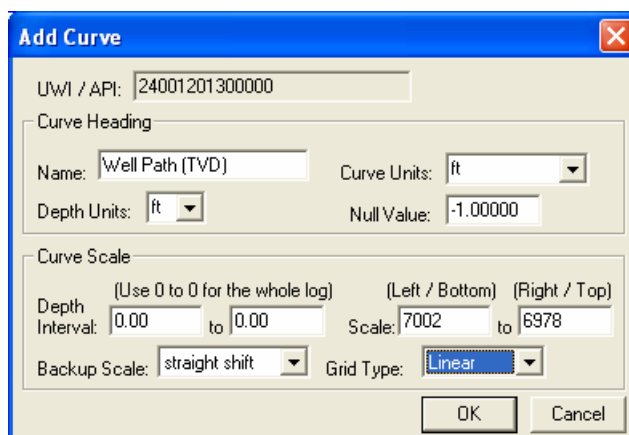
- 5.) Click on the **Log Format...** button to activate the **Log Format List** window.



- 6.) Click on “H SYSTEM HORZ [SYSTEM (I)]” to highlight it and then click on the **Select** button. You may also **double click** on “H SYSTEM HORZ [SYSTEM(I)].”

Note: The H before the Log name represents a Horizontal Log Format and the V before the Log name represents a Vertical Log Format

- 7.) Once you have been returned to the **New Log** window, **double click** in the **Log Start Depth** field. This will highlight the zero (0) and activate a flashing cursor. Type **1000** in the **Log Start Depth** field.
- 8.) Once the information is entered, click on the **Create** button.
- 9.) This will initiate a **New Log**. During this process, the curves associated with the selected log format will be added. You will now be prompted with the **Well Path (TVD) Add Curve** window.

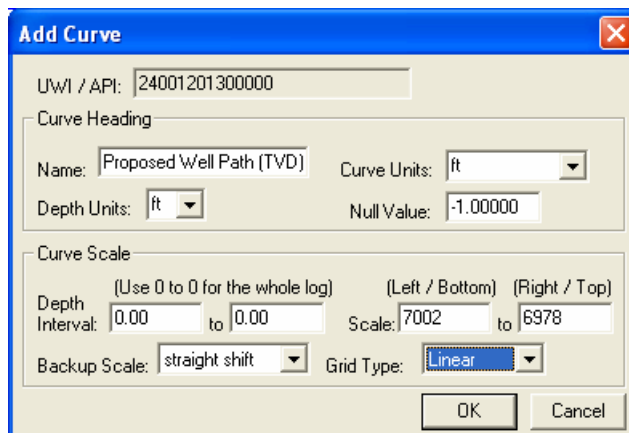


The **Well Path Curve** allows the user to draw the actual well path that the well takes when being drilled. The **Well Path Add Curve** window should have the exact same scale values as the **Proposed Well Path Add Curve** window had on the next page.

Note: The **Left / Bottom Scale** maps to the bottom on a horizontal curve and the **Right / Top Scale** maps to the top on a horizontal curve.

- 10.) Select “ft” for meters in the **Curve Units** field. Then, enter a value of “7002” into the **Left/Bottom Scale** field and a value of “6978” into the **Right/Top Scale** field. Finally, select “Linear” in the **Grid**

Type field and then click on the  button. The **Proposed Well Path Add Curve** window will then be displayed.

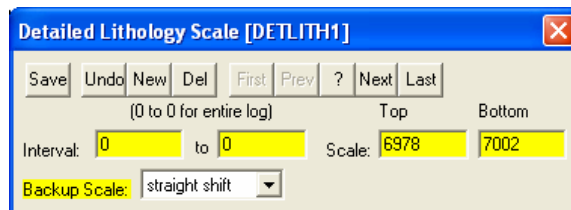


The **Proposed Well Path (TVD) Curve** allows the user to draw the proposed well path as first drawn by the directional drilling company. Typically, you would only show the horizontal portion of the well path and/or the last few meters of the build section.

The **Proposed Well Path Add Curve** window should have the exact same scale values as the **Well Path Add Curve** window had on the previous page.

- 11.) Select “ft” for meters in the **Curve Units** field. Then, enter a value of “7002” into the **Left/Bottom Scale** field and a value of “6978” into the **Right/Top Scale** field. Finally, select “Linear” in the **Grid**


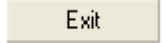
Type field and then click on the  button. The **Detailed Lithology Scale [DETLITH1]** window will then be displayed




The **Detailed Lithology Scale [DETLITH]** window allows the user to draw **Lithology** in the **Detailed Lithology** track.


Note: The **Display Depths** associated with the **Detailed Lithology** layer in the **Detailed Lithology** track are determined by the values entered into either the **Major** or the **Minor** field in the **Layer Configuration** window for the **Detailed Lithology** layer.

- 12.) Enter a value of “6978” into the **Top Scale** field and a value of “7002” into the **Bottom Scale** field. Select **Straight Shift** in the **Backup Scale** field.

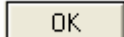
- 13.) Click on the  button, and exit from the ensuing **Shortcut Options** window by clicking once on the  button.

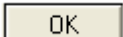
- 14.) You will now be prompted with the Curve Fill options window. We will delay this for now so click on the  button.

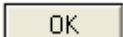
- 15.) You will now be prompted with an Add Generic Category layer window named Reservoir Quality. Type **Reservoir Quality** into the field as shown in the proceeding window.

16.) Click on the  button. You will now be prompted with the Add Curve window for Drill Rate.

17.) Select min/2ft from the **Curve Units** drop down box. If done correctly it will look like Figure on the next page.

18.) Click on the  button in the **Add Curve** window for **Drill Rate**. This will activate the second Add Curve window for **Gamma Ray** shown below.

19.) You will now be prompted with another ADD Curve window for Gamma Ray. Click on the  button.

20.) This will activate the last Add Curve window for Total Gas. Click on the  button.

Add Curve

UWI / API: 24001201300000

Curve Heading

Name: Total Gas Curve Units: units

Depth Units: ft Null Value: -1.00000

Curve Scale

(Use 0 to 0 for the whole log) (Left / Bottom) (Right / Top)

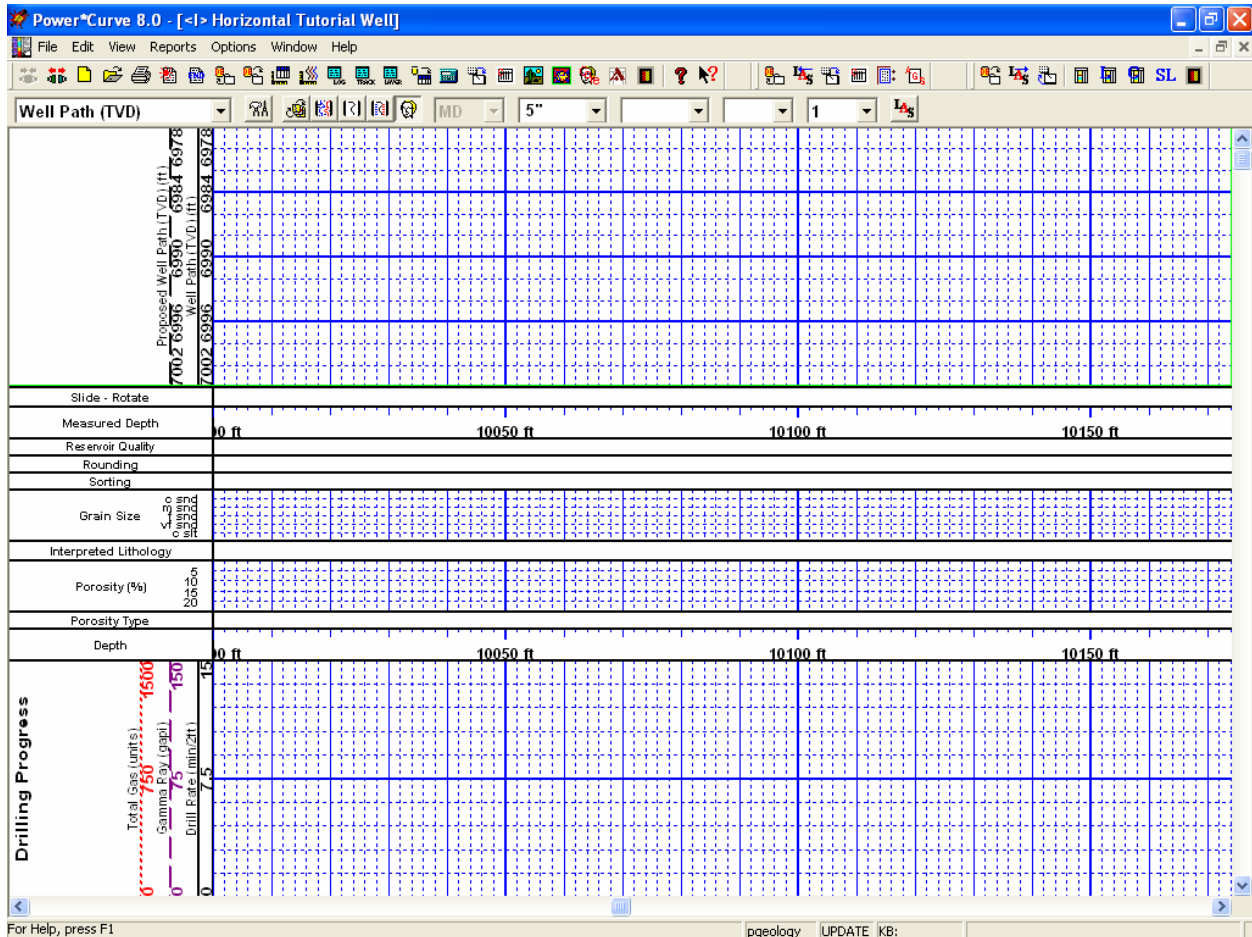
Depth Interval: 0.00 to 0.00 Scale: 0.00000 to 1500.0000

Backup Scale: straight shift Grid Type: Linear

OK Cancel

You have just added five curves to the database that will be displayed as layers in the Drilling Progress track and the Detailed Lithology track on your new horizontal log.

**** When your log opens, it should look similar to the log displayed below. ****



- 1.) You can now fill in your pertinent well information by selecting **Well** under **Edit** pull down menu on the **Selection Bar** to activate the **Well** window.

The screenshot shows the 'Well' window with the following data entered:

- API: 24001201300000
- Well Name: Horizontal Tutorial Well
- Operator: ABC Oil Company
- Drilling Contractor: Drill Em up Rig #3
- County: Silverado
- Province/State: Texas
- Country: U.S.A
- Location: 25 - 139 - 23155
- Licensee: ABC Oil Company
- Pool: Blue Zone
- Field: Redwater
- Permit #: 12RD329
- Elevations: Reference: Ground, KB: 579, Ground / Collar: 565, Casing Flange: 563
- Surface Coordinates: Latitude: 23 deg 11 h 23' 32", Longitude: 17 deg 23 h 15' 27", N/S: 123 feet North of the South boundary of Sec 25 - 139 - 23155, E/W: 685 feet East of the West boundary of Sec 25 - 139 - 23155
- Bottom hole Coordinates: Latitude: 23 deg 11 h 23' 36", Longitude: 17 deg 23 h 15' 26", N/S: 2156 feet North of the South boundary of Sec 25 - 139 - 23155, E/W: 5 feet East of the West boundary of Sec 25 - 139 - 23155
- UTM Surface Coordinates: Northing: 1221.12, Easting: 3231.54
- Hole Direction: Vertical, Faulted: , Deviated: , Hole ID: 2007-001
- Depths: Drillers T.D. (Tally) MD: 12309, 12306, 12308, 12305, 12310, 12307; Drillers T.D. (Tally) TVD (Strap) MD: 12306, 12308, 12305, 12310, 12307; Loggers T.D. MD: 12305, 12310, 12307; Loggers T.D. TVD: 12306, 12308, 12305, 12310, 12307; KB to Ground: 25; Cut: 4; Fill: ; Plugback: ; Sidetrack: ; Water Depth Reference: ; Water Depth: ;
- Work Schedule: Spud: Jul 12, 2007 03:00; T.D.: Aug 13, 2007 12:45; Rig Release: Sep 1, 2007 23:30; Well Status: Cased Potential Albuquerque Oil Well.

- 2.) Fill in the information you feel is necessary (the Figure above, has been filled in to give you an idea of how to complete the fields. Please **type in** the **KB elevation field** with **"594"**. This is done so that when we add a formation top that a sub sea level (ssl) field will be filled in. Then **click** on the **Save** button to save any changes you have made to the well record.

Note: Some of the fields in the **Well** window have character restrictions or mandatory requirements. Consequently, if any of these restrictions have been violated or if any requirements have not been met, the offending field will be highlighted, the nature of the problem will be displayed on the **Status Bar** (lower left hand corner of the screen). You will be prompted with a system error message window. Remember to save your work, after the problem has been fixed.

- 3.) If the record has been successfully saved, **click** on the **Exit** button, when prompted with the **Shortcut Options** system window.

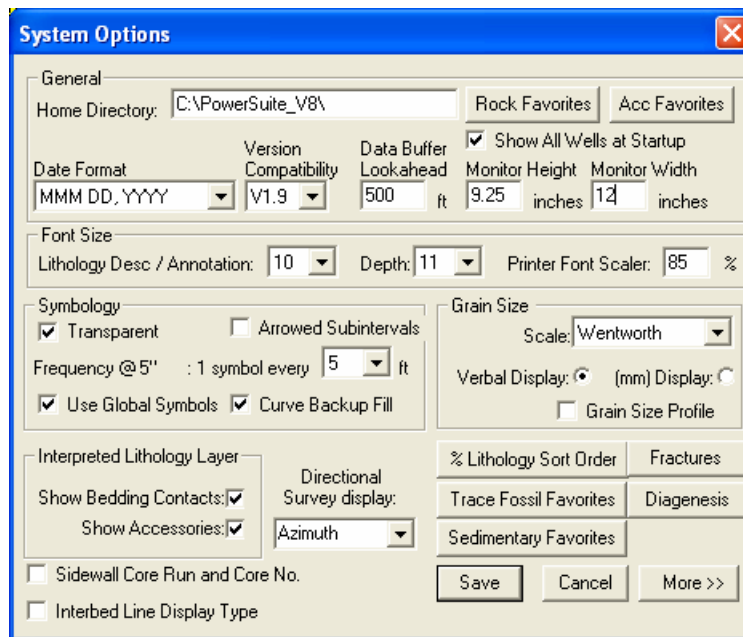
The 'Shortcut Options' dialog box displays the following text and buttons:

Record saved successfully. Choose one of the following shortcuts.

Buttons: Start New Record, Move to Next Record, Exit, Cancel

The System Options window:

To activate the System Options window **click** on the **Options selection** on the menu toolbar and then **select** the **Systems Options** selection to activate the Systems Options window.



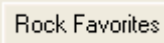
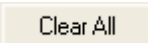
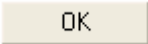
The **System Options** window is used to customize **Power*Log, Curve and Core** system settings to suit the needs of the user. Listed below are some of the more important system settings:

Monitor Height - Used to determine the height of the monitor (in inches), on which the log is going to be displayed on your monitor to an exact scale (Power*Log / Power*Core).

Monitor Width - Used to determine the width of the monitor (in inches), on which the log is going to be displayed on your monitor to an exact scale (Power*Curve).

Date Format - Allows the user to choose from several different types of **Date Formats**.

Rock Favorites - Allows the user to determine their favorite **Rock Types** and then displays them in a Toolbox menu generated by the activation of the **Rock Type Builder** window in the **Interpretive Lithology** track.

- 1.) **Click** on the  **button** in the **System Options** window.
- 2.) **Click** on the  **button** in the Rock Type Favorites list window to prepare it for the selection of your Rock Favorites.
- 3.) Select the following **Rock Types** from the **Rock Type Favorites** list window:
 - Ls ms [Limestone (mud supported)]**
 - Sh m gy [Shale medium gray]**
 - Ss [Sandstone]**
 - Dol [Dolomite]**
 - Plus any other rock types you would use a lot.**
- 4.) **Click** on the  **button** to return to the **System Options** window.

Accessory Favorites - Allows the user to determine their favorite **Accessories** and then displays them in a pop-up menu generated by the activation of the **Accessory Builder** window in the **Interpretive Lithology** track.

- 1.) **Click** on the  **button** in the System Options window.

- 2.) Click on the  button in the **Accessory Favorites** list window to prepare it for the selection of your **Accessory Favorites**.
- 3.) Select the following **Accessories** from the **Thinbed**, **Components**, and **Cement** headings in the **Accessory Favorites** list window:

Note: You can navigate around these selections by typing in the first two characters of the accessory to get a lot closer to your selection.

Thinbed


cht dk pebbles [chert dark pebbles]
sh gy stringers [shale gray stringers]
sid nodules [siderite nodule]

Component

aren [arenaceous]
calcs [calcareous]
carb [carbonaceous]
coal (carb) grs [coal (carbonaceous) grains]
cht dk grs [chert (dark) grains]
fld grs [feldspar grains]
glau grs [glauconite grains]
micmica [micromicaceous]
pyric [pyritic]
silty [silty]

Cement

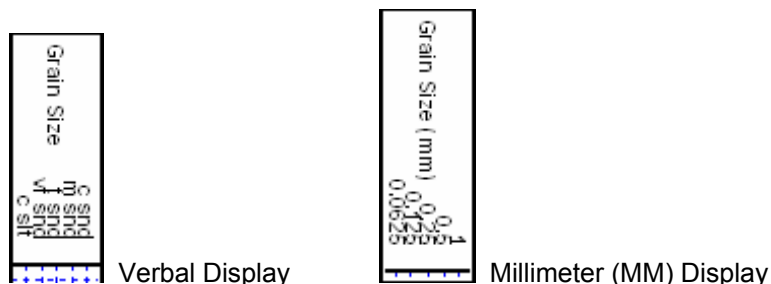
sid [siderite]
sils [siliceous]
Plus other components that you would use a lot.

- 4.) Click on the  button to return to the System Options window.

Font Size - Used to determine the default **Font Size** for **Sample/Lithology Descriptions**, **Annotations**, and the **Measured Depth** readings displayed on the **Depth** track.

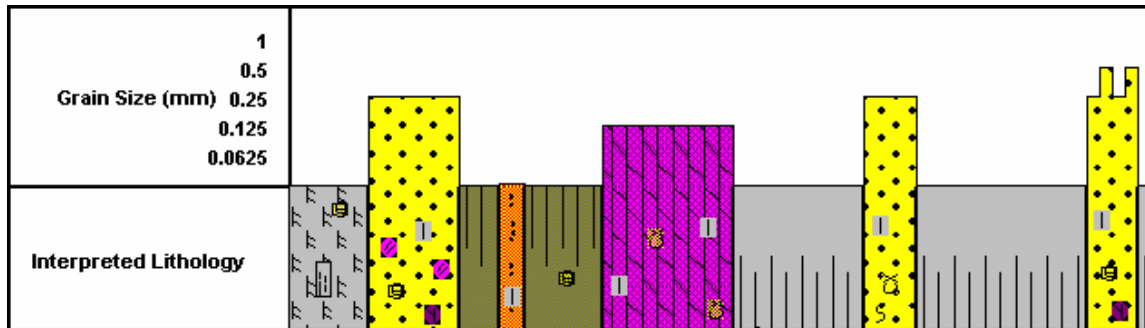
Printer Font Scaler - Used to scale the default printer's font size up or down, so that the font size on printouts matches the font size displayed on the screen.

Symbol Frequency - Used to determine the frequency with which symbols will appear on the **Framework**, **Oil Show**, **Rounding**, and **Sorting** tracks, e.g. one (1) symbol for every 2 meters of **Measured Depth**.



Grain Size mm Scale Radio Button- This radio button will display the **Grain Size Track header** with the equivalent numeric grain sizes (in mm) such as .0625, .125, .25, .5, 1, 2 etc. as shown above.

Grain Size Profile (Check Box)- This check box () will activate the grain size profile option which has the interpretive lithology fill up to the maximum grain size filled in over the interval. The user may wish to turn off the track borders when this option is selected. You will see an example of this shown below.




% Lithology Sort Order - If the user is utilizing the Percent Lithology in the Sample Description Report they can move the ordering (left to right on the Layer / Tack).

Trace Fossil Favorites - Allows the user to determine their favorite Trace Fossil and then displays them in a pop-up menu as well as a **Trace Fossil Toolbox** in the **Trace Fossil** track. Not applicable to Power*Log.

Sedimentary Favorites - Allows the user to determine their favorite Sedimentary Structures and then displays them in a pop-up menu as well as a **Sedimentary Structures Toolbox** in the **Sedimentary Structures** track. Not applicable to Power*Log.


Fractures Favorites - Allows the user to determine their favorite **Fractures** and then displays them in a pop-up menu as well as a **Fractures Toolbox** in the **Fractures** track. Not applicable to Power*Log.

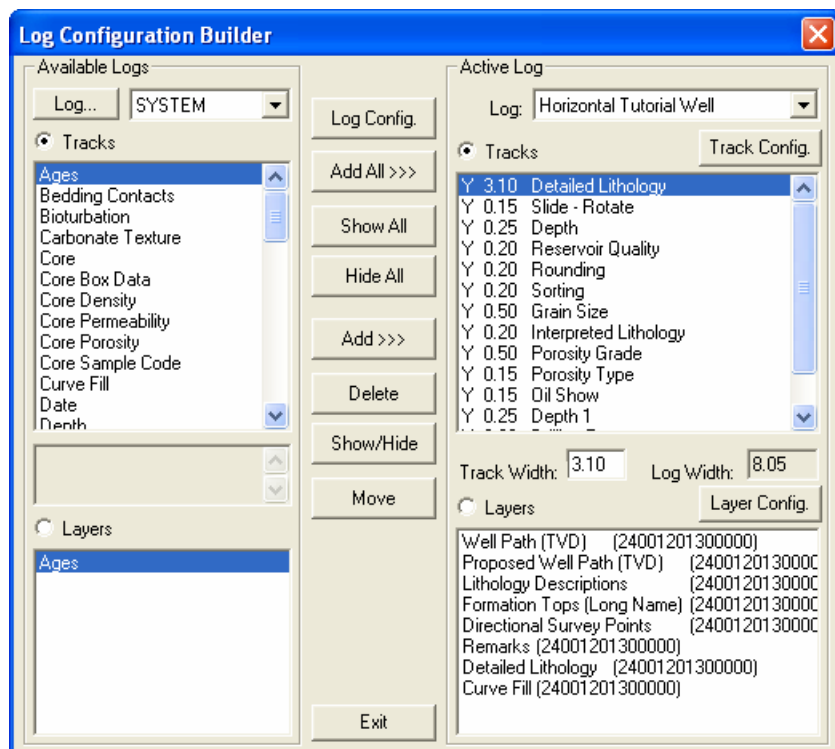
Diagenesis Favorites - Allows the user to determine their favorite **Diagenesis** and then displays them in a pop-up menu as well as a **Diagenesis Toolbox** in the **Diagenesis** track.

5.) Click on the  button to return to the Main Power*Log window.

The Log Configuration Builder Window

- This is the heart of the Log/Track/Layer configurations and controls the way your well's information is displayed on the log.
- The well may have a lot of information stored in the database, but that information cannot be shown graphically on the log, until the necessary layers have been created to illustrate that information.

Click on **Log Configuration Builder** under the **Options** menu on the **Selection Bar** or click on the **Log Configuration Builder**  button on the **Toolbar** to activate the **Log Configuration Builder** window.



Fundamentals of the Log Configuration Builder window:

The left side of the Log Configuration Builder window: Available Logs



The **Available Logs** section or **left** side of the **Log Configuration Builder** window allows you to take any track or layer from **Available Logs** and add it to the log you are currently creating/building. On the **left** side of the window, below the **Tracks** radio button is a list of the tracks available for adding to the **Active Log**.

The **Available Logs** section or left side of the window contains the track and layer configuration of the **SYSTEM [SYSTEM]** log, when the window first opens. You have the option of using any of the existing **Tracks** and their associated layers or any of the existing **Layers**, that are associated with any of the

system logs in the log database. The user can click on the **Log...** **SYSTEM** button on the left side of the screen to activate a selection list of all log formats that are in your database. The list is comprised of two (2) names with the first name in the list being the system **Log Name** and the second name (in brackets), being the **UWI** of its primary well. **Double click** on the log format you wish to copy from.

Below the **Layers** radio button on the left side of the window, is a list of the layers available in the track highlighted above. They will be added all at once, if you add their parent track. However, they can also be added on an individual basis, if you only want to add one(1) layer to an existing **Active Log** track.

The right side of the Log Configuration Builder window: Active Log


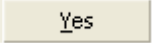
The **Active Log** section or **right** side of the window displays the track and layer configuration of the **Active Log** (the log you are currently creating), in the main **Power*Curve™** window. The name of the log is viewed in the **Log** field. In this case, it will be “**Horizontal Tutorial Well.**” Below the  **Tracks radio button** on the **right** side of the window, is a list of the tracks that are currently found within the **Active Log**. The track at the top of this list is drawn on the left side of the log, while the track on the bottom of the list is drawn on the far right of the log with all of the other tracks drawn in between, respectively. Below the  **Layers radio button** on the **right** side of the window, is a list of the layers that are associated with the track highlighted above.

The middle of the Log Configuration Builder window: Selection Buttons

The **selection** buttons, found in the middle column of the window, are for adding layers or tracks from the **Available Logs** to the **Active Log**, activating/deactivating the **Active Log's** tracks, deleting active log tracks or layers, and moving tracks or layers within the **Active Log** itself. Step-by-step instructions for accomplishing these tasks are provided on the following pages.

Working with the Log Configuration Builder window:**Deleting the Date track from the Horizontal Tutorial Log...**



- 1.) On the right side of the Log Configuration Builder Window scroll down in the Tracks list and **highlight** or **click** on the **Date** track.

- 2.) Click on the  **Delete** button in the middle of the builder. This action will prompt you with a system message, “**Do you want to delete the selected track in your log?**” Click on the  **Yes** button. The **Date** track has now been removed from the log.

Moving the Depth track...

- 1.) Click on the **Depth** track to highlight it on the right side of the Log Configuration Builder window.

Note: Make sure you have clicked on the **Depth** track and NOT the **Depth 1** track.


- 2.) Click on the  **Move** button and it will change to  **Move Start** button.” Then, click on the **Detailed Lithology** track. The **Depth** track will then be placed above the **Detailed Lithology** track.

Resizing a track...

- 1.) On the right side of the Log Configuration Builder window and **highlight** or **click** on the **Detailed Lithology** track.
- 2.) **Double click** in the **Track Width** field (3.1”) and **type** in the value of **3.4**. Then, press the **Tab** key and the Detailed Lithology Track with will change as well as the total width of the log itself will change to reflect the increase in the width of the **Detailed Lithology** track.

Note: For paper 8.5” wide, 8.00” is the widest that you want your log to be, especially if you are printing out the log in the **Landscape** paper orientation.

Turning off a track...

- 1.) Click on the **Porosity Type** track to highlight it on the right side of the Log Configuration Builder window.
- 2.) Click on the  **Show/Hide** button to turn the “**Y**”(yes), to the left of the track name, to “**N**”(no), indicating that the track will not be shown on the log, until it is reactivated.
- 3.) Alternatively, you can simply **double click** on the **Porosity Type** track to turn the “**Y**”(yes) to “**N**”(no).

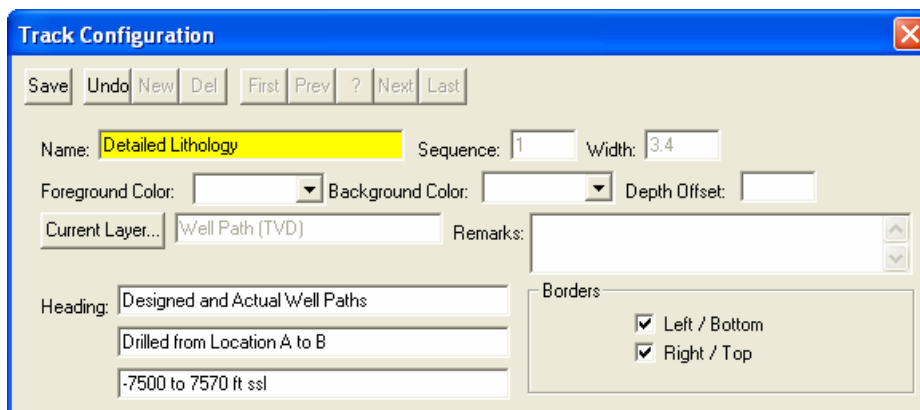
Deleting the Remarks layer from the Detailed Lithology track...

- 1.) Click on the **Detailed Lithology track** to highlight it on the right side of the Log Configuration Builder window. Notice that the layers associated with this track are displayed below, in the Layers list box in the lower right portion of the window.
- 2.) Click on the **Remarks layer** to highlight it in the layers list box. Notice that the **Layers** radio button is automatically activated by highlighting a given layer.

- 3.) Click on the button. This action will prompt you with a system message, "**Do you want to DELETE the selected [layer] in your log?**" Click on the button. The **Remarks layer** has now been removed from the log.

- **Configuring the Detailed Lithology track...**

- 1.) Click on the **Detailed Lithology track** to highlight it.
- 2.) Click on the button (to the right of Tracks portion of the window), to activate the **Track Configuration** window for Detailed Lithology



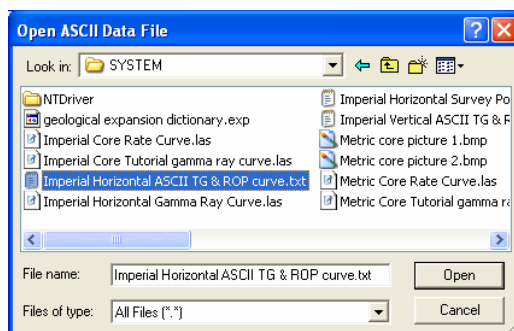
- 3.) The Track name is **Detailed Lithology**. To modify the Track Heading name type in "**Designed and Actual Well Paths**" in the first **Heading** field. In the second heading field, type in "**Drilled from location A to B.**" and in the third heading field type in "**-7500 to -7570 ft ssl**". These modifications are shown in Figure above.
- 4.) Click on the button to save the changes.
- 5.) A system message will appear asking the User. "Record saved successfully. Do you wish to exit?" Click on the button. This action will return you to the **Log Configuration Builder** window. When you exit from the **Log Configuration Builder** window, you will notice that the track headings have conformed to your changes.
- 6.) Click on the button or depress the **Esc** key on the keyboard to exit from the **Log Configuration Builder** window and you will be returned to the main log window, where you will see the changes you have made to the new log.

Importing ASCII File Data into the Drill Rate & Total Gas curve layers:

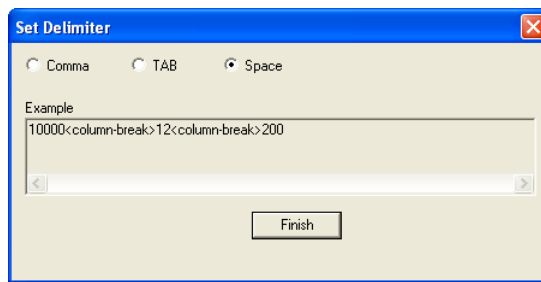
You will be able to do this import only if you have the LAS / ASCII Import Utility. If you do not you will have to input the curve data manually as instructed on pages 20 and 22.


- 1.) Click on the **File** pull down menu, **select Import / Export** and then **select ASCII Import** from the

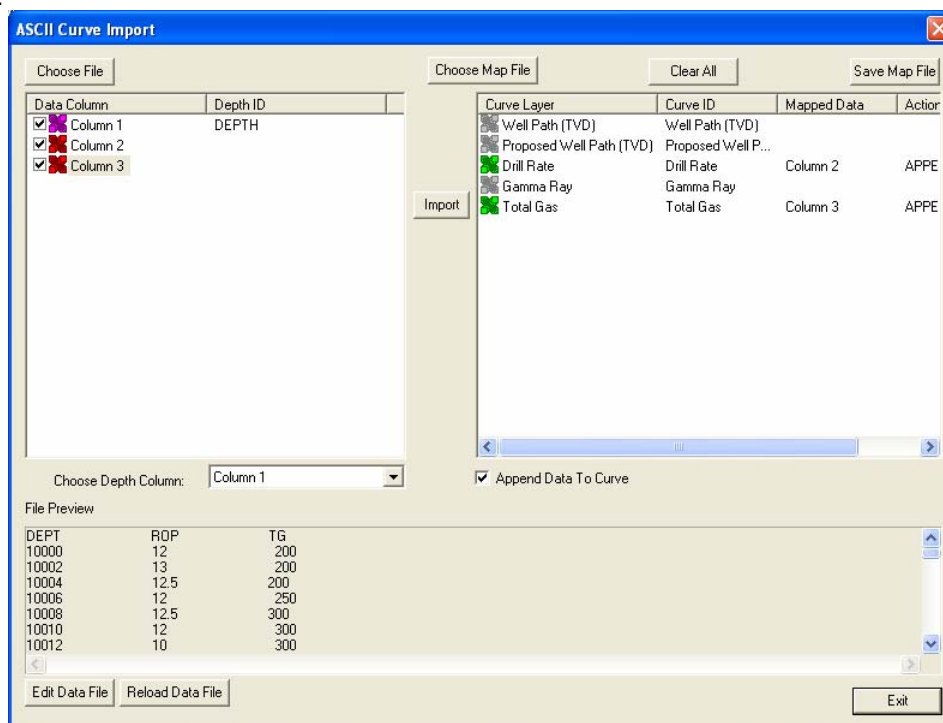
pop out menu. OR the user can **select the**  **Icon** from the Import Tool Bar. This will activate an Open ASCII Data File window.



- 2.) Navigate to the **C:\Powersuite_V8\system** folder and **select the Imperial Horizontal ASCII TG & ROP curve.txt** file. Click on the Open button. Once the file has been selected the Set delimiter window will be activated.



- 3.) This file is a Space delimited file and the default on this window is space delimited. You will see <column break> between the data points. **Click on the**  **button**. This will open the Import window.



- 4.) The default on the Depth column is Column 1 which is indicated by the purple X. **In our case the depth is the first column so we do not have to change the depth column indicator.**
- 5.) **Click** on the **Column 2** on the left side and **drag it to the Drill Rate Curve layer** on the right side of the window. You will see Column 2 in the mapped Data field and an APPEND in the action field.
- 6.) **Click** on the **Column 3** on the left side and **drag it to the Total Gas Curve layer** on the right side of the window. You will see Column 3 in the mapped Data field and an APPEND in the action field.
- 7.) **Click** on the **Import** **Button**. This will import the curve data and prompt you with a database message saying Imported successfully.

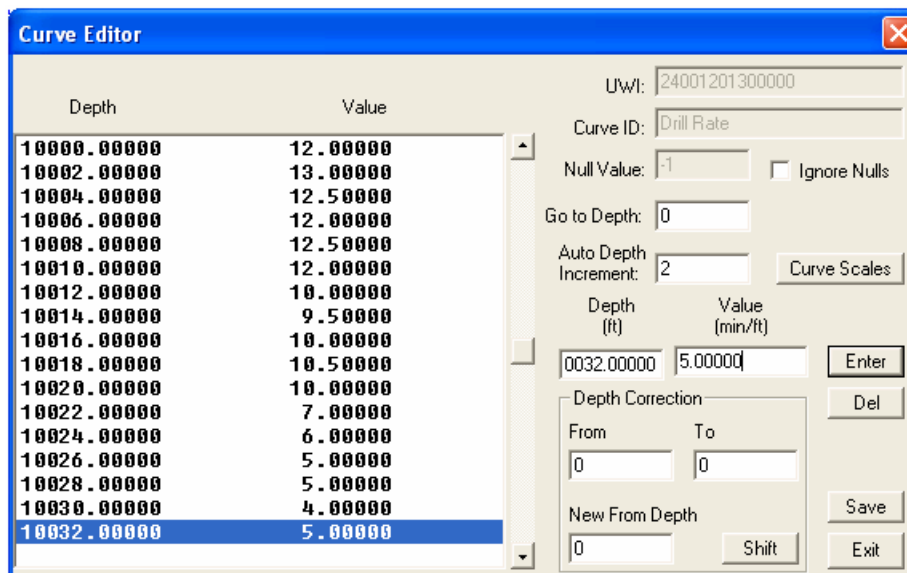


- 8.) **Click** on the **OK** **button** to close the window.
- 9.) **Click** on the **Exit** **button** to close the ASCII Import window.

If you have the LAS Import Module proceed to Changing Curve Scales on page 23.

Adding Drill Rate Curve Values Manually (If you do not have the Import Module or Files.)

- 1.) **Click** anywhere in the **Drilling Progress** track. Depending on your screen resolution you may have to scroll down to see the Drilling Progress track
- 2.) Use the drop down arrow in the **Layer Selection List** field (located at the upper left side of the **Selection bar**), to display a list of the layers in this track.
- 3.) **Click** on **Drill Rate** to make it the active layer and the **Layer Selection List** will close automatically after you have made your selection.
- 4.) **Double click** within the active **Drilling Progress** track to activate the Drill Rate Curve Editor.



- 5.) When the **Curve Editor** window opens, the cursor will be in the **Depth (ft)** field. **Double Click** in the **Auto Depth Increment** field and replace the (one) 1 with a (two) 2. Press the Tab Key to place the cursor in the Depth field.

- 6.) Type **10000** into the **Depth (ft)** field and then **press** the **Tab** key on the keyboard to move the cursor to the **Value (min/2ft)** field.
- 7.) Type **12** into the **Value (min/2ft)** field and **press** the **Enter** key on the keyboard. The value will be entered into the list field and the **Depth (ft)** field will automatically advance by the number specified in the **Auto Depth Increment** field, which is currently set at **two (2)**.


Note: You do not have to re-enter values if they are identical to the previous value. The previous value is already displayed in the **Value (min/2ft)** field, so you can just press the **Enter** key to insert the same value again.

- 8.) **Type** in the remaining **Values (min/2ft)** listed on the next page and **pressing** the **Enter** key on the keyboard after each data entry. You will see the list get refreshed with the new values after every time you depress the Enter key on the keyboard.

10002	13.0	10032	5.0	10062	4.0	10092	4.0
10004	12.5	10034	6.0	10064	5.0	10094	4.0
10006	12.0	10036	13.0	10066	4.0	10096	5.0
10008	12.5	10038	14.0	10068	3.0	10098	5.0
10010	12.0	10040	13.0	10070	3.0	10100	3.0
10012	10.0	10042	12.0	10072	3.5	10102	3.0
10014	9.5	10044	10.0	10074	4.0	10104	4.0
10016	10.0	10046	11.0	10076	4.0	10106	3.0
10018	10.5	10048	10.5	10078	4.0	10108	2.0
10020	10.0	10050	9.5	10080	5.0	10110	2.0
10022	7.0	10052	7.0	10082	5.0	10112	3.0
10024	6.0	10054	6.0	10084	5.0	10114	4.0
10026	5.0	10056	4.0	10086	4.0	10116	4.0
10028	5.0	10058	5.0	10088	4.0	10118	3.0
10030	4.0	10060	5.0	10090	5.0	10120	3.0

- 9.) When you have finished adding values to the curve, **click** on the  **button**.

Note: If you forget to save the values before you exit from the **Curve Editor** window, you will be prompted by the following system message, “*Would you like to save the digits?*” **Click** on the **Yes** button to save the newly edited curve values.

- 10.) **Click** on the  **button** or Press the **Esc** key on the keyboard to exit from the Curve Editor.

- **Adding the Total Gas Curve Manually (If you do not have the Import Module or Files.)**

- 1.) **Click** anywhere in the **Drilling Progress** track. Depending on your screen resolution you may have to scroll down to see the Drilling Progress track
- 2.) Use the drop down arrow in the **Layer Selection List** field (located at the upper left side of the **Selection bar**), to display a list of the layers in this track.
- 3.) **Click** on **Drill Rate** to make it the active layer and the **Layer Selection List** will close automatically after you have made your selection.
- 4.) Double Click on the **Total Gas** layer to bring up the **Curve Editor** window for the **Gamma Ray** curve.

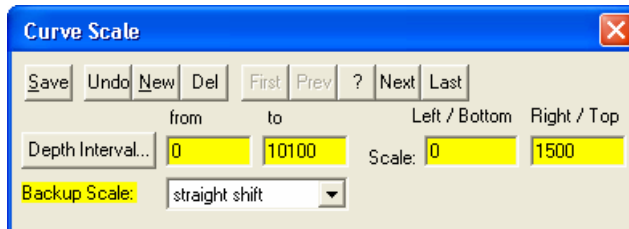
- 5.) When the **Curve Editor** window opens, the cursor will be in the **Depth (ft)** field. **Double Click** in the **Auto Depth Increment** field and replace the (one) 1 with a (two) 2. Press the Tab Key to place the cursor in the Depth field.
- 6.) Enter the values found on the following page into the **Depth (ft)** and **Value (units)** fields, respectively.

Note: After the first value has been entered into the **Depth (ft)** field, the **Curve Editor** window automatically performs each subsequent increment, according to the value placed in the **Auto Depth Increment** field. Consequently, the only values you need to enter manually, after the first entry, are the **Value (units)** field values.

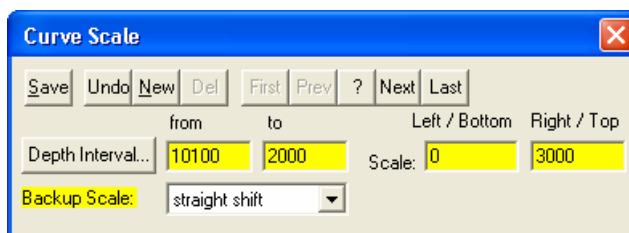
10000	200	10088	1320
10002	200	10090	1320
10004	200	10092	1320
10006	250	10094	1360
10008	300	10096	1370
10010	300	10098	1370
10012	300	10100	1370
10014	250	10102	1410
10016	250	10104	1410
10018	250	10106	1420
10020	350	10108	1490
10022	600	10110	1490
10024	680	10112	1460
10026	680	10114	1460
10028	700	10116	1490
10030	780	10118	1490
10032	780	10120	1460
10034	650		
10036	400		
10038	400		
10040	450		
10042	350		
10044	450		
10046	450		
10048	500		
10050	600		
10052	600		
10054	900		
10056	1200		
10058	1200		
10060	1450		
10062	1380		
10064	1380		
10066	1380		
10068	1300		
10070	1300		
10072	1300		
10074	1300		
10076	1250		
10078	1250		
10080	1250		
10082	1280		
10084	1280		
10086	1280		

Changing Curve Scales from Total Gas Layer Pop Up Menu.

- 1.) **Right click** on the **Total Gas layer**. This will activate a Total Gas Pop-up menu.
- 2.) **Select Scale** from the menu. This will activate the Scale Window shown below. We will be changing scales in our case at **10100ft**.



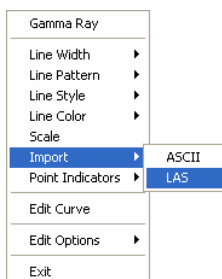
- 3.) **Type** in a different from Depth Interval changing the 0 to **10100** and then **click** on the **Save** button. This will activate a System message stating Record Saved Successfully.
- 4.) **Click** on the **Start New Record** button. This will clear the window.

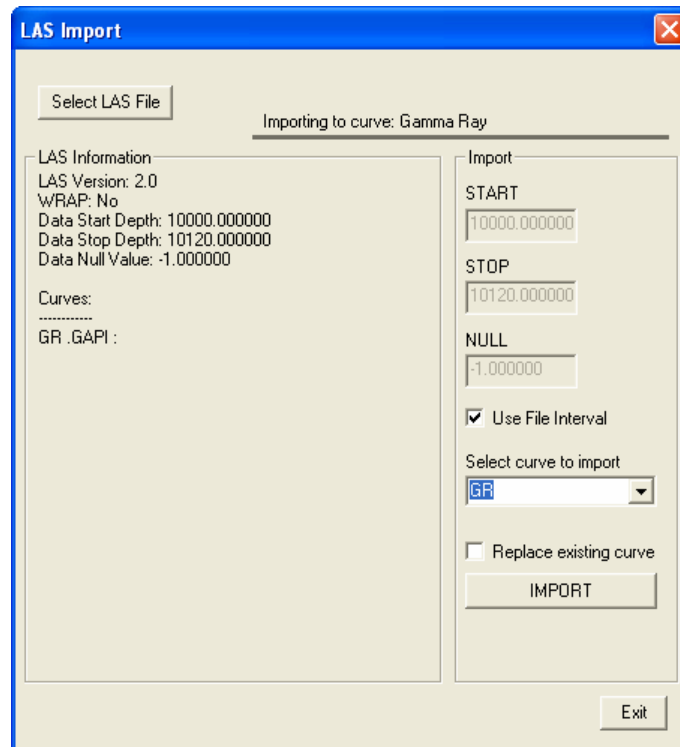


- 5.) **Type** in **10100** in the **from depth** interval field, **tab**, type **20000** in the **to depth** interval field, **tab**, type in **0** in the **left / bottom scale** field, type in **3000** in the **right / top scale** field, **select** **strait shift** from the **Backup Scale** drop box.
- 6.) **Click** on the **Save** button and then **click** on the **Exit** button from the ensuing Record Saved Successfully message box.

Importing an LAS Gamma Ray Curve data file...

- 1.) **Click** on the **Drill Progress track** to make it active. You will notice a green trace around the outside of the track if done correctly.
- 2.) Use the drop down arrow in the **Layer Selection List** field (located on the left side of the **Selection bar**), to display the **Drilling Progress** track layer list.
- 3.) **Select** the **Gamma Ray** layer to make it the **active** layer and the **Layer Selection List** will close automatically after you have made your selection.
- 4.) **Right click** on the **Gamma Ray layer** to activate a popup menu.
- 5.) **Select Import** from the pop-up menu to activate a pop out menu and **select LAS**. This will activate the Las Import Window.





- 6.) Click on the **Select LAS File** button. This will activate the Open LAS File window and locate the **“Imperial Horizontal Gamma Ray Curve.las”** in the Powersuite / System directory.
- 7.) After locating the Drive and Directory where the **Imperial Horizontal Gamma Ray Curve.las** file is the user must select the file by **double clicking on the file name** or **clicking on it once** and clicking on the **OK** button. This will bring the file header into the LAS Import window.
- 8.) Click on the **Select Curve to Import drop box** and select the **GR** curve.
- 9.) Click on the **IMPORT** button. The curve will import and the window will disappear leaving the core rate curve on the layer.

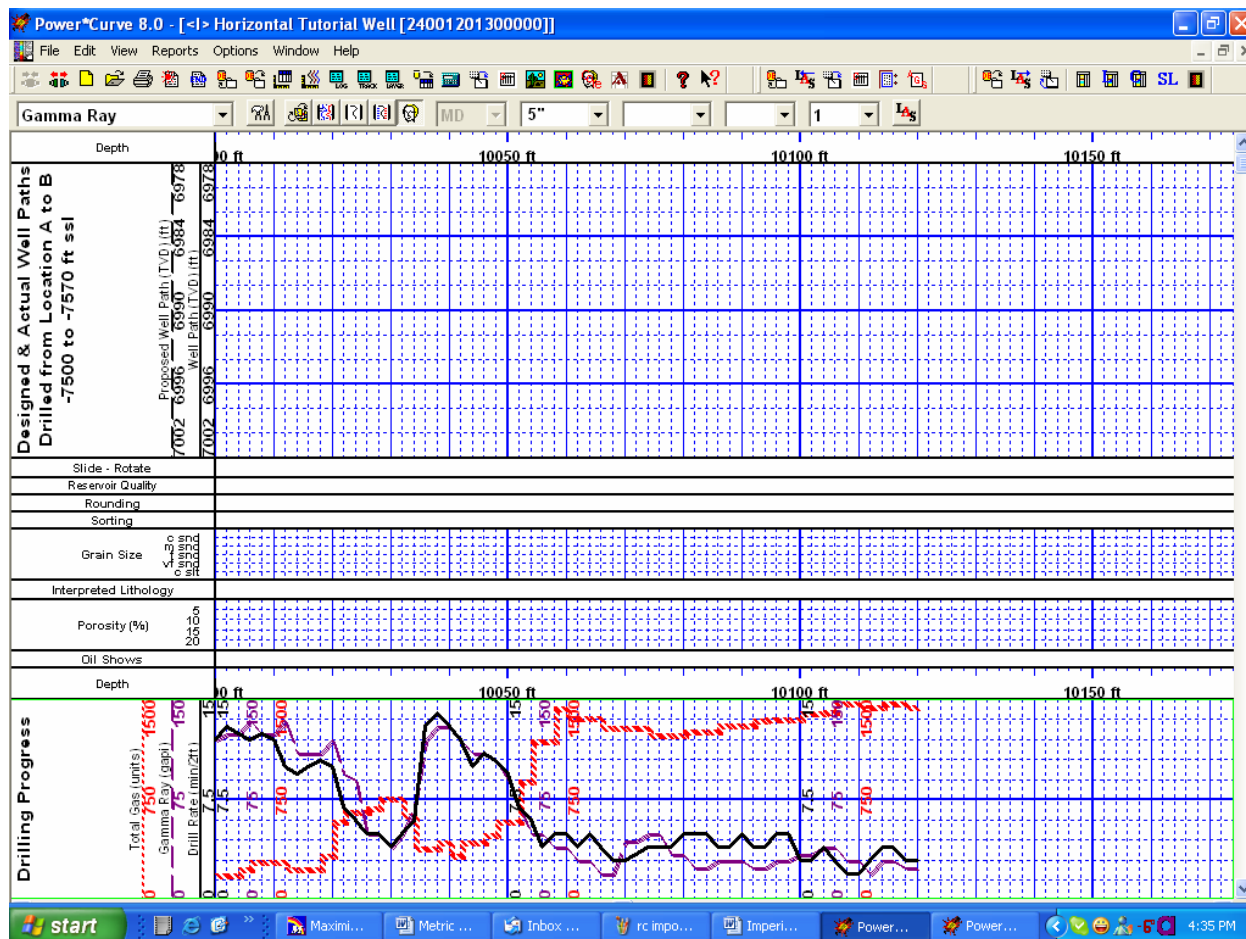
- **Adding the Gamma Ray Curve Manually (If you do not have the Import Module)**

- 1.) Double Click on the **Gamma Ray** layer to bring up the **Curve Editor** window for the **Gamma Ray** curve.
- 2.) **Double Click** on the **Auto Depth Increment** field and **replace** the one (1) with a two (2). **Press the Tab key** on your keyboard and this will place the cursor in the Depth field.
- 3.) Enter the values found on the following page into the **Depth (ft)** and **Value (gapi)** fields, respectively.

Note: After the first value has been entered into the **Depth (ft)** field, the **Curve Editor** window automatically performs each subsequent increment, according to the value placed in the **Auto Depth Increment** field. Consequently, the only values you need to enter manually, after the first entry, are the **Value (gapi)** field values.

10000	120.0	10032	50.0	10064	30.0	10096	30.0
10002	125.0	10034	70.0	10066	20.0	10098	30.0
10004	125.0	10036	120.0	10068	20.0	10100	35.0
10006	135.0	10038	130.0	10070	45.0	10102	35.0
10008	125.0	10040	130.0	10072	45.0	10104	40.0
10010	125.0	10042	120.0	10074	50.0	10106	40.0
10012	135.0	10044	110.0	10076	50.0	10108	30.0
10014	110.0	10046	110.0	10078	35.0	10110	30.0
10016	110.0	10048	105.0	10080	35.0	10112	20.0
10018	110.0	10050	90.0	10082	25.0	10114	30.0
10020	120.0	10052	70.0	10084	25.0	10116	30.0
10022	95.0	10054	50.0	10086	30.0	10118	25.0
10024	90.0	10056	50.0	10088	30.0	10120	25.0
10026	50.0	10058	40.0	10090	30.0		
10028	50.0	10060	40.0	10092	25.0		
10030	40.0	10062	30.0	10094	25.0		

**** Your log should now look similar to the log shown below. ****



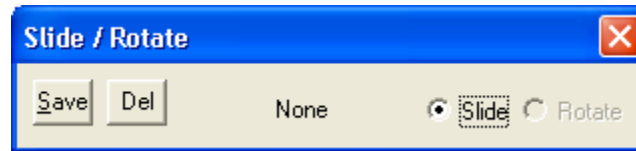
The Slide/Rotate Layer:

The **Slide/Rotate** layer provides a visual representation of the **Drill String Rotation** and **Orientation** throughout the progress of the well.

The **Rotate** function of the window is shown as disabled, because rotation is represented as a blank space on the layer. The only thing you can physically draw on this layer is a **Slide**, which is shown as a black bar covering the distance of the slide or orientation of the drill string.

- **Drawing a Slide...**

- 1.) **Double click** on the **Slide/Rotate layer** to activate the **Slide/Rotate** window.



- 2.) On the **Slide/Rotate** track, position your mouse pointer at **10000 ft**, because this is where the **Slide** will begin.

- 3.) **Hold down your left mouse button and drag** the mouse pointer to **10050 ft**, because this is the position where you want the **Slide** to end.

- 4.) **Release the mouse button** and the **Slide** will be drawn from **10000 ft** to **10050 ft**.

- **Drawing another Slide...**

- 1.) Position your mouse pointer at **10070 ft** on the **Slide/Rotate** track.

- 2.) **Hold down the left mouse button and drag** the mouse pointer to **10100 ft** on the **Slide/Rotate** track.

- 3.) **Release the mouse button** and the **Slide** will be drawn from **10070 ft** to **10100 ft**.

- **Drawing yet another Slide...**

- 1.) Position your mouse pointer at **10110 ft** on the **Slide/Rotate** track.

- 2.) **Hold down the left mouse button and drag** the mouse pointer to **10120 ft** on the **Slide/Rotate** track.

- 3.) **Release the mouse button** and the **Slide** will be drawn from **10110 ft** to **10120 ft**.

- **Deleting a Slide...**

- 1.) **Right click** your mouse button on the **Slide** between **10110 ft** and **10120 ft**.


- 2.) You will then receive a delete confirmation window. **Click** on the **Yes** button to confirm the deletion of the Slide residing between 10110 ft to 10120 ft.

- **Resizing a Slide...**

- 1.) Position the mouse pointer within the **Slide** you wish to resize (in this case the **Slide** residing between **10070 ft** and **10100 ft**)
- 2.) **Hold down** the **Ctrl** key, while pressing and holding down the **left mouse button**.
- 3.) While continuing to hold down the **Ctrl** key and the mouse button, **drag the mouse pointer** to the right to resize the **Slide** from **10070 ft** and **10100 ft** to **10070 ft** and **10106 ft**. Notice that the yellow increment box displays the two depth limits of the **Slide**, as you move the mouse pointer.
- 4.) **Release the left mouse button** (before the Ctrl key) and the new **Slide** interval will be drawn from **10070 ft** and **10106 ft**.
- 5.) **Press the Esc** key on the keyboard to exit from the **Slide/Rotate** window.

Adding values to the Proposed Well Path Curve:

The following steps will show you how to add values to the **Proposed Well Path** curve layer. In a actual Wellsite situation the User could import the Proposed well path curve if the ASCII file for the drilling program is available form the directional drillers. We will make up proposed well path in this case. Ie where the well was designed to be drilled.

- 1.) **Click** anywhere in the **Detailed Lithology** track. Notice that a **green** border highlights or surrounds the track. This is used to indicate that the track is **ACTIVE**.
- 2.) **Click** on the **down arrow** of the **Layer Selection List** to drop the list.
- 3.) **Click** on the **Proposed Well Path** from the Layer Selection List. This will make the Proposed Well Path curve layer the active.
- 4.) **Double click** within the active **Detailed Lithology track** to activate the Curve Editor for the Proposed Well Path Curve. Or the user can **click once** on the  **Data Editing Tool of Active Layer** button on the **Toolbar**.
- 5.) **Double click** in the **Auto Depth Increment** field and **type** in a value of thirty (**30**). Then, **press** the **Tab** key on the keyboard once to move the cursor to the **Depth (ft)** field.
- 6.) Type **10000** into the **Depth (ft)** field and then press the **Tab** key on the keyboard to move the cursor to the **Value (ft)** field.

Note: The **Depth (m)** field in the **Curve Editor** window represents the **Measured Depth (MD)** in the **Detailed Lithology** track, while the **Value (ft)** field represents the **True Vertical Depth (TVD)** in the **Detailed Lithology** track.

- 7.) Type **6983** into the **Value (ft)** field and then press the **Enter** key on the keyboard. The depth value will automatically advance by 30 as specified in the Auto Depth Increment field.
- 8.) Type in the remaining **Value (ft)** values listed below. After typing in a value the user must then press the **Enter** key on the keyboard to see his values getting added to the list.

10030 ft	6987.0 ft
10060 ft	6989.0 ft
10090 ft	6989.3 ft
10120 ft	6989.5 ft

9.) When you are finished adding values to the curve, **click** on the **Save** button.

Click on the **Exit** button or the user can press the **Esc** key on the keyboard to exit from the Curve Editor window and put you back into the main Power*Curve Window.

Importing Directional Surveys, Running Minimum Curvature Calculations and Updating the Well Path Curve.

Before we can successfully import surveys, run the minimum survey calculations and update the well path curve at one time we have to fill in some necessary information in the Survey Report.

- 1.) **Click** on the **Report** selection on the Menu bar and **select** the **Directional Survey** selection from the pull down menu. This will activate the Direction Survey Window. The steps below will fill in the necessary fields to run minimum curvature calculations, you can fill in the rest if you so desire.

Directional Survey

Save Undo New Del First Prev ? Next Last Survey Points Master Survey Group Calculate TVD

Survey Group... 1

Service Company: Ed's Directional Drilling

Directional Driller: Ed Godfrey

MWD Hands: Freddy Whynot

Survey

Date: Sep 20, 2004 Type: magnetic Mode: MWD

Calculation Method: minimum curvature *Dog Leg Severity Characteristic: 30 *Target Azimuth: 120

User-defined TVD Calculation

Calculate Calculation Method: minimum curvature Calculate From: tie-in

Remarks:

The well was drilled very close to what the proposed well path was planned. The hole was terminated early due to hole problems.

Kick-off

*MD: *TVD: *Inclination °: *Azimuth °

*E/W: *N/S: *Section: *Dog Leg

Latitude: Longitude:

Surface Coordinates relative to boundary

N/S: E/W:

Tie-in

*MD: 990 *TVD: 494 *Inclination °: 80 *Azimuth °: 120

*E/W: 770 *N/S: -32 *Section: 658 *Dog Leg: 3

Latitude: 10 deg 23 hr 12' 23"

Longitude: 30 deg 19 hr 45' 30"

Surface Coordinates relative to boundary

N/S: 870 feet north of the South boundary

E/W: 340 feet East of the West boundary

* Indicates fields that are required for Minimum Curvature and TVD calculations

2.) **Select 30** from the **Dog Leg Severity Characteristic** Drop Box.

3.) **Type in 120** in the **Target Azimuth** Field

4.) **Type in 990** in the **Tie in MD** Field, **tab, 494** in the **Tie in TVD** Field, **tab, 80** in the **Inclination** field, **tab, 120** in the **Azimuth** Field, **tab, 770** in the **E/W** field, **-32** in the **N/S** field, **tab, 658** in the **Section** field, **tab,** and **3** in the **Dog Leg Severity** field.

- 5.) In the user defined portion of the window **place a check in the box beside the calculate field, select minimum curvature** from the calculation method drop box and **select tie in** from the **calculate from drop box**. Doing this will automate the calculation in survey points window.
- 6.) Click on the **Save** button and then click on the **Exit** button from the ensuing Record Saved Successfully System Message. This will put you back into the main Power*Curve window.

Note: If you do not have the Las Import Module or you do not have Access to the necessary data file hztutsp.txt in the Pgeology \ System directory skip to page 27 to do the manual entry method.

- 7.) Click on the **File** selection to activate the pull down menu and **select Import / Export** to activate the pop-out menu and **Select Import Surveys...** or you can click on the **Import Surveys** button on the toolbar to activate the Directional Surveys Import window.

Directional Survey Import

Choose File... Edit File... Reload File Survey Group... 1

Choose Delimiter
space

Choose Start Depth

Depth Angle Azimuth

10000.00 80.00 120.00

10030.00 85.00 120.00

Once the correct delimiter is selected, the data should fill separate curves, starting with the first. Then, from the drop-down lists, choose which curves are for Measured Depth, Inclination and Azimuth.

Select Data Columns

Column 1	Column 2	Column 3	Column 4	Column 5
Depth	Angle	Azimuth		
10000.00	80.00	120.00		
10030.00	85.00	120.00		
10060.00	87.50	120.00		
10090.00	89.50	120.00		
10120.00	90.00	120.00		

Measured Depth Column
1

Inclination Column
2

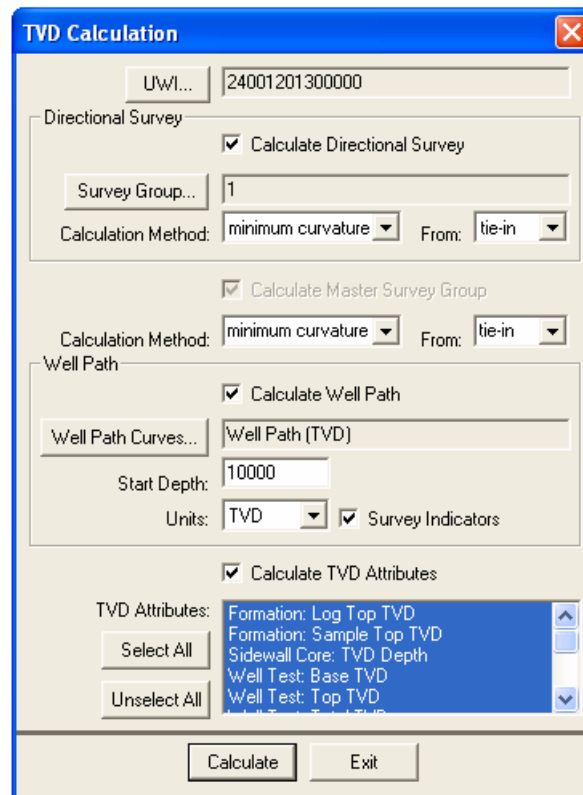
Azimuth Column
3

IMPORT

Calculate TVD Exit

- 8.) Click on the **Survey Group...** button. This will activate the Choose Directional Survey Group window and **select Group 1**.
- 9.) Click on the **Choose File...** button. This will activate the Open ASCII File window.
- 10.) Select the **“Imperial Horizontal Survey Points.txt”** located in the Powersuite / System directory. If chosen correctly it will look like the Direction Survey Import Window.

- 11.) In the Choose Start Depth field **select the 10000 line** by **clicking on it once** so that it becomes highlighted.
- 12.) In the Measured Depth Column Field **Select 1 (one)** by clicking on the down arrow and selecting 1 (one) from the resulting 1-10 menu. You should see 1 in the field.
- 13.) In the Inclination Column Field **Select 2 (two)** by clicking on the down arrow and selecting 2 (two) from the resulting 1-10 menu. You should see 2 in the field.
- 14.) In the Azimuth Column Field **Select 3 (three)** by clicking on the down arrow and selecting 3 (three) from the resulting 1-10 menu. You should see 3 in the field. **Your Import window should now look identical the figure on the previous page.**
- 15.) **Click** on the **IMPORT** button. You will notice a Progress or Status Window and then after the import a System Message will be activated asking the user *“Do you wish to calculate your Directional Surveys Now?”*.
- 16.) **Click** on the **Yes** button. This will activate the TVD Calculations window.



- 17.) In the **Directional Survey portion** of this window the defaults should be set by the Directional survey report we filled in earlier. Make sure that the **Calculate Directional Survey check box is checked**, **Survey Group One (1)** is viewed, **Minimum Curvature** is selected in the Calculation Method drop box and **tie in** is selected from drop box
- 18.) In the Master Survey Group **select the Minimum Curvature** in the Calculation Method drop box and **tie in** is selected from drop box

- 19.) In the Well Path portion of the window **select the Calculate Well path check box**. Click on the **Well Path Curves...** button. This will activate a Curve List window.
- 20.) **Double Click** on the **Well Path (TVD)** curve **or Click once** on the **Well Path (TVD)** curve and **click** on the **Select** button. This will put you back into the TVD Calculations window and place the Well Path (TVD) curve name. **Type** in a Start Depth of **10000** in the Start Depth field and **select the Units** for the curve as **TVD**. Also **check the Point Indicators check box**.
- 21.) In the **Calculate TVD Attributes** portion of the window deselect the **check box**. We do not have any of these fields to be updated at this point in time.
- 22.) **Click** on the **Calculate Button**. This will activate a Progress Window followed by a System message "*Exit TVD Calculation Window?*". **Click** on the **Yes** button. **You should now see the directional survey points and well path plotted in the Detailed Lithology Track.**

Adding Directional Survey Points Manually:

If you have already imported the surveys skip ahead to page 30 dealing with **Adding an Oil / Water Contact curve layer to the log**. Those that do not have access to the import files or do not have the LAS Import module proceed with the next steps.

There are two ways of getting the survey points into the program. The user can either enter them manually into the survey point window. Or you can get an ASCII or LAS file from the directional driller. We will show you the manual entry here.

Click on the **Report** selection on the Menu bar and **select the Directional Survey** selection from the pull down menu. This will activate the Direction Survey Window.

Adding a Directional Survey Point...

- 1.) **Click** on the **Survey Points** button. This will activate the Survey Points window.

- 2.) **Click** on the **New** button to prepare the **Directional Survey Point** window for the acceptance of a new record.
- 3.) **Type** in **10000** into the field beneath the **Measured Depth** button, **tab**, **82** in the **Drift Angle** field, **tab**, and **120** in the **Azimuth** field.

Note: The **Alignment** always defaults to the **right (top)** of the track that holds the directional survey points layer. However, if you select a **Blank Alignment** from the **Alignment** field drop

box, your **Directional Survey Point(s)** will not be displayed on the **Detailed Lithology** track, but they will still be printed out in the **Well End Report** print window.

4.) Click on the **Save** button and then select **Start New Record** from the ensuing **Shortcut Options** window.

- **Adding another Directional Survey Point...**

1.) Type in **10030** into the field beneath the **Measured Depth** button, **tab**, **85** in the **Drift Angle** field, **tab**, and **120** in the **Azimuth** field.



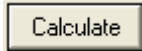
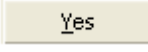
2.) Click on the **Save** button and click on the **Start New Record** from the ensuing **Shortcut Options** window.

3.) Repeat steps 1 and 2 until you enter the last 10120 Survey point and then proceed with step 4

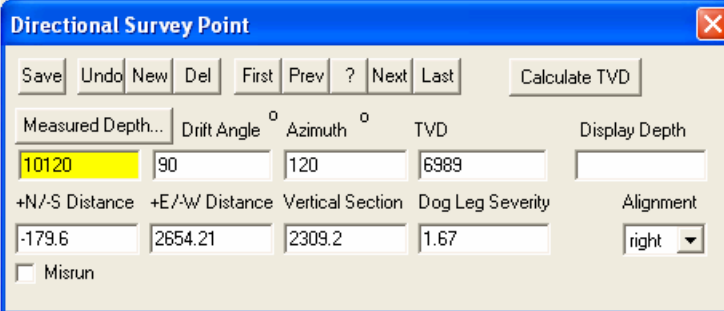
10060	87.5	120		10120	90	120
10090	89.5	120				

4.) Click on the **Calculate TVD** button to activate the TVD Calculations window.

5.) In the **Directional Survey portion** of this window the defaults should be set by the Directional survey report we filled in earlier. Make sure that the **Calculate Directional Survey check box is checked**, **Survey Group One (1)** is viewed, **Minimum Curvature** is selected in the Calculation Method drop box and **tie in** is selected from drop box

- 6.) In the Master Survey Group **deselect** the **Calculate Master Survey Group** check box as we only have one set of survey points and we do not need to assemble a master survey group.
- 7.) In the Well Path portion of the window **select** the **Calculate Well path** check box. Click on the  **button**. This will activate a Curve List window.
- 8.) **Double Click** on the **Well Path (TVD)** curve or **Click once** on the **Well Path (TVD)** curve and **click** on the  **button**. This will put you back into the TVD Calculations window and place the Well Path (TVD) curve name. **Type** in a Start Depth of **10000** in the Start Depth field and **select** the **Units** for the curve as **TVD**.
- 9.) In the Calculate TVD Attributes portion of the window deselect the check box. We do not have any of these fields to be updated at this point in time.
- 10.) **Click** on the  **button**. This will activate a Progress Window followed by a System message "*Exit TVD Calculation Window?*". **Click** on the  **button**.

When it is done your Directional Survey Point Window will be filled in with the calculation results shown.





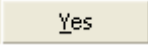

Measured Depth...	Drift Angle °	Azimuth °	TVD	Display Depth
10120	90	120	6989	
+N/S Distance	+E/W Distance	Vertical Section	Dog Leg Severity	Alignment
-179.6	2654.21	2309.2	1.67	right
<input type="checkbox"/> Misrun				

- 11.) **Click on the X** or Press your esc key to Exit this window. Your survey points and Well Path should now be seen on you log in the Detailed Lithology Track.



Adding an Oil / Water Contact Curve Layer to the log:

- 1.) Under the **Options** menu, click on **Log Configuration Builder** or click on the **Log Configuration Builder** button on the **Toolbar** to activate the **Log Configuration Builder** window.
- 2.) On the left side scroll down in the tracks portion of the window and **highlight** the **Generic Curve**

It just so happens that the default Available Log [System] defaults to the Generic Curve track. This track has all of the curves available except for mud gas curves. These can be found in the Mudlogs. The User can change names of any of the curve layers to represent any curve you wish but in our case all we have to do is follow step 2.



- 3.) Click on the **Curve** layer in the layers portion of the window on the lower left side of the builder to highlight it. Also notice the  **Layers radio button** on the left hand side gets activated.
- 4.) On the **right side (Active Log)** of the **Log Configuration Builder** window, click on the **Detailed Lithology** track to highlight it. This is the track we want to add the Curve layer to.
- 5.) Click on the  **button** and you will be prompted with the following system message, “*Do you want to ADD the selected (layer) from the available log to the active log?*” Click on the  **button**.
- 6.) This will activate a **Get Name** window with “*Curve*” as the name in the **New Layer Name** field. Type in the Get Name window “**Oil Water Contact**” and then Click on the  **button** and the **Oil Water Contact** layer will then be added to the **Detailed Lithology** track.

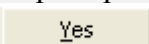
Note: The **Oil Water Contact** curve has not yet been associated with the layer yet. This will be done when the **Add Curve** window has been correctly filled in.

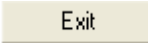
- 7.) Click on the  **button** to return to the log and the log will be initialized with the new layer, which in turn will generate an **Add Curve** window.
- **The Add Curve window...**
 - 1.) Select **ft** from the **Curve Units** drop box field.
 - 2.) Make sure **ft** is in the **Depth Units** drop box field.
 - 3.) Make sure the **Null Value** field is **-1**.
 - 4.) Make sure the **Depth Interval** is **0** and **0** indicating the present curve scale is applicable to any depth on the log.
 - 5.) Type in **7000** in the **Left / Bottom** field and **6980** to the **Right / Top** field.
 - 6.) Make sure the **Backup Scale** drop box field is **Straight Shift**.
 - 7.) Select **Linear** from the **Grid Type** drop box.
 - 8.) Click on the  **button** to add the curve layer to the Detailed Lithology Track.

Changing the Oil / Water Contact line color and adding two (2) data points to draw a line.

- 1.) Click anywhere in the **Detailed Lithology** track. Notice that a **green** border highlights or surrounds the track. This is used to indicate that the track is **ACTIVE**.
- 2.) Click on the **down arrow on the right hand side of the Layer Selection List** to activate the list.
- 3.) Click on the **Oil Water Contact** selection from the Layer Selection List. This will make the Oil / Water Contact layer active.

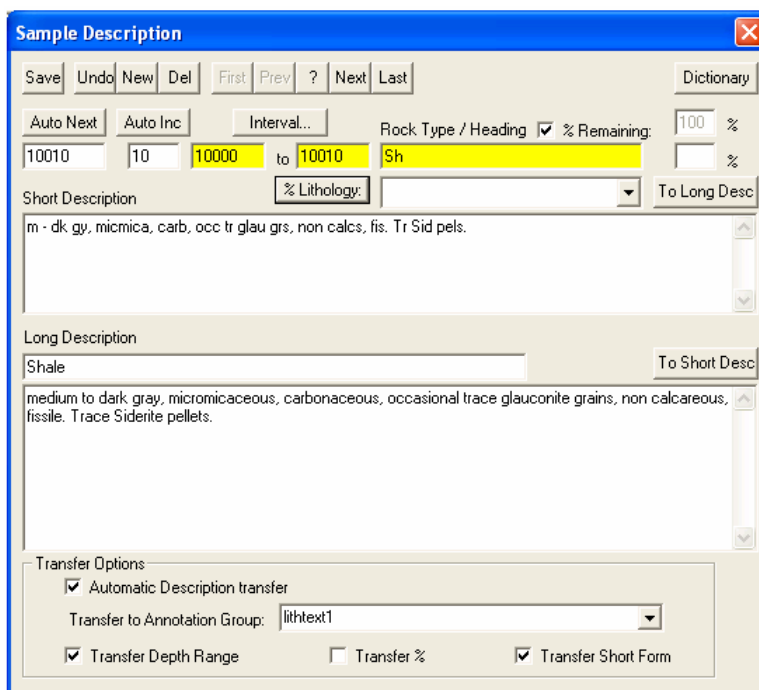
- 4.) **Right Click** on the **Oil Water Contact layer** to activate the pop-up menu and **select color** and then **select Red** from the pop-out menu. Your curve will now be red.
- 5.) **Double click** within the active **Detailed Lithology track** to activate the Curve Editor for the Oil / Water Contact Curve. **Or** the user can **click once** on the  **Data Editing Tool of Active Layer button** on the **Toolbar**.
- 6.) **Double click** on the **Depth (ft)** field and type **10000** into the **Depth (ft)** field and then press the **Tab** key on the keyboard to move the cursor to the **Value (ft)** field.
- 7.) **Type 6994** into the **Value (ft)** field and then press the **Enter** key on the keyboard.
- 8.) **Double click** again on the **Depth (ft)** field and **type 10200** into the **Depth (ft)** field and then press the **Tab** key on the keyboard to move the cursor to the **Value (ft)** field.
- 9.) **Type 6994** into the **Value (m)** field and then press the **Enter** key on the keyboard.
- 10.) **Click** on the  **button**.

Note: If you forget to save the values before you exit from the **Curve Editor** window, you will be prompted by the following system message, *“Would you like to save the digits?”* **Click** on the  **button** to save the newly edited curve values.

- 11.) **Click** on the  **button** or the user can press the **Esc key** on the keyboard to exit from the Curve Editor window and put you back into the main Power*Curve Window.

Adding Sample Descriptions:

- 1.) **Click** on the **Reports** selection on the **Power*Curve™ Menu Bar** to activate the pull down menu and then **Click** on **Sample Description** to open the **Sample Description** window.



- 2.) Type **10000** into the **Interval (From)** field and then depress the tab key.
- 3.) Type **10010** into the **Interval (To)** field and then depress the tab key.
- 4.) Type **Sh** into the **Rock Type** field and then depress the **tab key 4 times**. This will move the cursor to the Short description field.

Note: The rock types can be entered in a percentage format. This would generate a % description report as well as a % track or layer. For this exercise we will describe the samples interpretively.

- 5.) Type the following description into the **Short Description** field, exactly as it appears below:

m – dk gy, micmica, carb, occ tr glau grs, non calcs, fis. Tr Sid pels.

Note: The **Short Description** can be added to the **Lithology Description** layer in the main **Power*Curve™** window and the **Long Description** will be printed out in the **Sample Description Reports** in the **Well End Report** window.

- 6.) In the transfer options portion of the window **check mark** the **Automatic Description transfer**, **check mark** the **Transfer Depth Range**, and **check mark** the **Transfer Short Form** and select the lithtext1 group from the Transfer to Annotation Group drop box.
- 7.) Click on the **Save** button and then click on the **Start New Record** button from the ensuing **Shortcut Options** window.

Note: This will automatically transfer your samples descriptions to the Striplog.

- **Adding another Sample Description...**

- 1) Click on the **Auto Next** button to advance the description interval from depth to **10010 ft** and places the caret or highlight in the Interval to field.
- 2) Type **10022** into the **Interval (To)** field and then depress the tab key
- 3) Type **Ls** into the **Rock Type** field and then depress the **tab key 4 times**. This will move the cursor to the Short description field.
- 4) Type the following description into the **Short Description** field, exactly as it appears below:

lt gy brn, rexld mdst (crpxl), arg, dns, ns.

- 5) Click on the **Save** button and then click on the **Start New Record** button from the ensuing **Shortcut Options** window.

Note: If you have made any typing errors the user can click on the Cancel button, then you can make any necessary corrections and then **Save** the record once again to replace the old record with the new one.

- **Adding another Sample Description**

- 1.) Click on the **Auto Next** button to advance the description interval from depth to **10022 ft** and places the caret or highlight in the Interval to field.
- 2.) Type **10036** into the **Interval (To)** field and then depress the tab key
- 3.) Type **Ss** into the **Rock Type** field and then depress the **tab key 4 times**. This will move the cursor to the Short description field.
- 4.) Type the following description into the **Short Description** field.

m gy brn, m - c gred, mod srtg, rdd, qtz, com cht, occ glau & carb grs, sils cmt, fr - g intgran por (14-20%), com - abnt brn o stng, bri yel flor, g stmg mky yel cut flor.


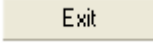
- 5.) Click on the **Save** button and then click on the **Start New Record** button from the ensuing **Shortcut Options** window.

- **Copying a Sample Description...**


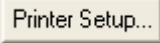
- 1.) While still in the **Sample Description** window, click on the **Interval...** button to bring up a list of the descriptions you have already entered.
- 2.) **Double click** on **10000 - 10010 Sh** and you will now see this description displayed in the **Sample Description** window.
- 3.) Highlight the text in the **Short Description** field by **clicking and dragging the mouse pointer over the text**.
- 4.) Once the text is highlighted, **hold down** the **Ctrl** key on the keyboard, press the letter **“C”** key on the keyboard, and then release the **Ctrl** key. This will **copy** the highlighted text to the computer’s clipboard. Alternatively, **Windows 95** users can simply **right click** anywhere and then select the **Copy** function from the ensuing pop-up menu.
- 5.) Click on the **New** button to clear the **Sample Description** window.
- 6.) Type in a new from **depth of 10036 ft** and **press** the **tab key** to place the caret or highlight in the Interval to field.
- 7.) Type **10052** into the **Interval (To)** field and then depress the tab key
- 8.) Type **Sh** into the **Rock Type** field and then depress the **tab key 4 times**. This will move the cursor to the Short description field.
- 9.) In the **Short Description** field **hold down** the **Ctrl** key on the keyboard, press the letter **“V”** key on the keyboard, and then release the **Ctrl** key. This will **paste** the contents of the clipboard into the **Short Description** field. Alternatively, **Windows 95** users can simply **right click** anywhere and then select the **Paste** function from the ensuing pop-up menu.
- 10.) Click on the **Save** button and then click on the **Start New Record** button from the ensuing **Shortcut Options** window.

- **Adding more Sample Descriptions...**


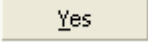
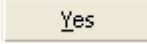
- 1.) Click on the **Auto Next** button to advance the description interval from depth to **10052 ft** and places the caret or highlight in the Interval to field.

- 2.) Type **10120** into the **Interval (To)** field and then depress the tab key
- 3.) Type **Ss** into the **Rock Type** field and then depress the **tab key 4 times**. This will move the cursor to the Short description field.
- 4.) Type the following description into the **Short Description** field, exactly as it appears below:
wh, lt gy, m - c gred, modly w srt, sbang - sbrdd, qtz, tr wthrd fld grs, tr dk cht pbls, sils cmt, g - ex intgran por (20-22%), abnt even brn o stng, flor aa.
- 5.) Click on the  **Save** button and then click on the  **Exit** button from the ensuing **Shortcut Options** window.

Printing out Sample Descriptions

- 1.) Click on the  **Print Well End Report** button on the **Toolbar** or select **Print Well End Report**, under **File**, on the **Selection Bar** to activate the **Power*Log Report: Well End Report** window.
- 2.) The **Well End Report** print window will automatically default to the active **Well/Log Name** and its associated **UWI**: you will see **Horizontal Tutorial Well (24001201300000)** in the **Well List** field and it should be highlighted. If it is not highlighted, move the mouse pointer to the **Well List** field and click on the desired **Well / Log Name** to highlight the **Well** you wish to print information from.
- 3.) Highlight **Sample Descriptions** in the **Reports** field by clicking on it once.
- 4.) Select **Printer** from the **Output** drop box field list.
- 5.) Click on the  **Printer Setup...** button, in the upper right corner of the **Well End Report** window, to activate the **Print Setup** window. Notice that the currently selected printer is listed beneath the **Default printer** radio button () , at the top left of the **Print Setup** window. Use the **Printer** section of the **Print Setup** window to specify the use of a printer other than the default printer.

Note: Power*Curve™ automatically defaults to a **Paper Orientation** of **Portrait** and a **Paper Size** of **8 5 x 11**, as specified in the **Orientation** and **Paper** sections, respectively, of the **Print Setup** window. Please do **NOT** change these default settings.

- 6.) Make sure that the **All** check box () , in the **Sample Description** section at the lower right of the **Well End Report** window, is activated.
- 7.) Click on the  **Print** button in the **Well End Report** window to printout the **Sample Descriptions**.
- 8.) When you are finished, **press** the **Esc** key on the keyboard to exit from the **Well End Report** window and to activate the following system message, **“Do you want to save the setup configuration?”** Click on the  **Yes** button and all of the printer selection/settings information utilized in the **Well End Report** window will be saved to the database for any future **Well End Report** print jobs. Clicking on the  **Yes** button will also return you to the main log window.

The Detailed Lithology Layer:

In **Power*Curve™**, this layer allows you to create a visual representation of the **Interpreted Lithology** associated with your horizontal well path and gives you the ability to show **Lithology** above and below the well path.

There are two ways this can be done. The first will be shown below utilizing the Detailed Lithology Layer. Near the end of the Tutorial we will explain how to use the Curve Fill layer to represent your lithology along the well path curve.

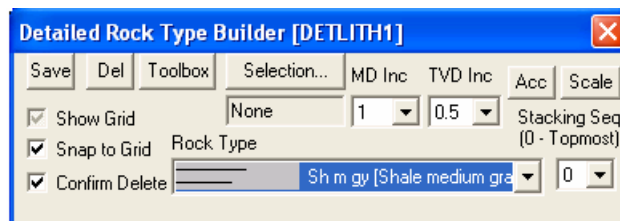
- **Drawing Detailed Lithology...**

- 1.) Make the **Detailed Lithology** layer active within the **Detailed Lithology** track by clicking on the Track and then selecting the **Detailed Lithology** layer from the **Layer Selection List** field.

Note: When this layer was first added to your log, you were prompted with a **Measured Depth** interval and a **Scale** for the top and bottom of the layer. This scale defines the upper and lower limits of your **Detailed Lithology** and should correspond to the top/right and bottom/left scales of your well path curves. The scale can be changed at any time and new scales may be added within the Detailed Lithology builder window.

When **Detailed Lithology** is your active or working layer, you will have the **True Vertical Depth (TVD)** increments visible on the left side of the layer. These are predetermined by the major/minor linear cycle settings set in the **Layer Configuration** window for this layer.

- 2.) **Double click** on the track to activate the **Detailed Rock Type Builder** window, the Toolbox, and a grid pattern (both the MD and TVD are defaulted to **1m** increments), in the **Detailed Lithology** layer.



- 3.) In our case we will need a little more accuracy in the TVD grid pattern. To change the grid pattern in the detailed lithology layer **click on the TVD Inc drop box arrow** and **select 0.2** from the subsequent list. This grid change will now be the default when you open this builder window the next time.

The Grid pattern is determined by the MD Inc and the TVD Inc drop boxes. This grid pattern is extremely helpful when the **snap to grid option** is activated. This makes the drawing of lithology a lot simpler when the user is attempting to join similar rock types together. The Show Grid option is a toggle for lack of better terms. It places the grid in front of the rock type, in back of the rock type and then it also turns the grid off entirely. As you click on this option you will notice the 3 different types of grid options.

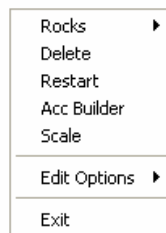
Drawing a Rock Type in the Detailed Lithology layer...

- 1.) Click on the **Sh m gy [Shale medium gray]** selection in the Rock Type Favorite toolbox to highlight it
- 2.) To define the top of the Shale bed move the mouse pointer to the detailed lithology layer so that you see in the yellow field that follows the mouse **10000 [6982]**. To define the top **left click and drag** your mouse on the Detailed Lithology layer until you see **10120 [6982]**

10000.00 [6982]
10120.00 [6982]

in the lower portion of the yellow field that follows the mouse pointer and then **release the left mouse button**. This will draw a line indicating the top of the Shale bed.

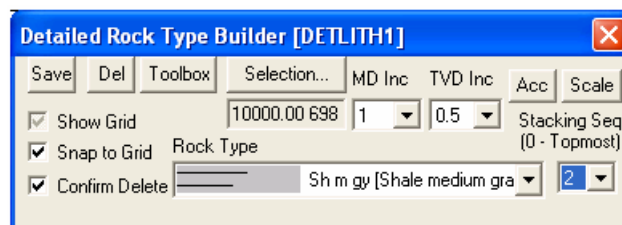
Note: If you do not like the position of the line the user can right click on the layer and you can select Restart from the resulting pop-out menu and the line will disappear so that you can proceed with step 2 again.



- 3.) Move the mouse pointer to the detailed lithology layer so that you see in the yellow field that follows the mouse **10000 [6987.5]**. To define the bottom of the Shale bed **left click and drag** your mouse on the Detailed Lithology layer until you see **10120 [6987.5]**

10000.00 [6987.5]
10120.00 [6987.5]

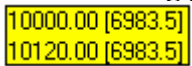
in the lower portion of the yellow field that follows the mouse pointer and then **release the left mouse button**. This will fill in the area between the two lines with Shale medium gray.
- 4.) We will define the Shale bed we just drew as the second rock type layer. We will be drawing some other rock types on top of this layer and this action will make this shale bed always underneath any lithology drawn later on this layer. To do this click on the shale bed once so that it is viewed in the builder. Then **select the 2 from the Stacking Seq drop box**.
- 5.) Click on the **Save** button. The detailed Rock Type builder should look like figure.



- **Drawing more Detailed Lithology...**

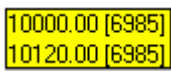
- 1.) Select the **Rock Type** for **Ls ms [Limestone (mud supported)]** from the Favorites Toolbox and it will automatically be displayed in the **Rock Type** field within the **Detailed Rock Type Builder** window.

- 2.) To define the top of the Limestone bed move the mouse pointer to the detailed lithology layer so that you see in the yellow field that follows the mouse **10000 [6983.5]**. To define the top **left click and drag** your mouse on the Detailed Lithology layer until you see **10120**

[6983.5]  in the lower portion of the yellow field that follows the mouse pointer and then **release the left mouse button**. This will draw a line indicating the top of the Limestone bed.

Note: If you do not like the position of the line the user can right click on the layer and you can select Restart from the resulting pop-out menu and the line will disappear so that you can proceed with step 2 again.

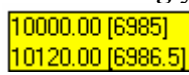
- 3.) Move the mouse pointer to the detailed lithology layer so that you see in the yellow field that follows the mouse **10000 [6985]**. To define the bottom of the Limestone bed **left click and**

drag your mouse on the Detailed Lithology layer until you see **10120 [6985]**  in the lower portion of the yellow field that follows the mouse pointer and then **release the left mouse button**. This will fill in the area between the two lines with Limestone (mud supported).

Note: After the Limestone (mud supported) has been drawn you will notice you will notice that there is a 0 in the **Stacking Seq drop box**. Whenever a new rock has been added it will default to a 0 layer or on top. The Limestone in this case will always be on top of the Shale that was first drawn.

- **Drawing still more Detailed Lithology...(rectangle method)**

- 1.) Select the **Rock Type** for **Ss [Sandstone]** from the Favorites Toolbox and it will automatically be displayed in the **Rock Type** field within the Detailed Rock Type Builder window.
- 2.) We will define the top left interval and the lower right interval defining a rectangle with the mouse. Hold the **CTRL Key down** on the keypad and then to define the top left hand corner of the Sandstone bed move the mouse pointer to the detailed lithology layer so that you see in the yellow field that follows the mouse **10000 [6985]**. Now **left click and drag** your

mouse on the Detailed Lithology layer until you see **10120 [6986.5]**  in the lower portion of the yellow field that follows the mouse pointer and then **release the left mouse button**. This will fill in the area of the rectangle with Sandstone.

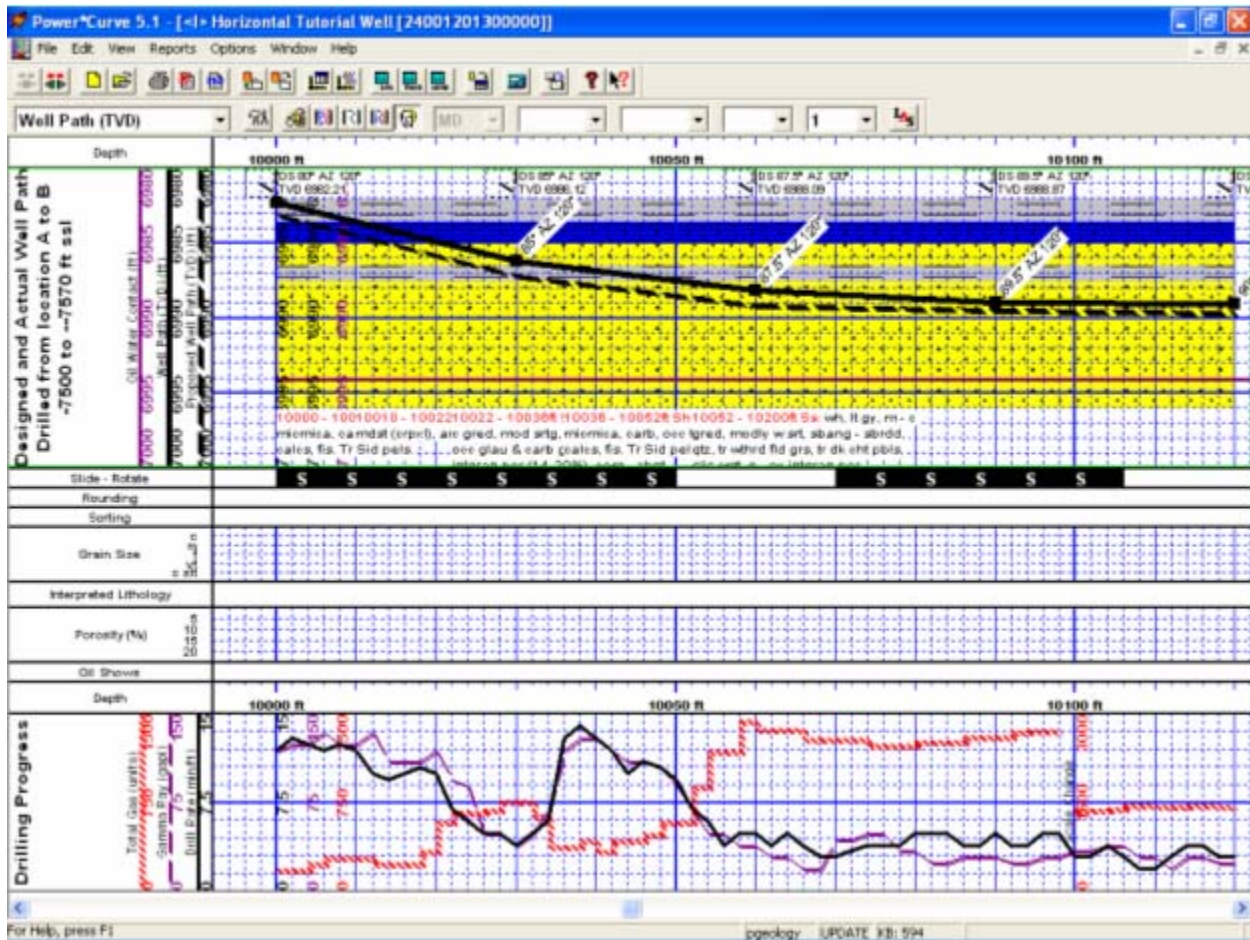
- **Drawing still more Detailed Lithology...(rectangle method)**

- 1.) Select the **Rock Type** for **Ss [Sandstone]** from the Favorites Toolbox and it will automatically be displayed in the **Rock Type** field within the Detailed Rock Type Builder window.
- 2.) We will define the top left interval and the lower right interval defining a rectangle with the mouse. Hold the **CTRL Key down** on the keypad and then to define the top left hand corner of the Sandstone bed move the mouse pointer to the detailed lithology layer so that you see

in the yellow field that follows the mouse **10000 [6987.5]**. Now **left click and drag** your mouse on the Detailed Lithology layer until you see **10120 [6996]** **10000.00 [6987.5]** **10120.00 [6996]** in the lower portion of the yellow field that follows the mouse pointer and then **release the left mouse button**. This will fill in the area of the rectangle with Sandstone.

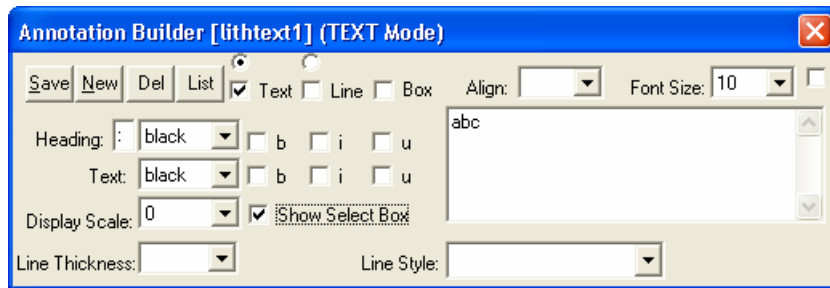
3.) Click on the X or press the **ESC** key on your keypad to Exit the builder

**** Your log should now look similar to the Log shown below. ****



Moving Lithology Descriptions...

- 1.) Make the **Lithology Descriptions** layer active within the **Detailed Lithology** track by clicking on the Track and then selecting the **Lithology Descriptions** layer from the **Layer Selection List** field.
- 2.) **Double click** anywhere within the **Detailed Lithology** track to activate the **Annotation Builder** window for the Lithology Descriptions Layer.



- 3.) **Click once** in the **Show Select Box** check box () within the builder and this will activate a red dot on the corner of all the annotations that belong to this annotation layer.
- 4.) **Click** on the **Red Dot** next to the Description you want to move and it will be displayed in the **Annotation Builder** window and an outline will appear around the **Sample Description**.
- 5.) Place the mouse pointer inside the outline surrounding the selected **Sample Description** on the **Lithology Descriptions** layer and the mouse pointer will turn into cross-hairs.
- 6.) **Click and drag** the mouse pointer to the Sample Description's new position and then release the mouse button, and the **Sample Description** will be redrawn at its new location.
- 7.) Repeat steps 4-6 to move any of the descriptions to where they best fit.
- 8.) Press the **Esc** key on the keyboard to exit from the **Annotation Builder** window, when you are finished.

- **Resizing Sample Descriptions...**


- 1.) **Click** on the **Red Dot** next to the Description you want to resize and it will be displayed in the **Annotation Builder** window and an outline will appear around the **Sample Description**.

Note: You may only be able to activate the red dot associated with the uppermost **Sample Description**, because the **Sample Descriptions** created by you in the **Sample Description** window may overlap one another within the **Lithology Descriptions** layer.


- 2.) Place the mouse pointer overtop of the square boxes in the box outline around the selected **Sample Description** on the **Lithology Descriptions** layer and the mouse pointer will turn into two arrows.
- 3.) **Click and drag** the mouse pointer to the Sample Description's new size and then **release** the **mouse button**, and the **Sample Description** will be redrawn at its new size.
- 4.) Repeats steps 4-6 to change any of the sizes of the Sample Descriptions on your Log.
- 5.) Press the **Esc** key on the keyboard to exit from the **Annotation Builder** window, when you are finished.

- **Editing a Sample Descriptions...**

In this example, you will change the description of the **Sh** originally placed at **10036 ft** The description was 10036-10052 ft Sh : m – dk gy, micmica, carb, occ tr glau grs, non calcs, fis. Tr Sid pels.


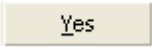
- 1.) **Click** on the **Red Dot** next to the above sample description and it will be displayed in the **Annotation Builder** window and an outline will appear around the **Sample Description**.
- 2.) In the Builder window **click once in the editing field** between the Sh and the Colon (:) so that you see a flashing caret in the space and change the depth interval from 10036 to 10052 ft to **10036 to 10051 ft and then replacing the shale description with aa**.
- 3.) **Click** on the  **button**, when you are finished.

If you wish to modify the **Sample Description** further, you can use the **Heading, Color, Bold, Italicize, and Underline** fields to modify the appearance of the **Sample Description** header and/or text. For example, the **Bold** check box (**b**) can be activated to bold the **Sample Description** header and/or text. The *Italic* check box (**i**) can be used to italicize the **Sample Description** header and/or text. The Underline check box (**u**) can be used to underline the **Sample Description** header and/or text. Moreover, the **Sample Description** header and/or text may also be assigned different colors selected from the **Color** drop box fields.

Note: If you wish to edit any other **Sample/Lithology Description** parameters simply make the necessary changes within the **Annotation Builder** window and click on the  **button**, and the **Sample/Lithology Description** will be changed accordingly.

- 4.) Press the **Esc** key on the keyboard to exit from the **Annotation Builder** window, when you are finished.

Deleting a Sample Descriptions:

- 1.) **Right click** on the Red Dot to activate the pop-up menu and then **click** on the **Delete** selection. **Or Click** on the  **button** within the Annotation Builder window. This will activate a System message *“Do you really want to Delete?”*
- 2.) **Click** on the  **button**.
- 3.) Press the **Esc** key on the keyboard to exit from the **Annotation Builder** window, when you are finished.

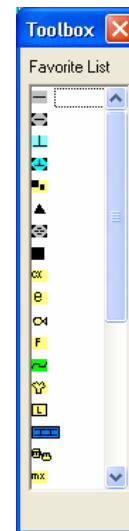
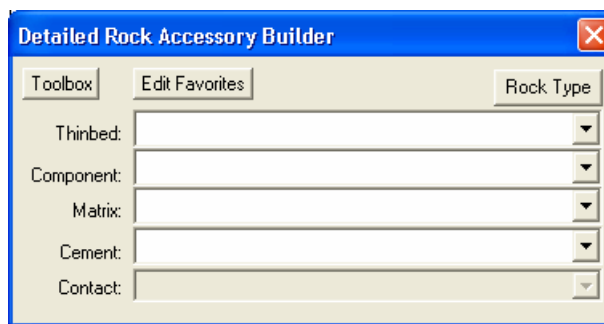
Drawing Accessories:

- 1.) Make the **Detailed Lithology** layer active within the **Detailed Lithology** track by clicking on the Track and then selecting the **Detailed Lithology** layer from the **Layer Selection List** field.

- 2.) **Double click** anywhere within the **Detailed Lithology** track to activate the **Detailed Rock Type Builder** window and it favorites toolbox.
- 3.) **Right click** once anywhere within the **Detailed Lithology** track to activate the pop-up menu.



- 4.) **Select Acc Builder** from the pop-up menu to activate the **Detailed Rock Accessory Builder** window along with the **Accessory Favorite Toolbox**.



Note: The graphical images utilized in the Favorites Toolbox shown above represents the specific **Accessories** selected by the user in the **System Options** window (See **System Options** earlier in this tutorial).

...Adding a Thinbed...

- 1.) **Click** on the symbol for **Siderite Nodules** from the Toolbox and the Thinbed field in the Detailed Rock Accessory Builder window will be filled in with sid nodules [siderite nodules].
- 2.) **Click anywhere** within the existing Detailed Lithology layer to insert the desired symbol.
- 3.) Repeat Steps 1 to 2 for **dark chert pebbles**

Note: To delete an **Accessory symbol**, activate the **Detailed Rock Accessory Builder** window, **right click** on the upper left corner of the **Accessory** symbol you wish to delete, and then select **Delete** from the pop-up menu.

- **Adding a Cement...**

- 1.) **Click** on the symbol for **Siliceous Cement** from the Toolbox and the **Cement** field in the Detailed Rock Accessory Builder window will be filled in with sils [siliceous].

2.) Click anywhere within the existing Detailed Lithology layer to insert the desired Symbol.

- **Adding a Component...**

1.) Click on the symbol for **Carbonaceous** from the Toolbox and the **Component** field in the **Detailed Rock Accessory Builder** window will be filled in with **carb [carbonaceous]**.

2.) Click anywhere within the existing Detailed Lithology layer to insert the desired Symbol.

Note: When placing **Accessories** on the log, you may wish to increase the mouse accuracy from the default of **1** to **0.1**. This selection is located to the left of the **LAS** button on the **Toolbar**.

- **Adding more Components...**

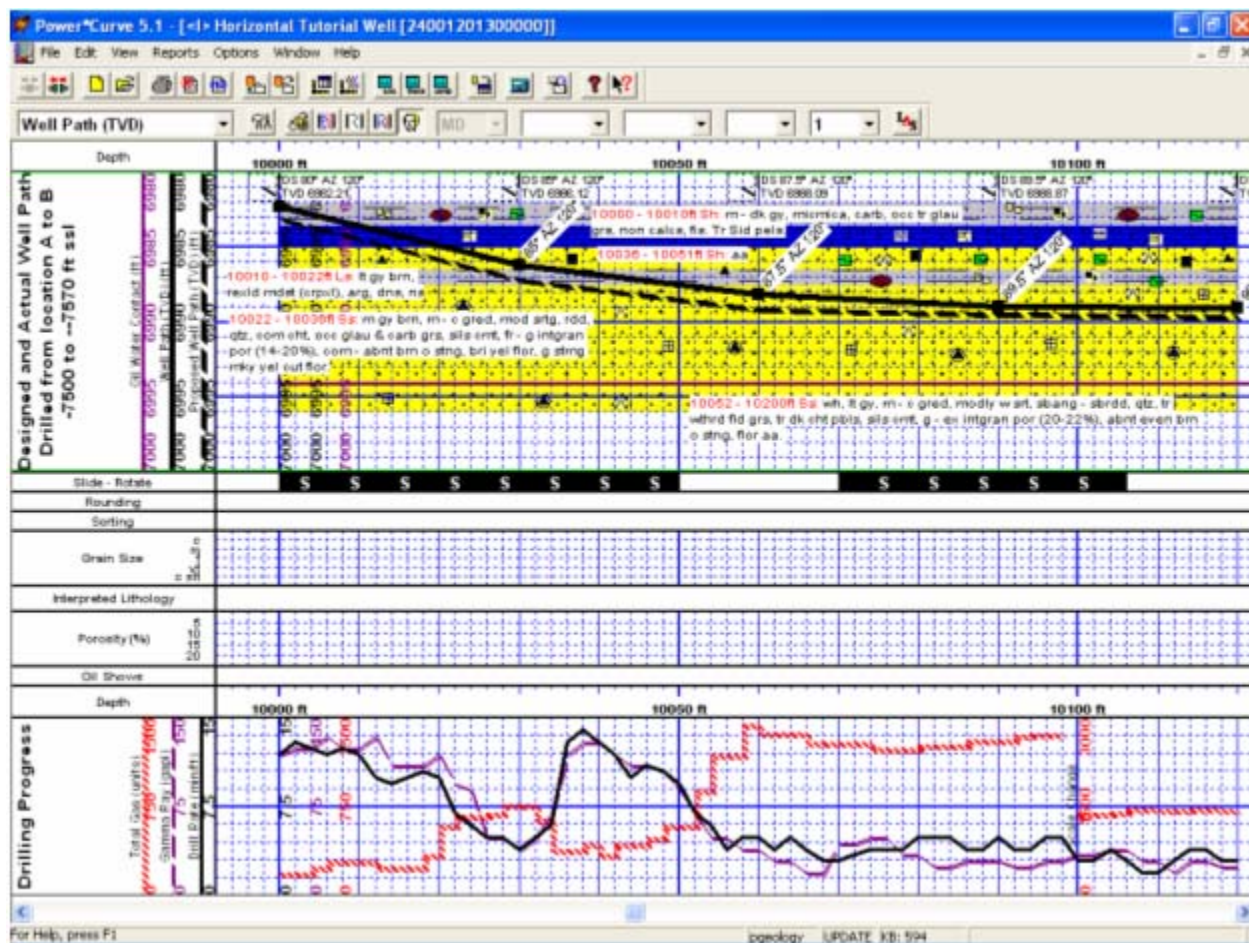
1.) Click on the symbol for **Micromicaceous** from the pop-up menu and the component field in the Detailed Rock Accessory Builder window will be filled in with micmica [micromicaceous].

2.) Click anywhere within the existing Detailed Lithology layer to insert the desired Symbol.

3.) Repeat **Steps 1** and **2** for the following components:

argillaceous chert grains feldspar grains cryptocrystalline glauconite grains

**** Your log should now look similar to the Log shown below. ****

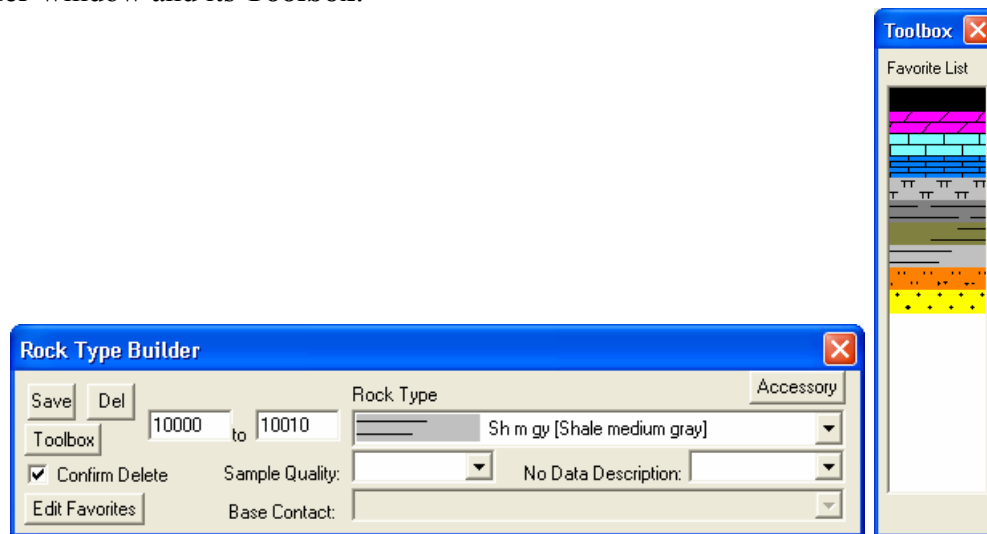


Drawing Interpreted Lithology:

Note: To work on any layer in any track, simply **double click** on the track in which you wish to work to activate the “**builder**” window for that particular layer. Once the “**builder**” window for a given layer is active, you are then able to access the right click **pop-up** menu(s) associated with that “**builder**” window and may proceed to enter any necessary intervals and graphical descriptions for the given layer.

- **Drawing Rock Types...**

- 1.) **Double click** anywhere within the **Interpreted Lithology** track to activate the **Rock Type Builder** window and its **Toolbox**.



Note: The **Rock Types** are selected by the user in the **System Options** window (See **System Options** earlier in this tutorial).

- 2.) **Select** the Rock Type for **Shale (medium gray)** from the **Toolbox** and it will automatically be displayed in the **Rock Type** field within the **Rock Type Builder** window.
- 3.) **Define** the left side of the interval by **clicking and holding** the **left mouse button** at **10000 ft** on the **Interpreted Lithology** track.
- 4.) **Define** the right side of the interval by **dragging** the mouse pointer to **10010 ft**.
- 5.) **Release the mouse button** and the interval will be drawn accordingly.

- **Drawing another Rock Type...**

- 1.) **Select** the Rock Type for **Limestone (mud supported)** from the **Toolbox** and it will automatically be displayed in the **Rock Type** field within the **Rock Type Builder** window.
- 2.) **Define** the left side of the interval by **clicking and holding** the **left mouse button** at **10010 ft** on the **Interpreted Lithology** track.
- 3.) **Define** the right side of the interval by **dragging** the mouse pointer to **10022 ft**.

4.) **Release the mouse button** and the interval will be drawn accordingly.

Drawing another Rock Type...

- 1.) **Select** the Rock Type for **Sandstone** from the Toolbox and it will automatically be displayed in the **Rock Type** field within the **Rock Type Builder** window.
- 2.) Define the left side of the interval by **clicking and holding the left mouse button** at **10022 ft** on the **Interpreted Lithology** track.

3.) Define the right side of the interval by **dragging** the mouse pointer to **10110**.

10022.00
10110.00

4.) **Release the mouse button** and the interval will be drawn accordingly.

Inserting Rock Type within an interval...

- 1.) **Select** the Rock Type for **Shale (medium gray)** from the Toolbox and it will automatically be displayed in the **Rock Type** field within the **Rock Type Builder** window.
- 2.) **Define** the left side of the interval by **clicking and holding the left mouse button** at **10036** on the **Interpreted Lithology** track.

3.) Define the right side of the interval by **dragging** the mouse pointer to **10051**.

10036.00
10051.00

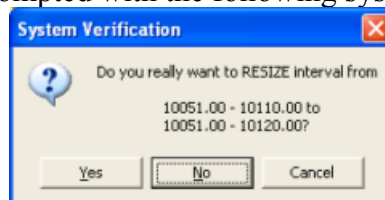
4.) **Release the mouse button** and the user will be prompted with a system message **“Do you want to ADD an interbedded interval?”**

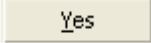
5.) **Click** on the **button** and the Shale bed will be inserted within the Sandstone Interval. If you had any accessories, grain size, sorting, rounding etc. Within this interval they would have been deleted.

Resizing an interval...

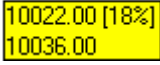
Note: The user can only resize either the top or the bottom of a particular bed at any one time. Accordingly, if you wish to resize both, you will have to repeat the steps.

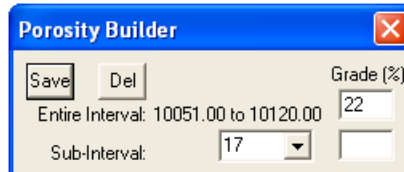
- 1.) **Left click** once anywhere within the **Sandstone** bed on the **Interpreted Lithology** track between **10051** and **10110 ft** to bring up the **Sandstone** bed and its associated interval (**10051 to 10110**), in the **Rock Type Builder** window.
- 2.) **Press and hold** the **Ctrl** key on the keyboard **down**, while **clicking and dragging** the **left mouse button** from **10100** to **10120 ft** on the **Interpreted Lithology** track.
- 3.) **Release the mouse button** at **1040m**, followed by the release of the **Ctrl** key on the keyboard, and you will be prompted with the following system message.




- 4.) Click on the  button to resize the **Sandstone** bed and then press the **Esc** key on the keyboard to exit from the **Rock Type Builder** window.

Drawing Porosity (%)

- 1.) **Double click** on the **Porosity (%)** track to activate the **Porosity Builder** window.
- 2.) Set the overall **Porosity** of the entire interval (**Ss** from **10022 to 10036 ft**), by moving the mouse pointer to the left or right within the **Porosity (%)** track, until the mouse pointer displays **10022 [18%]** in the yellow display box adjacent to the mouse pointer.
- 3.) **Click and drag** your mouse pointer to **10036**  and then **release the mouse button**, and the desired **Porosity Grade** will be drawn accordingly.
- 4.) Another method for drawing larger intervals of porosity is to click the mouse pointer within the interval. In our case **click** the mouse in the **porosity grade track between 10051 and 10120 ft**. You will notice the builder will show the entire interval for the bed.



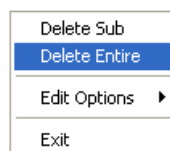
- 5.) **Click once** in the **top Grade % field** representing the entire interval. This will activate a flashing caret and type in 22 in the field.
- 6.) **Click** on the  button and the entire interval will be drawn with 22% porosity.

- **Drawing Porosity Grade sub-intervals...**

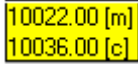
To draw **Porosity (%)** sub-intervals, as illustrated on **Page 52**, simply **click and drag** the mouse pointer from a desired **Depth** and **Porosity (%)** to another **Depth** on the **Porosity Grade track** and the sub-interval will be drawn accordingly.

- **Deleting entire Porosity (%) intervals and sub-intervals...**

If you wish to delete an entire **Porosity (%)** interval or sub-interval, while the **Porosity Builder** window is open, **right click** within the interval or sub-interval slated for deletion to activate a pop-up menu, and then left or right click on the appropriate selection.

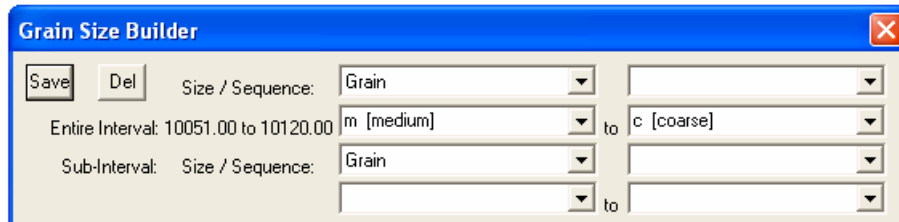


Drawing Grain Size:

- 1.) **Double click** on the **Grain Size** track to activate the **Grain Size Builder** window.
- 2.) **Click and drag** the mouse pointer from **10022 [m]** to **10036 [c]**  on the **Grain Size** track.

Note: Measured Depths and Grain Sizes, like 10022.0 [m], can be viewed within the mouse pointer display box, situated just to the right of the mouse pointer.

- 3.) Release the mouse button and the entire Grain Size interval will be drawn accordingly.
- 4.) Another method for drawing larger intervals of Grain Size is to click the mouse pointer within the interval. In our case click the mouse in the grain size track between 10051 and 10120. You will notice the builder will show the entire interval for the bed.



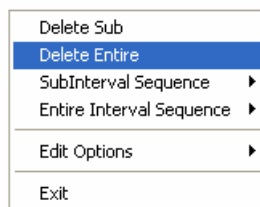
- 5.) Click on the top Grain size from field drop box arrow and select m [medium] from the resulting choice list.
- 6.) Click on the top Grain size to field drop box arrow and select c [coarse] from the resulting choice list.
- 7.) Click on the **Save** button and the entire interval will be drawn.

- **Drawing Grain Size sub-intervals...**

- 1.) Click and drag the mouse pointer from 10064.00 [m] to 10078.00 [vc].
- 2.) Release the mouse button and the sub-interval will be drawn accordingly.
- 3.) Repeat Steps 1 and 2 for 10098.00 [m] to 10120.00 [vc].
- 4.) To exit from the Grain Size Builder window press the Esc key on the keyboard once.

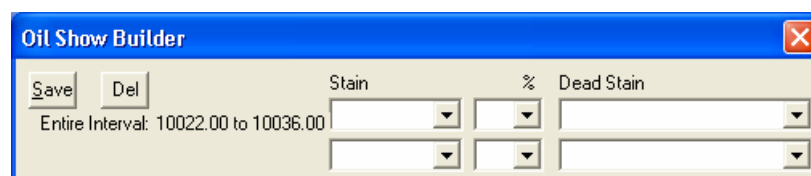
- **Deleting entire Grain Size intervals and sub-intervals...**

If you wish to delete an entire Grain Size interval or sub-interval, while the Grain Size Builder window is open. Simply right click within the interval or sub-interval slated for deletion to activate a pop-up menu, and then left or right click once on the appropriate selection.

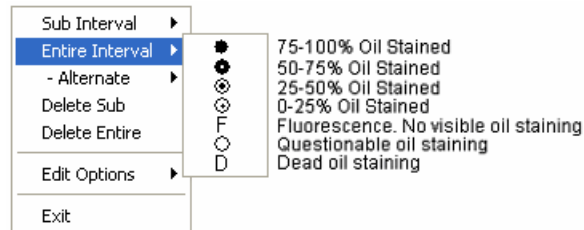


Drawing Oil Shows

- 1.) Double click on the Oil Show track to activate the Oil Show Builder window.



- 2.) **Right click** anywhere within the **10022 to 10036 ft** interval in the **Oil Show track** to activate the pop-up menu.



Note: The symbols utilized in the pop-up menu, represent a specific percentage (%) or amount of oil staining, as illustrated in the above diagram.

- 3.) **Select 50-75%** oil staining from the **Entire Interval** pop out menu and the entire bed will be populated with the **Oil Show** symbol (●) indicating **50-75%** oil staining.
- 4.) **Right click** anywhere within the **10051 to 10120 ft** interval in the **Oil Show track** to activate the pop-up menu.
- 5.) **Select 75-100%** oil staining from the **Entire Interval** pop out menu and the entire bed will be populated with the **Oil Show** symbol indicating **75-100%** oil staining.

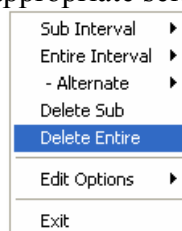
Note: The Symbol frequency or the number of symbols on a 1:240 scale is determined in the System Options located under the Option pull down men on the Power*Curve Menu Bar

- **Drawing Oil Show sub-intervals...**

- 1.) **Right click** anywhere **Oil Show** Track to activate the pop-up menu.
- 2.) **Select 50-75%** oil staining from the **Sub Interval** pop-up menu.
- 3.) **Click and drag** from **10061-10066 ft** 10061.00 10066.00, **10080-10086 ft** 10080.00 10086.00, and **10095-10102 ft** 10095.00 10102.00 and three sub-intervals will be populated with the **50-75%** oil staining symbol (●).

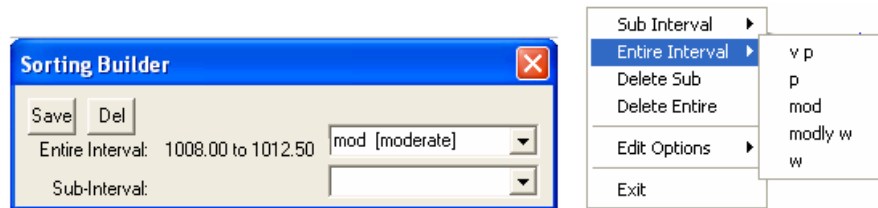
- **Deleting entire Oil Show intervals and sub-intervals...**

To delete an entire **Oil Show** interval or sub-interval, while the **Oil Show Builder** window is open, **right click** within the interval or sub-interval slated for deletion to activate the pop-up menu and then left or right click on the appropriate selection.



Drawing Sorting

- 1.) **Double click** on the **Sorting** track to activate the **Sorting Builder** window.



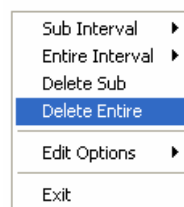
- 2.) **Right click** anywhere within the **10022 to 10036 ft** interval the **Sorting Track** to activate the pop-up menu.
- 3.) **Select mod** for the **Entire Interval** from the pop-up menu and the entire bed will be populated with the “**M**” symbol.
- 4.) **Right click** anywhere within the **10051 to 10120 ft** interval the **Sorting Track** to activate the pop-up menu.
- 5.) **Select modly w** for the **Entire Interval** from the pop-up menu and the entire bed will be populated with the “**mW**” symbol.

- **Drawing a Sorting sub-interval...**

- 1.) **Right click** anywhere on the **Sorting** track to activate the pop-up menu.
- 2.) **Select mod** from the Sub Interval pop-up menu.
- 3.) **Click and drag** from **10098 to 10108** 1026.00 1028.00 and the specified sub-interval will be populated with the “**M**” symbol.

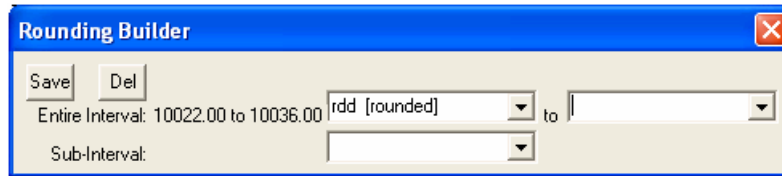
- **Deleting entire Sorting intervals and sub-intervals...**

To delete an entire **Sorting** interval or sub-interval, while the **Sorting Builder** window is open, **right click** within the interval or sub-interval slated for deletion to activate the pop-up menu and then left or right click once on the appropriate selection.



Drawing Rounding:

- 1.) **Double click** on the **Rounding** track to activate the **Rounding Builder** window



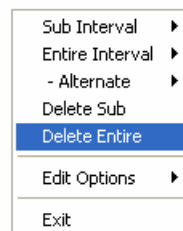
- 2.) **Right click** anywhere within the **10022 to 10036 ft** interval in the **Rounding** Track to activate the pop-up menu.



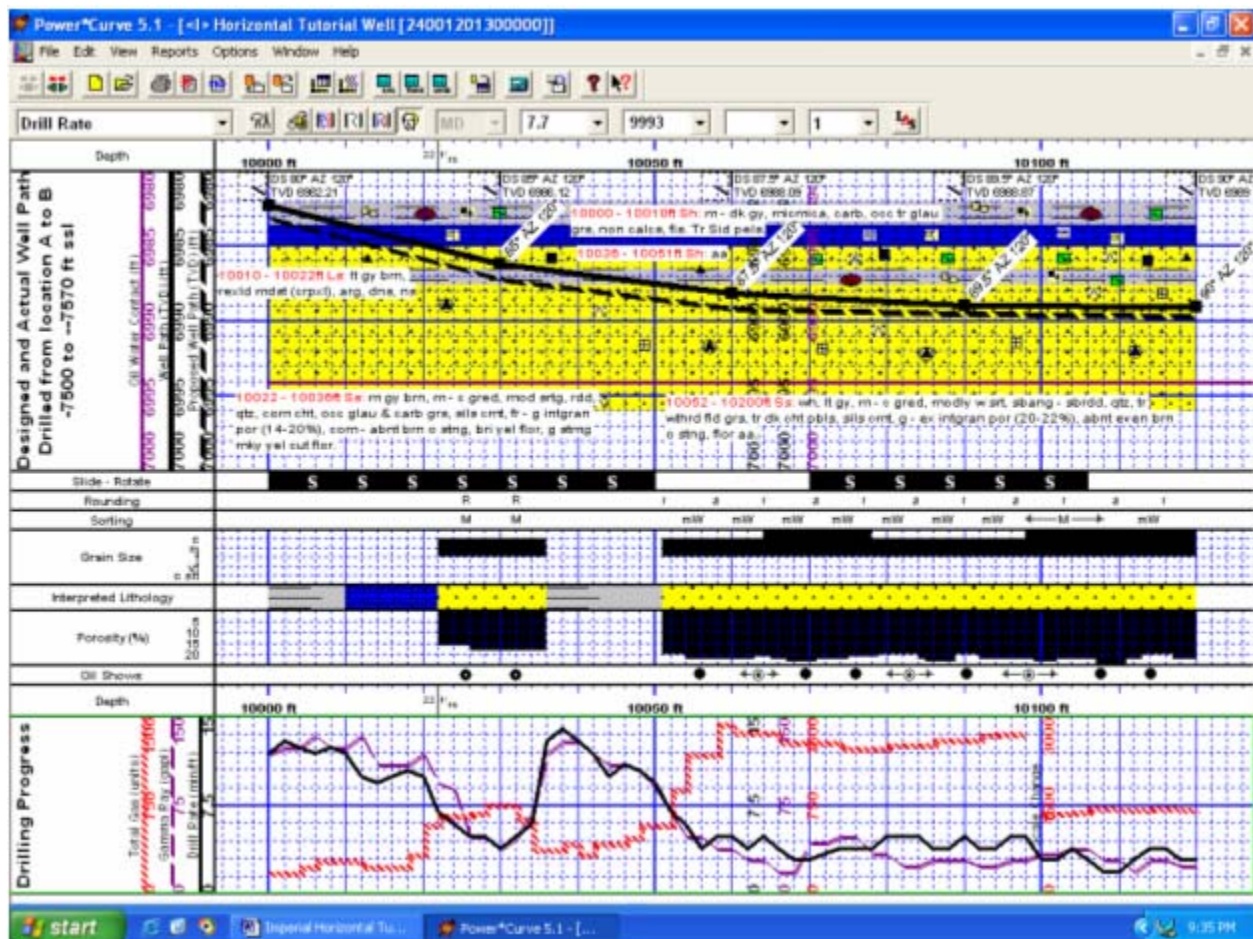
- 3.) **Select rdd** for the **Entire Interval** from the pop-up menu and the entire bed will be populated with the “**R**” symbol.
- 4.) **Right click** anywhere within the **10051 to 10120 ft** interval in the **Rounding** Track to activate the pop-up menu.
- 5.) **Select sbrdd** from the **Entire Interval pop-out menu** and the entire bed will be populated with the “**r**” symbol.
- 6.) **Right click** anywhere within the **10051 to 10120 ft** interval in the **Rounding** Track to activate the pop-up menu.
- 7.) **Select sbang** from the **- Alternate pop-out menu** and you will view alternating “**a**” and “**r**” symbols in this track.

- **Deleting entire Rounding intervals and sub-intervals...**

If you wish to delete an entire **Rounding** interval or sub-interval, while the **Rounding Builder** window is open, **right click** within the interval or sub-interval slated for deletion to activate the pop-up menu and then left or right click once on the appropriate Delete selection.



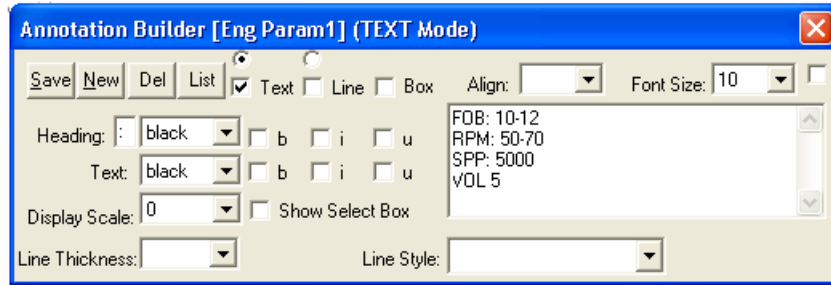
**** Your log should now look similar to the log shown below. ****



Adding an Annotation to the Drilling Progress Track

There are a number of annotations layers associated with this track. These are represented with Engineering Parameters, Mud Parameters and Gas Annotations. You could one annotation layer for all three types of annotations. We will deal with making an annotation in the Engineering Parameters layer.

- 1.) Click on the **Drilling Progress** track to make it active (highlighted in green).
- 2.) Select **Engineering Parameters**, as your active layer, from the **Layer Selection List** field.
- 3.) **Double click** anywhere within the **Drilling Progress** track to activate the **Annotation Builder** window.



- 4.) Click on the **New** button to clear the **Annotation Builder** window and prepare it for the entry of a new **Annotation**.
- 5.) Type the following into the **Annotation Builder** window's main text field where the abc is defaulted:

FOB: 10-12
RPM: 50-70
SPP: 5000
VOL: 5

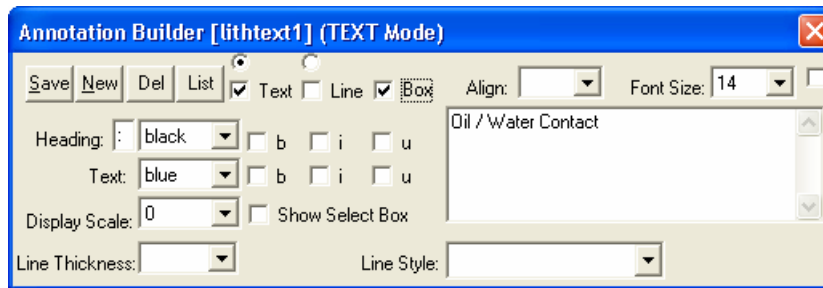
- 6.) Define the area of the layer where the **Annotation** will appear by:
 - a) placing the mouse pointer at the desired depth;
 - b) **clicking and dragging** the **left** mouse button from the upper left corner to the lower right corner of the desired area to form a rectangular shape
 - c) releasing the **left** mouse button.

Note: You can make changes to **Annotations** at any time by **double clicking** within the **Annotation** layer to bring up the **Annotation Builder** window, activating the **Show Select Box** check box () , and then clicking once on the red dot overlying the **Annotation** itself in order to display it in the **Annotation Builder** window for editing purposes.

- 7.) Press the **Esc** key on the keyboard to exit from the **Annotation Builder** window.
- 8.) The user would probably want a Grid Pattern on this Track. Select a Curve layer (Gamma Ray, Drill Rate or Total Gas) from the layer selection list on the Selection Bar.

Adding an Annotation to the Detailed Lithology Track:

- 1.) Click on the **Detailed Lithology** track to make it active (highlighted in green).
- 2.) Select **Lithology Description**, as your active layer, from the **Layer Selection List** field.
- 3.) **Double click** anywhere within the **Detailed Lithology** track to activate the **Annotation Builder** window.
- 4.) Click on the **New** button to clear the **Annotation Builder** window and prepare it for the entry of a new **Annotation**.
- 5.) Type in **Oil / Water Contact** into the **Annotation Builder** window's main text field where the abc is defaulted:



- 6.) Click on the **Box** check box () to have a box drawn around your **Annotation**.
- 7.) Select **14** from the **Font Size Drop box**.
- 8.) Select **Blue** from the **Text Color Drop box**.
- 9.) Define the area for the Oil Water Contact Curve to make this curve stand out.
 - a) placing the mouse pointer at the desired depth;
 - b) **clicking and dragging** the **left** mouse button from the upper left corner to the lower right corner of the desired area to form a rectangular shape
 - c) releasing the **left** mouse button.
- 10.) Press the **Esc** key on the keyboard to exit from the **Annotation Builder** window.
- 11.) The user would probably want a Grid Pattern on this Track. Select a Curve layer (Proposed Well path, Well Path, or Oil / Water Contact) from the layer selection list on the Selection Bar.

Adding a Formation Top:

- 1.) Click on the **Reports** selection on the **Power*Curve™ Menu Bar** to activate the pull down menu and then Click on **Formation** to open the **Formation** window shown on the next page.
- 2.) Click on the **New** button to clear the window and get the window ready to accept another record.
- 3.) Click in the **Formation Short Name field** to activate a flashing caret and **type in rs**. Press the Tab Key. This will advance the user to the Formation Long Name field. The rs will be drawn in the Formation Tops (Short Name) layer which is associated with the Measured Depth Tracks.
- 4.) **Type in the Red Sky** in the Formation Long name field. Red Sky will be drawn in the Formation Tops (Long Name) layer which is associated with the Detailed Lithology Track.

Well Formation

Save Undo New Del First Prev ? Next Last K.B. Ground Casing Flange Alignment
 Short Long 594 center

Group: Boundary Type: conf [conformable]

Formation... rs **Red Sky** Fault Type:

Member:

Seq#: Subsea: -6391.0 Long Name Display Depth:

Era Mesozoic Series Lower
 Period K [Cretaceous] Stage Santorian

Age: 84 million years Thickness: Calculate Thickness

Evaluation: Samples To Long Desc

The Red Sky consists of an upper 7 foot thick Sandstone, a middle 5 foot thick Shale unit, followed by the lower main Red Sky Sand. The well was drilled horizontally in this formation. The lower Sand was predominately white, light gray, medium to coarse grained, moderately well sorted, subangular to subrounded, quartz, trace weathered feldspar grains, trace dark chert pebbles, siliceous cement, good to excellent intergranular porosity (20-22%), abundant even brown oil staining, bright yellow fluorescence, good streaming milky yellow cut fluorescence.

To Long Desc

Conclusion: To Long Desc

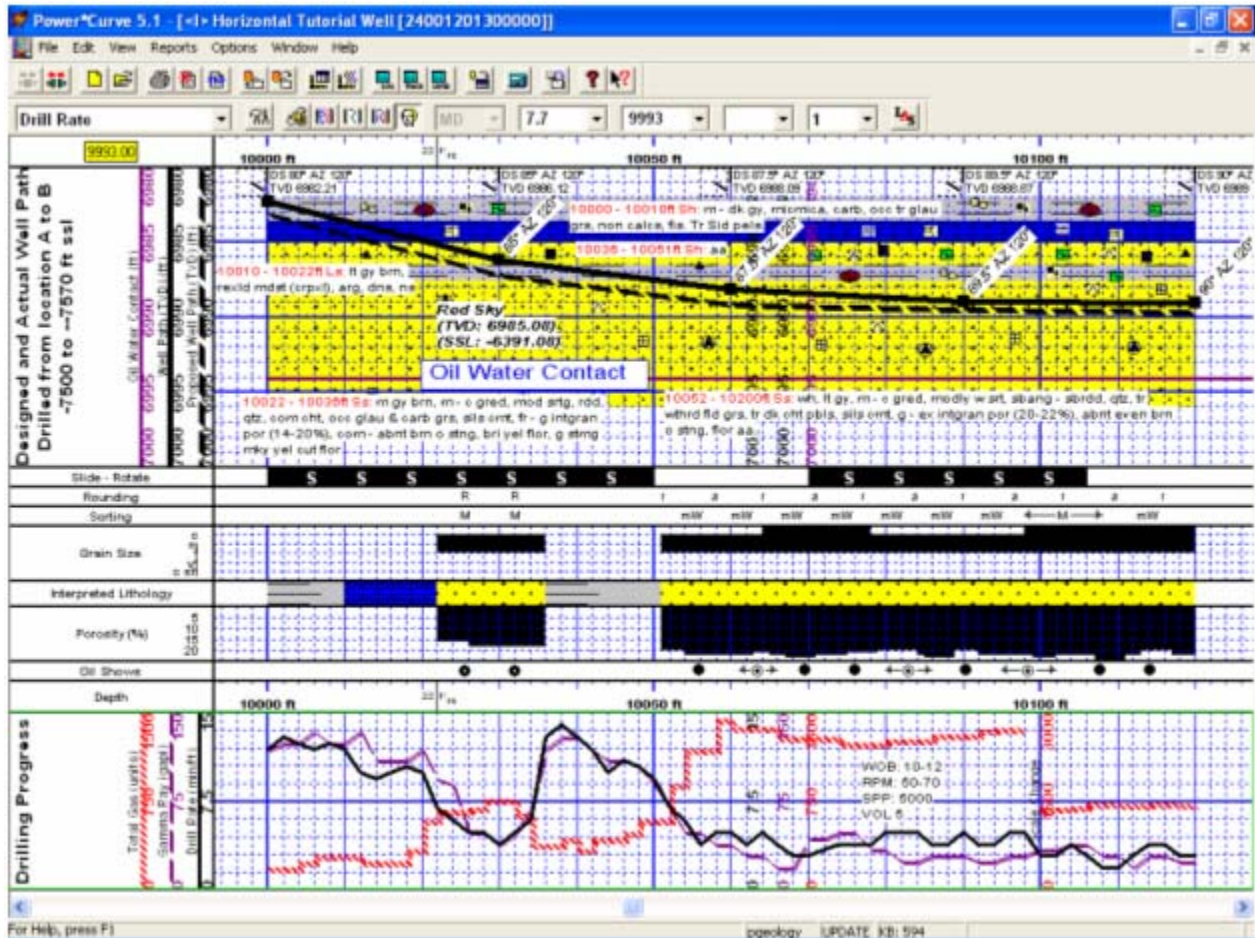
The Red Sky showed well with all three economic indicators. The mud gas shows were quite good. The staining was even and lively and the porosity estimations were very good as well. This is more than likely a good hydrocarbon reservoir and should be cased and production tested.

- 5.) **Select Mesozoic** from the **Era drop down box**.
- 6.) **Select Lower** from the **Series drop down box**.
- 7.) **Select K (Cretaceous)** from the **Period drop down box**. The K will be drawn in the Formation Tops (Short Name) layer which is associated with the Measured Depth Tracks.
- 8.) **Select Santorian** from the **Stage drop down box**.
- 9.) **Select Conformable** from the **Boundary Type drop down box**.
- 10.) Type **10022** into the **Sample Top MD** field. You will notice that the TVD Sample top field will be calculated for you. Then depress the tab key four times. This will place the flashing caret in the Evaluation field.
- 11.) The user can then **type** in the Evaluation short form or the user can go to the **Samples button** and search the samples to copy and paste the relevant description. Once done **click** on the **To Long Desc** button to expand the description. Then depress the tab key. This will advance the flashing caret to the Conclusion field.
- 12.) **Type the Conclusion** into the Conclusion field. **Click** on the **To Long Desc** button to expand the description.
- 13.) **Select Center** from the **Alignment drop down box**. Red Sky will be drawn in the center of the Formation Tops (Long Name) layer which is associated with the Detailed Lithology Track along with its Subsea and TVD values.

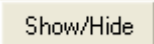

Note: The subsea values are calculated from the K.B. elevations entered into the Well window which can be edited. The Well window can be found by clicking on Edit on the Power*Curve men bar and select Well from the resulting pull down menu.

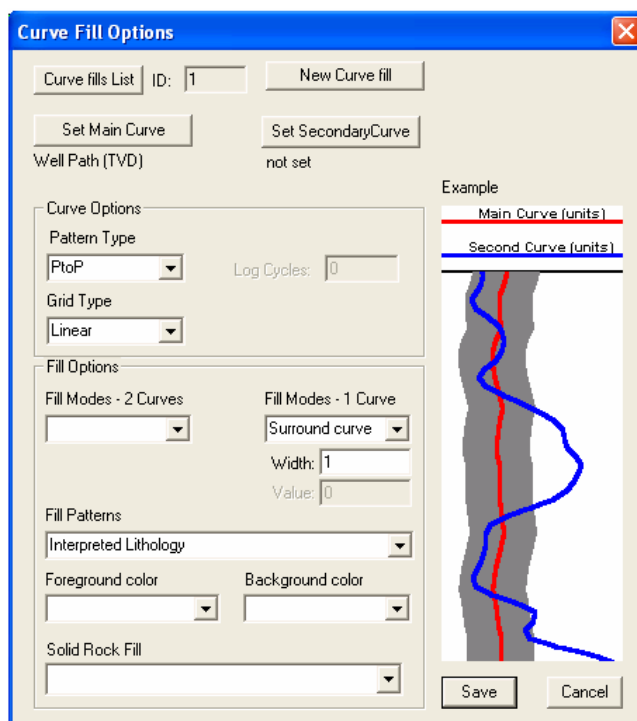
- 14.) Click on the **Save** button and then select **Exit** from the ensuing **Shortcut Options** window. You will notice the both the Short Name and Long Name formation tops layers filled in with the appropriate Red Sky tops information.



**** Your log should now look similar to log shown below. ****



Curve Fill Layer to Draw Lithology in the Detailed Lithology Track

- 1.) Click on the **Detailed Lithology** track to make it active (highlighted in green).
- 2.) Click on the **View pull down menu** and select **Layers Organizer**. This will activate the Layers Organizer window for the detailed Lithology Track.
- 3.) Click on the **Detailed Lithology Layer** so that it is highlighted.
- 4.) Click on the  **button**. This will turn off the detailed lithology layer. You will notice and N beside the layer name.
- 5.) Click on the  **button**. This will close the window and turn off the Detailed Lithology layer.
- 6.) Select **Curve Fill**, as your active layer, from the **Layer Selection List** field. This will make the Curve fill layer active.
- 7.) **Double click** anywhere within the **Detailed Lithology** track to activate the **Curve Fill Options** window shown below.



- 8.) Click on the  **button**. This will activate a list of curves associated with this well.
- 9.) Click on the **Well Path** so that it gets listed in the upper portion of the window and then click on the  **button** or **double click** on the **Well Path**. You will now view the curve name below the Set Main Curve button.

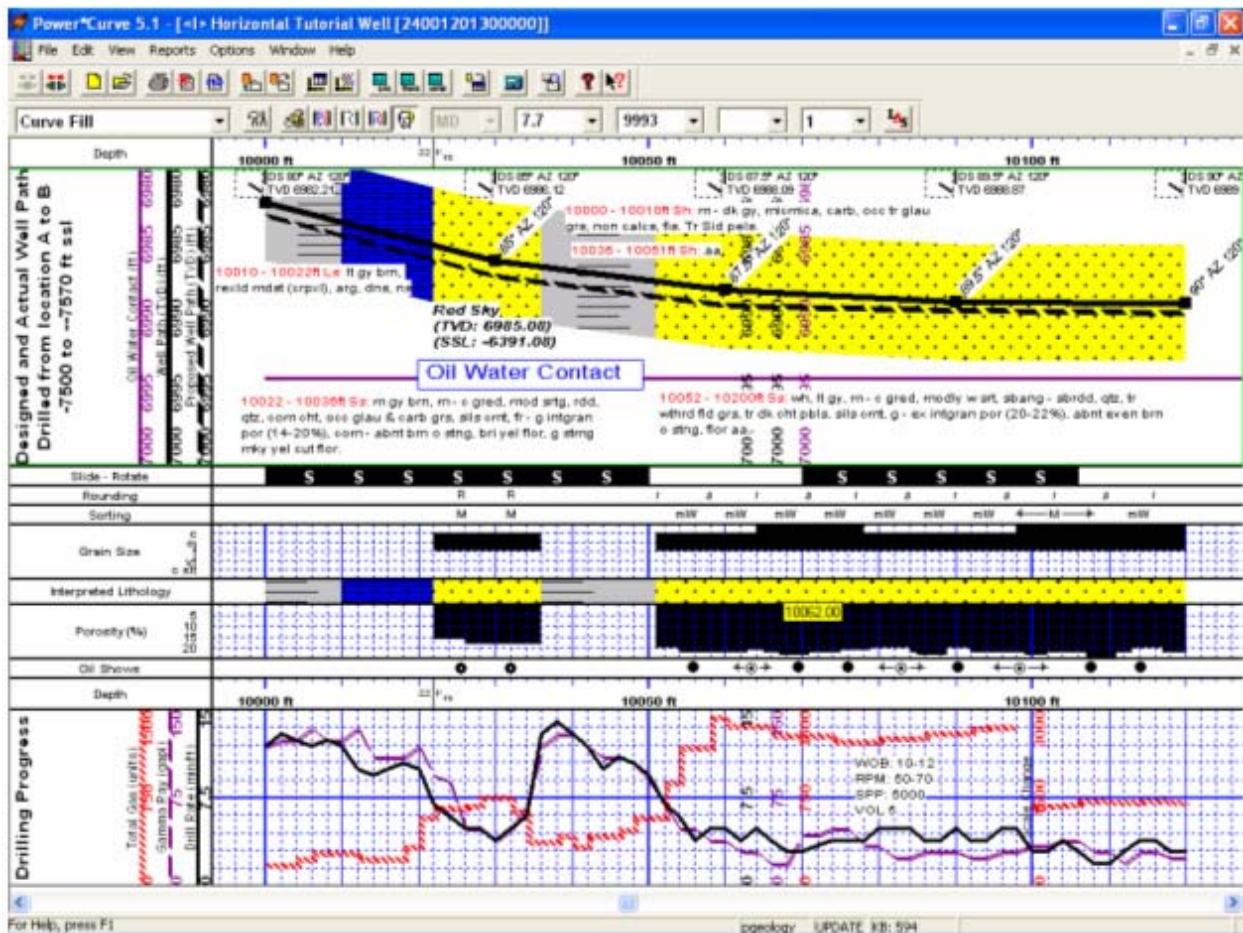
Curve Options Portion of the Window. This information is pertaining to the Main Curve and its Curve attributes.

- 10.) Click on the **Pattern Type** down arrow and select PtoP (Point to Point).
- 11.) Click on the **Grid Type** down arrow and select the **Linear**.


Fill Options Portion of the Window (One Curve)

- 12.) Click on the **Fill Modes – 1 Curve** down arrow and select **Surround Curve**.
- 13.) **Type 1** in the **Width** field. Example If (1) one is type into the width field then the fill will be ½” either side of the Well Path Curve.
- 14.) Click on the **Fill Patterns** down arrow and select the **Interpretive Lithology**.
- 15.) Click on the **Save** button. The Curve Fill Options window will close and the changes you have made will be shown on the layer.

**** Your log should now look similar to the log shown below. ****



How to Print the Log

- 1.) Under the **File** menu, click on **Print Log** or click on the  **Print button** on the **Toolbar** to activate the **Print Log** window.

Note: The Title bar and all depths associated with the Print Log window are defaulted to the Depth View that Power*Core are in at the time of the activation of the Print Log window.

- 2.) Select the **letter landscape** paper orientation from the **Page Orientation drop box field** and the **Title Page**, **Legend**, and **Formation Tops** will automatically conform to the selected orientation.

Note: The letter or legal landscape or portrait settings selected from within the **Print Log** window will NOT override the paper orientation settings selected in the printer's **Properties** window. Therefore, you must also modify the paper orientation settings in your printer's **Properties** window to letter or legal landscape.

- 3.) Activate the **Legend** check box () , if you wish to have a striplog legend printed out.
- 4.) Activate the **Dynamic Legend** check box () , if you wish to have the legend reflect only the symbols printed on the log or core portions of the printed intervals defined in the log and core portions of the print log window. Leave the Dynamic Legend unchecked if you wish to print out the entire list of symbols.

In the Log portion of the Print Log window

- 5.) **Select 5"** from the scale drop box for the log to be printed out at.
- 6.) **Click** to activate the **Header** check box () to print the track headers on the log.
- 7.) **Click on User Defined Section** and **type in 9990 to 10130** in the appropriate fields to highlight it in the printing options selection box.

Note: The log itself must be displayed in whatever depth view you wish to print before you activate the print log window. To change the log to the desired format refer to depth view under the view pull down menu.

Page Margin The page margin field is available, primarily, when you are printing to Adobe Acrobat writer. When a numerical value in inches is typed into this field it will initiate a top and left margin for the templates (Title Page, Legend and Formation Tops) as well as a left margin for the main log.

Page Overlap Activate the **Page Overlap** check box () if you are printing on single sheets. This will force the printer to include an additional 1/4 inch of the log at the top and bottom of each page, so that you can cut-and-paste pages manually, if you so desire.

Print Methods...

Default Activating the **Default** radio button () forces Power*Log / Curve / Core to use a **raster or bitmap graphic printing method**. This printing method is generally used with Laser printers but not exclusively so.

Meta File Activating the **Meta File** radio button () forces Power*Log / Curve / Core to use the **meta file technology printing method**. This printing method was developed for the newer models of printers on the market today as well as using the Adobe Acrobat Distiller or pdf printing technology.

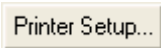
Color Options...

Auto Activating the **Auto** radio button () forces Power*Log / Curve / Core to use the settings from the printer driver to printout the log.


Color Activating the **Color** radio button () forces Power*Log / Curve / Core to override the printer driver settings and consequently Power*Log / Curve / Core assumes that you are using a color printer.

Mono Activating the **Mono** radio button () forces Power*Log / Curve / Core to override the printer driver settings and consequently Power*Log / Curve / Core assumes that you are using a monochrome (black and white) printer.

Interval per page field indicates how many meters of log will fit on a page of selected paper size and orientation selected in the setup as well as what log scale you are printing at. This will help indicate to the user how many pages will be required by the print job.

- 8.) **Click** on the  **button** to activate the **Print Setup** window and confirm that the correct printer settings are in effect.

Note: If you are printing out logs in color, you must activate the **Diffusion** or **Error Diffusion** option normally found under **Graphics** in the **Properties** window for most printers.

9.) When you are ready to print your log, **click** on the  **button**.

Note: If you do exit from the **Print Log** window, you will be asked if you wish to save the print settings. If you **click** on **Yes**, the program will remember every setting that you made to the **Print Log** window and then will default to those settings the next time you enter the **Print Log** window.

*This concludes the Power*Curve™ Tutorial. If you need help with specific functions or operations, please use the Table of Contents in the Power*Suite™ User Manual to find the desired topic or use the Search function built into the Power*Curve™ On-line Help System.*