Strater® 4

Full User's Guide



Simply Superior Well Log, Borehole & Cross Section Plotting Software

Golden Software, Inc.

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Strater® User's Guide

Simply Superior Well Log, Borehole
& Cross Section Plotting Software



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Chapter 1

Introducing Strater

Introduction to Strater®

Welcome to **Strater**, a powerful well log, borehole, and cross section plotting software package. **Strater** creates 14 different log types: depth, line/symbol, crossplot, zone bar, bar, percentage, tadpole, post, classed post, complex text, graphic, lithology, well construction, and function logs. Each of the logs can be modified to suit your needs. **Strater also** creates maps to display the well locations and cross sections that interpolate between wells. **Strater** exports to a variety of formats, including a direct export to Golden Software's **Voxler** program.

Data

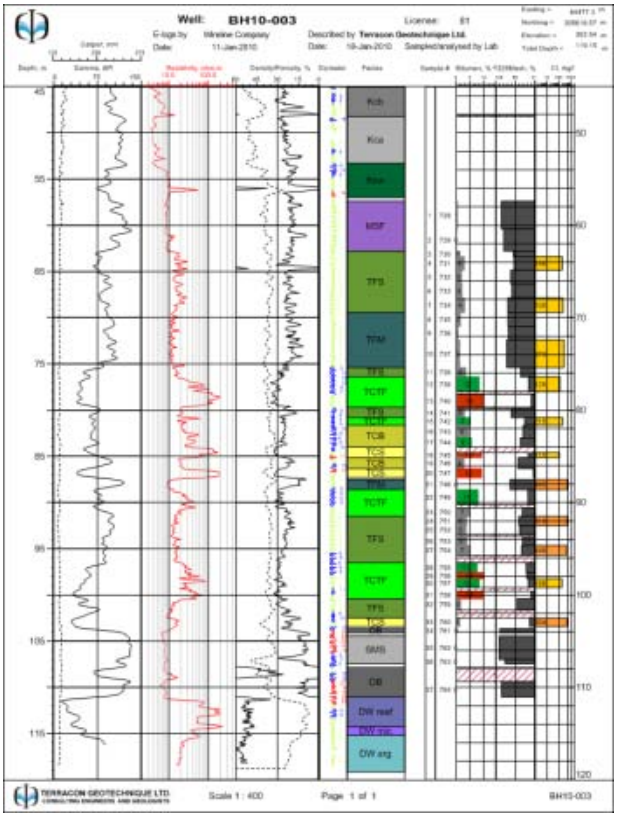
Data can be imported from many sources, including ASCII text files, LAS files, and just about any database. **Strater's** internal data structure can contain multiple tables. Multiple boreholes can be stored in the data tables at one time.

Multiple Boreholes, Multiple Views

Strater can have multiple boreholes displayed in a single view, and create multiple borehole views in a single project. You can specify a different borehole for each log in a borehole view with a few mouse clicks.

Reuse, Reuse, Reuse

Once you design a borehole view, you can use the design repeatedly with other data. There are several features in **Strater** designed to save time with borehole graphic



Create individual logs or create cross sections connecting multiple logs.

processing. After creating an initial design, you can take advantage of templates and schemes, which can be used in different projects with different data or in the same project multiple ways. Templates store the design elements of a project, including log items, header and footer items, data tables, and schemes.

Schemes contain detailed information of how the data relate to drawing properties. For example, a lithology log uses lithology schemes, which contain keywords, such as granite, clay, etc. Each of these keywords is assigned a fill pattern, contact line properties, line properties, and font properties. Schemes can be reused; therefore, you do not have to go through the process of assigning properties each time you create a log.

Strater Projects

A project file consists of all borehole views, data tables, and optional schemes, and is saved in a single .SDG file. When **Strater** first opens you see a blank, unnamed project to which you can add all the components necessary to create the borehole design. Once the borehole design is complete, use **File | Save** to save it to an .SDG project file.

Strater also provides batch printing and exporting. You can design a log and then print or export the log with multiple borehole data.

Who Uses Strater?

People from many different disciplines use **Strater** to display their well data. Users in the oil and gas industry, environmental monitoring firm consultants, mudloggers, mining geoscientists, water quality experts, military personnel, and people working at utilities companies use **Strater** to best display their data. Data from well studies, LAS files, drill cores, or text files based on seismic studies and subsurface mapping can be displayed in **Strater**. Anyone wanting to visualize the relationship of their data with stunning graphical output will benefit from **Strater's** powerful features!

System Requirements

The minimum system requirements for **Strater** are:

- Microsoft Windows® XP SP2 or higher, Vista, 7, 8, or higher
- 1024 x 768 x 16-bit color minimum monitor resolution
- At least 100 MB of free hard disk space
- At least 512 MB RAM above the Windows requirement for simple data sets, 1 GB RAM recommended

Installation Directions

Installing **Strater 4** requires logging onto the computer with an account that has Administrator rights. Golden Software does not recommend installing **Strater 4** over any previous version of **Strater**. **Strater 4** can coexist with older versions (i.e. **Strater 3**) as long as they are installed in different directories. By default, the program directories are different. For detailed installation directions, refer to the Readme.rtf file.

To install **Strater** from a CD:

1. Insert the **Strater** CD into the CD-ROM drive. The installation program automatically begins on most computers. If the installation does not begin automatically, double-click on the Autorun.exe file located on the **Strater** CD.
2. Click *Install **Strater*** from the **Strater Auto Setup** dialog to begin the installation.

To install **Strater** from a download:

1. Download **Strater** according to the emailed directions you received.
2. Double-click on the downloaded file to begin the installation process.

Updating Strater

To update **Strater**, open the program and click the **Help | Check for Update** command or click the  button. The Internet Update program will check Golden Software's servers for any free updates. If there is an update for your version of **Strater**, (i.e. version 4.1 to 4.2), you will be prompted to download the update. Updates contain minor changes to the program. There are no new features added in updates. A list of changes is located at http://www.goldensoftware.com/support.shtml#stat.

Before using this command, make sure your computer is connected to the Internet. Follow the directions in the dialog to complete the update if an update is available.

To obtain a full upgrade when available (i.e. **Strater** version 3 to **Strater** version 4), contact Golden Software.

Uninstalling Strater

Windows XP: To uninstall **Strater**, go to the Windows Control Panel and double-click *Add/Remove Programs*. Select **Strater 4** from the list of installed applications. Click the *Remove* button to uninstall **Strater 4**.

Windows Vista: To uninstall **Strater** when using the *Regular Control Panel Home,* click the *Uninstall a program* link. Select **Strater 4** from the list of installed applications. Click the *Uninstall* button to uninstall **Strater 4**.

To uninstall **Strater** when using the *Classic View Control Panel*, double-click *Programs and Features*. Select **Strater 4** from the list of installed applications. Click the *Uninstall* button to uninstall **Strater 4**.

Windows 7: To uninstall **Strater**, go to the Windows Control Panel and click the *Uninstall a program* link. Select **Strater 4** from the list of installed applications. Click the *Uninstall* button to uninstall **Strater 4**.

Windows 8: From the *Start* screen, right-click the **Strater 4** tile and click the *Uninstall* button at the bottom of the screen. Alternatively, right-click anywhere on the *Start* screen and click *All apps* at the bottom of the screen. Right-click the **Strater 4** tile and click *Uninstall* at the bottom of the screen.

New Features

The following is a list of new or improved features in **Strater**.

User Friendly

- Calculate and display the true depth of logs using either dip or inclination.
- Added a template wizard for easier importing of template files.
- Double-click on grouped text objects in the **Object Manager** to edit the text.
- Group log objects so that logs and other drawn objects move together.
- Space multiple objects side by side at the same time.
- Space multiple objects at the same time with a space between each object.
- Change the width of multiple objects at once.
- Set the default borehole view and cross section view pane line properties.
- Read and display numbers with the decimal separator as either commas or periods.
- Wrap linked text objects onto multiple lines.
- Set the label format for linked text properties.
- Active window tab is lighter in color to quickly determine which tab is active.

- Window tab names are color coded, to quickly determine what type of window each tab contains.
- Close tabs by clicking the X on the tab name.

Borehole View Enhancements

- Display the header and footer on every page, on only the first page, on only the last page, on both the first and last pages, or not at all.
- Hang boreholes on sea level or any other marker bed.
- Set the scale bar scaling to user intervals to set the scale bar tick mark interval with automatic starting and ending tick values.
- Automatically fit custom starting and ending depths to a single page.
- Draw unconformity lines in the borehole view, map view, or cross section view windows.

Log Feature Enhancements

- Set the numeric format for labels for bar logs.
- Set the numeric format for labels for zone bar logs.
- Set the label column to any column in the table for zone bar logs.
- Set the label column to any column in the table for tadpole logs.
- Create complex text logs from depth data tables.
- Reset edited blocks back to the data table values for complex text logs.
- Change the separator line properties for an individual text block for complex text logs.
- Format numbers and text for complex text labels.
- Set depth log scaling to user intervals to set the depth tick mark interval with automatic starting and ending tick values.

Map View Enhancements

- Set the coordinate system and projection for well location and base maps.
- Change the coordinate system and projection on the fly to show the entire map in any desired system.
- Change the collars table for a well location map.
- Show the deviation path for well maps.
- Show symbols at the bottom of each well on deviated well maps.
- Move each well label individually.

- Control the label font properties from a keyword scheme.
- Display the location of the cursor in map units on the status bar.
- Set the horizontal alignment for multiple well labels.
- Georeference images in base maps.
- Use the **Arrange | Order Objects** commands to move map layers, wells, or well selector lines forward, backward, to the front, or to the back of all other objects in the map or layer.
- Draw unconformity lines in the borehole view, map view, or cross section view windows.
- Export maps in map coordinates.

Cross Section View Enhancements

- Create cross sections directly from line/symbol logs.
- Manually create new layers on any cross section.
- Manually pick layer marks on each line/symbol log.
- Import layer marks from a table for a line/symbol log.
- Clear manual layer marks from a line/symbol log.
- Layer marks indicate the top or bottom of each layer.
- Display logs as vertical or deviated
- Display the header and footer on every page, on only the first page, on only the last page, on both the first and last pages, or not at all.
- Add a cross section scale bar.
- Display distances on the scale bar in various units.
- Display distances in well headers in various units on the cross section.
- Set vertical exaggeration using different depth and map units.
- Set the scheme, grid line, label properties for all logs in the cross section at once.
- Automatically set custom starting and ending depths to fit to a single page.
- Snap two layers when reshaping by holding down the SHIFT and ALT keys.
- Draw unconformity lines in the borehole view, map view, or cross section view windows.
- Export cross sections with depth as the Y value and relative distance as the X value.

Data Table Enhancements

- Import multiple files at once using **File | Import** or **File | Open Multiple** in a table view.
- Import or open multiple sheets at once from an XLS or XLSX file.
- Flip or transpose columns to rows and rows to columns.
- Save all tables to a single multiple sheet XLSX file.
- Update or change the external link for each table.
- Round data with the **Data | Transform** *Round* equation.
- Calculate values in the worksheet with the PI expression.
- Added a percentage number format for easier conversion of data.
- Save data files as Excel XLSX format.
- Import data in Excel XLSM format.
- Use the + option in data transforms to combine cells with text.
- Added new date/time formats.
- Updated the available numeric formats.
- Export all data in table to new XYZ file.
- Calculate true vertical depth from survey tables.
- Export data directly to a **Voxler** WellRender module.
- Export data directly to a **Voxler** VolRender module.

Import and Export Format Improvements

- Import PDF files.
- Import GeoPDF files as base maps in the map view.
- Export PDF files with page sizes.
- Export GIF and PNG files with transparent backgrounds.
- Compress raster and vector PDF files, creating smaller exported files.
- Export partially transparent objects to vector PDF file format.
- Improved import and export of metafile images with partial transparency.
- Import and export JPG2000 files.
- Import ZIP and USGS SDGS topological files in .TAR.GZ, .TAR, .ZIP, and .TGZ format directly without unzipping.
- Improved the LAS import options to allow the user to select API or UWI for the Hole ID.
- Import LAS version 1.2 files, in addition to 2.x and 3.x LAS formats.

A Note about the Documentation

Various font styles are used throughout the **Strater** quick start guide and online help. **Bold** text indicates menu commands, dialog names, and page names. *Italic* text indicates items within a dialog such as group box names, options, and field names. For example, the **Save As** dialog contains a *Save as type* drop-down list. Bold and italic text may occasionally be used for emphasis.

In addition, menu commands appear as **Edit | Undo**. This means, "click on the **Edit** menu at the top of the **Strater** window, then click **Undo** within the **Edit** menu list." The first word is always the menu name, followed by the commands within the menu list.

Three-Minute Tour

We have included several example files with **Strater** so that you can quickly see some of **Strater's** capabilities. Only a few example files are discussed here, and these examples do not include all of **Strater's** many log types and features. The **Object Manager** is a good source of information as to what is included in each file.

Sample Strater Files

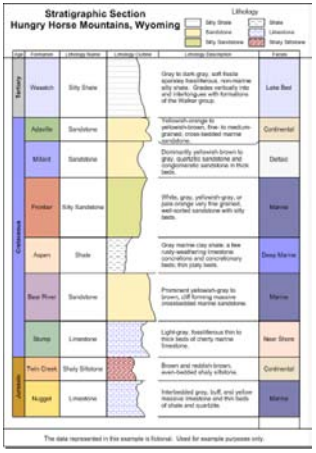
To see the sample **Strater** files:

1. Open **Strater**.
2. Click the **File | Open** command.
3. Click on a .SDG file located in the Samples folder. By default, the **Strater** Samples folder is located in C:\Program Files\Golden Software\Strater 4\Samples.
4. Click *Open* and the file opens.

The primary graphical component to a document is a borehole view. A borehole view is either based on a template file or created from scratch by adding the necessary log, header and footer items. Boreholes views, map views, and cross section views display logs, well and base maps, and cross sections of the selected data when the tab is selected. When a data table tab is selected its data appears in the workspace.

Lith Secton-1 .sdg

The Lith Section-1.sdg sample file contains a sample lithology log column. Age, formation, lithology type, and lithology description appear in the borehole view. Four data tables are included in the .SDG file and include the information being displayed in the borehole view.

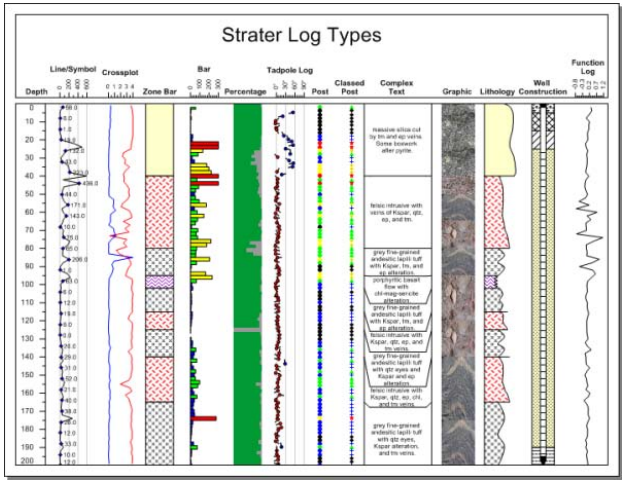


The Lith Section-1.sdg file contains several zone bar logs and a lithology log.

Example Logs.sdg

The *Example Logs.sdg* sample file contains every type of log file that **Strater** can create. Click on a log and the **Property Manager** updates to show only that log's properties. Experiment with the properties for the logs to see how the log changes. Click on the map and cross section tabs to experiment with the properties for the map and cross section views.

One purpose of the sample files is to discover the effects of changes made in the **Property Manager** – to experiment so that the functionality is closer to second nature and you do not need to search for the correct setting. Use these sample files, especially this file, to discover the breadth of options available. If you want to save any changes we recommend keeping the original file and using the **File | Save As** command to save a copy of the file to a new name.



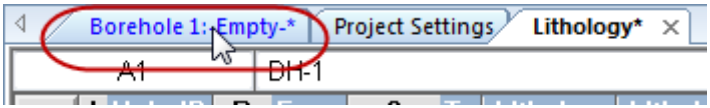
The Example Logs.sdg file displays an example of each log type in the same borehole view.

Using Strater

The general steps to progress from a data file to a borehole are as follows.

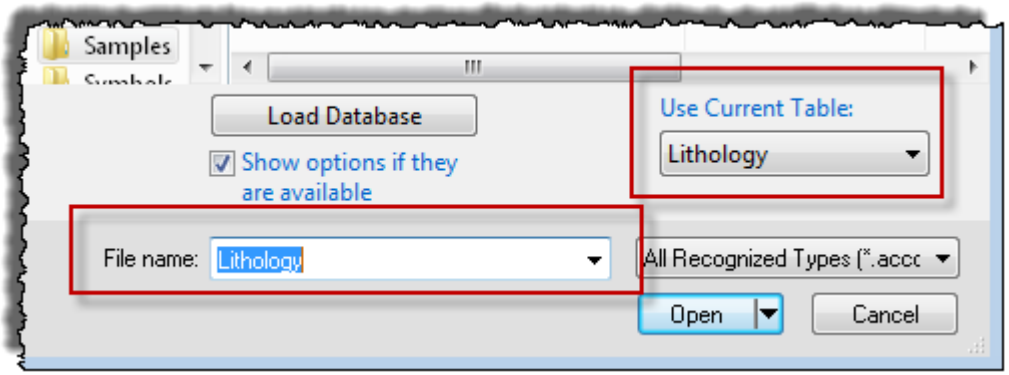
1. Open **Strater**.
2. Click the **File | Open** command or click the  button.
3. In the **Open** dialog, select the data file and click the *Open* button. For this example, the data should have *From* and *To* columns because of the type of log created. The sample *Tutorial 1.xls* file can be used with the *Lithology* sheet.

4. In the **Specify Worksheet Column Definitions** and **Specify Data Type and Column Positions** dialogs, set the column names and rows to import. The data opens into **Strater** and is displayed in a table view.
5. Click on the *Borehole 1* tab.



Click on the Borehole 1 *tab.*

6. Click the **Log | Depth** command to create a depth log.
7. Click on the screen in the location where you want the depth log to be displayed.
8. In the **Open** dialog, verify that *Use current table* is selected and click *Open*. The depth log is displayed.



Verify that the table is selected.

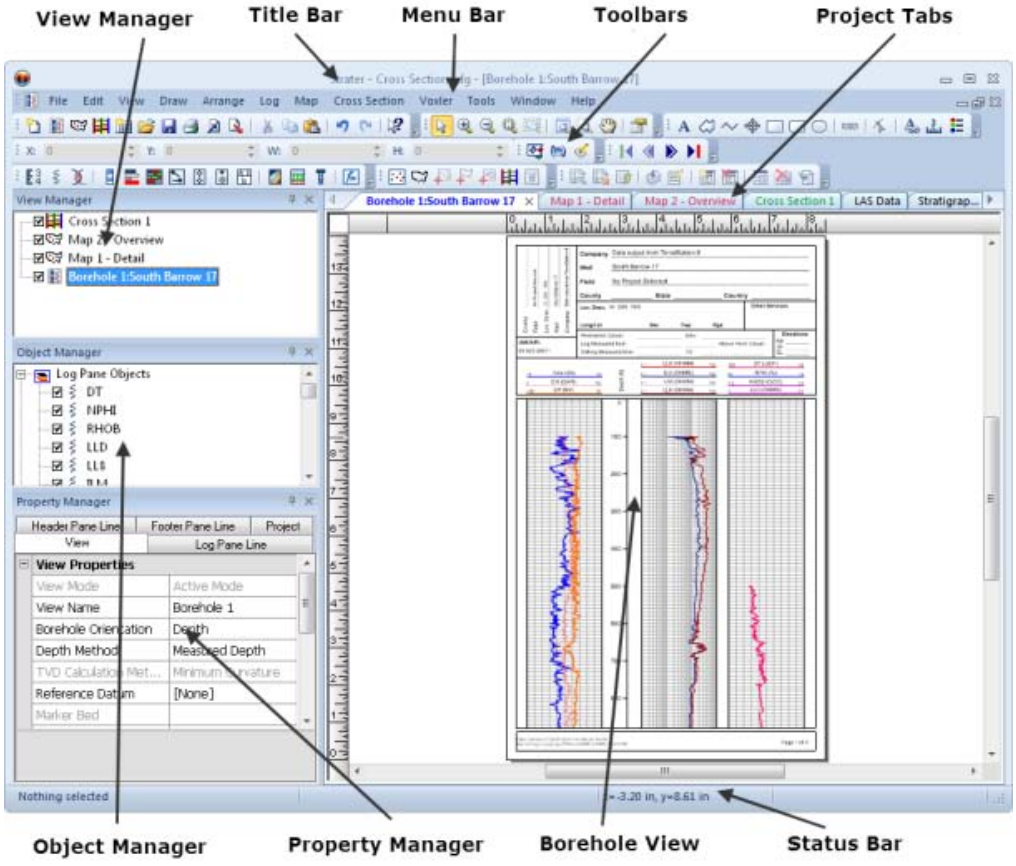
9. Click the **Log | Zone Bar** command to create a zone bar log.
10. Click on the screen where you want the zone bar log to be displayed.
11. In the **Open** dialog, verify that *Use current table* is selected and click *Open*. The zone bar log is displayed.
12. Click the **File | Save As** command. Enter a *File name* in the **Save As** dialog and click the *Save* button to save your **Strater** project.

To proceed from the borehole to a map view and cross section view, these steps are used.

1. Click the **File | New | Map View** command to create a new blank map window.
2. Click the **Map | Create Well Map** to display the wells on the map. Select and open a collars table, if prompted. The sample *Example Data.xls* file can be used with the *Collars* sheet.
3. Click on the *Wells* layer in the **Object Manager**.
4. Click the **Map | Add Well Selector** command.
5. Click on the wells in the order they should appear in a cross section.
6. Click the **File | New | Cross Section View** command to create a new blank cross section.
7. Click the **Cross Section | Create Cross Section** command to create the default cross section from the well selector.

Strater User Interface

Strater contains four document window types: borehole view, map view, cross section, and table windows. Borehole views display various log types. Map views display post and base maps that can be used to identify where individual wells are located. Cross sections are created and edited in the cross section view. The data is opened, edited, and transformed, and saved in the table windows.



*This is the **Strater** borehole view with the **View Manager, Object Manager,** and **Property Manager** windows displayed on the left side. Tabs displaying the view windows and tables are displayed above the horizontal ruler. Left-click anywhere in the image to see detailed information about each part of the **Strater** window.*

Opening Windows

Clicking the **File | New** command opens a new project, or adds a new borehole view, map view, cross section view, or table to the existing project.

Title Bar

The title bar is the top part of the **Strater** window and contains the name of the current project or template and the active tab, if any. Use the title bar to drag the window to reposition. Double-click the title bar to maximize or restore a window. Use the three buttons on the right to minimize, maximize, or close **Strater**

Menu Commands

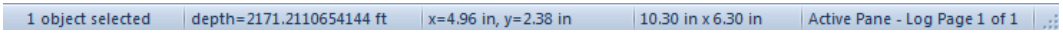
The menu bar contents change, depending upon the current active window in **Strater**.

Regardless of which view is currently active, clicking the image (, , , or ) in the top left of the **Strater** window displays commands to restore, move, size, maximize, minimize, and close **Strater**. A *Next* option is also available that opens each tab in turn, from left to right.

Status Bar

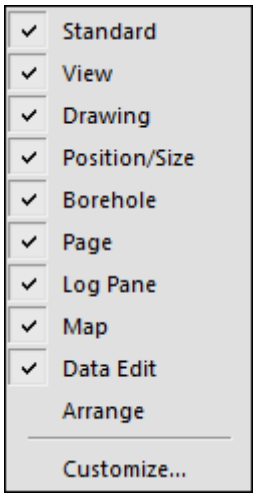
Click **View | Status Bar** to show or hide the status bar. A check mark next to **Status Bar** indicates that the status bar is displayed.

The status bar is located at the bottom of the window. Use the **View | Status Bar** command to show or hide the status bar. The status bar displays information about the current command or activity in **Strater**. The status bar is divided into five sections. The left section displays the number of objects that are currently highlighted or help messages. The next section displays the depth on a cross section or borehole view or the XY coordinates on a map view. The middle section displays the cursor location. The fourth section displays a progress gauge or the estimated time remaining for long tasks or the size of the selected object. The right section displays the active pane for the selected view window.



Toolbars

All window types in **Strater** include toolbars that contain buttons for the most common commands. The toolbars are initially docked, but they can be dragged and placed anywhere on the screen.

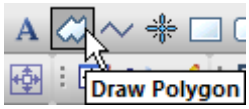


You can select individual toolbars to view or hide by checking their box. You can also customize the appearance of toolbars.

Show or Hide Toolbars

Click the **View | Toolbars** command or right-click in the toolbar area to see the list of toolbars. Check the box next to each toolbar to show or hide that toolbar. A check mark is displayed next to visible toolbars.

Tool Tip Display of Button Function



Move the cursor over a button to view a hint of the button's function.

Hold the cursor over any toolbar button to view a short description of the button's function. Tool tips cannot be customized. Hold the cursor over the toolbar images to see tool tip examples.

If tool tips do not display, click **View | Toolbars | Customize**. Click on the **Options** tab. Check the box next to *Show ScreenTips on toolbars*. Click *Close* and the tooltips will display.

Customize Toolbars

Use the **View | Toolbars | Customize** command to open the **Customize** dialog and customize toolbars, menus, and keyboard shortcuts.

Toolbar positions

Toolbars can be docked to any side of the window or they can be displayed as a floating window. To dock the toolbar in a new location, click the "grip" bar along the edge of the toolbar, hold the left mouse button, and then drag the toolbar to a new location. Drag the toolbar away from a window edge or hold down the CTRL key while dragging to display the toolbar as a floating window. Alternatively, you can double-click the toolbar to display it as a floating window. To quickly dock a floating toolbar, double-click on the title bar.

Tabbed Documents

Each tab represents a view window or a table. To select a tab to view, click the tab name. To close a tab, right-click and select *Close* or click the X next to the tab name. The tab no longer is displayed. This does not delete the information on the tab; this action simply removes a tab from display. To display the tab again click the **Windows | Show All Tables** command or click on the view window name in the **View Manager**.

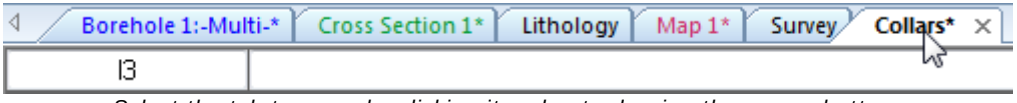
To delete the tab and all information contained in the view or table from a project, right-click on the tab and select *Delete.* Alternatively, click the **Table | Delete Table** command or right-click on the view name in the **View Manager** and select *Delete*.

Tab Colors

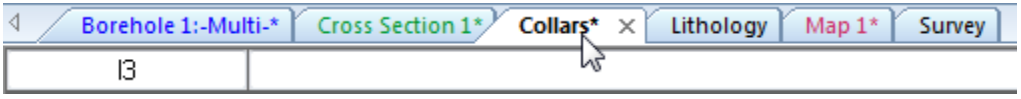
Each type of window displays the name of the window on the tab in a different color. Borehole views are displayed with blue text, map views are displayed with red text, cross section views are displayed with green text, and tables are displayed with black text. This can be changed from the **Tools | Options** dialog in the *Display* section.

Change Order of Tabs

You can change the order of tabs by clicking on the tab name. Hold down the left mouse button and drag the tab to the desired location in the tab array.



Select the tab to move by clicking it and not releasing the mouse button.



Drag the tab to the desired location and release the mouse button.

Changing the Window Layout

The windows, toolbars, managers, and menu bar display in a docked view by default; however, they can also be displayed as floating windows. The visibility, size, and position of each item may also be changed.

Visibility

Use the **View | Toolbars** commands to toggle the display of the toolbars. Alternatively, use the **Tools | Customize** command to open the **Customize** dialog.

The **Toolbars** page of the **Customize** dialog displays all of the toolbars. A check mark indicates the toolbar is currently visible. Reset toolbars with the **Customize** dialog.

Use the **View | Managers** commands to toggle the display of the **Object Manager**, **Property Manager**, and **View Manager**. Alternatively, you can click the button in the title bar of the **Object Manager, Property Manager,** or **View Manager** to close the manager window. The **Property Manager** can also be opened by double-clicking on an object.

Auto-Hiding Managers

Click the button to auto-hide a docked manager. The manager slides to the side or bottom of the main **Strater** window and a tab appears with the window name.

Position the mouse pointer over the tab to view the manager. Move your mouse away from the manager and the manager "hides" again. You can also click inside the manager to anchor it at its current position. Click in another manager to release the anchor and hide the manager. Click the button to disable the auto-hide feature.



*The **Object Manager** appears as a tab on the side of the window.*

Size

Drag the sides of a floating plot window, table view, manager, toolbar, or menu bar to change its size. If a window or manager is docked, its upper and lower bounds are indicated by a or cursor. Move the cursor to change the size.

Position

To change the position of a docked manager, click the title bar and drag it to a new location. The entire manager appears in the location it will be displaed when the manager is floating. To dock the manager, use the docking mechanism. You can also double-click the manager's title bar to toggle between floating and docked modes. A tabbed manager view is also an option.

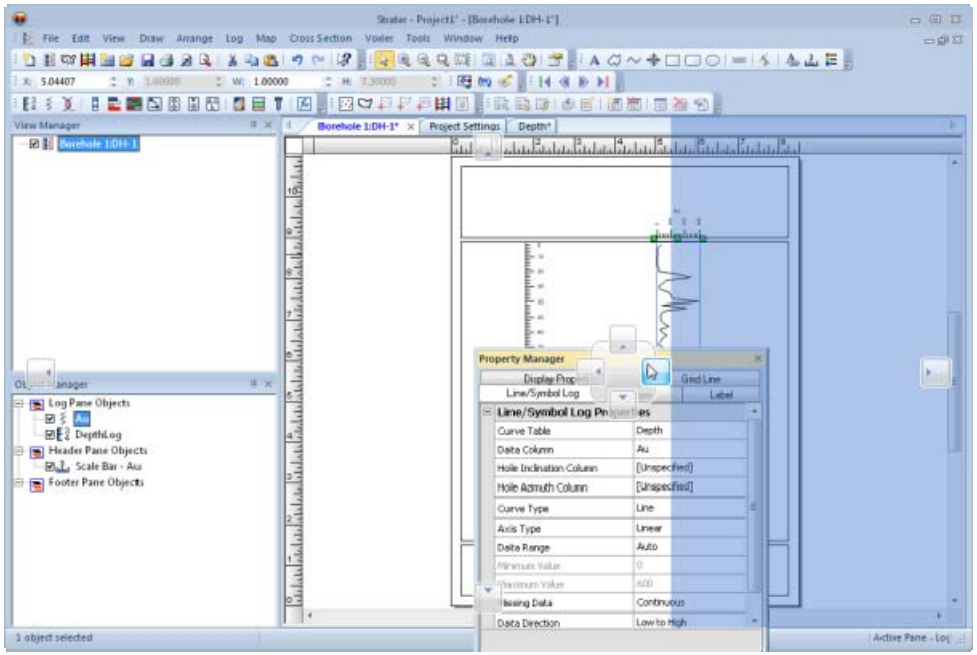
Docking Mechanism

Left-click the title bar of a manager and drag it to a new location while holding the left mouse button. The docking mechanism displays with arrow indicators as you move the manager.



*The docking indicator can lock the location of the **Object Manager**.*

When the cursor touches one of the docking indicators in the docking mechanism, a blue rectangle shows the window docking position. Release the left mouse button to allow the manager to be docked in the specified location.



*This image displays the **Property Manager** being docked to the right side of the **Strater** window.*

Tabbed Managers

To create tabbed managers:

1. Drag one manager on top of another window.
2. Hover over the center section of the docking mechanism. The blue area shows where the tabbed manager will display.
3. Release the mouse button.

To return to individual managers from the tabbed view:

1. Click on the manager's name on the tab.
2. Drag the tab to a new position.



Click on a manager's tab and drag it to a new position to separate the managers.

Floating Managers

The toolbars and menu bar can also be moved or displayed in floating windows.

To dock the toolbar or menu bar in a new location, click the "grip" bar along the toolbar or menu bar edge, hold the left mouse button, and then drag the toolbar or menu bar to a new location. Drag the toolbar or menu bar away from the window edge to display the toolbar as a floating window. Double-click the manager title bar to switch between floating and docked.

Restoring the Managers and Windows to Their Original Locations

If the windows or managers have moved or become invisible, or if they are in undesired locations, you can use the **View | Reset Windows** command to move them back to their original locations. You must restart **Strater** for the changes to take effect.

Hide or Show All Managers

Click the **View | Hide All Managers** command to hide all manager windows and maximize the space available for viewing the window. This command is especially useful if you want to zoom in on the current display.

Click the **View | Show All Managers** command to change the view to include the window and all managers. Note: This command returns all managers to their respective locations before the **Hide All Managers** command was used; it does not restore their default positions. Use the **View | Reset Windows** command to restore the default window layout.

Reset Windows

Click the **View | Reset Windows** command to change the display of the program. This command resets the **Object Manager**, **Property Manager**, and **View Manager** windows back to the default size and position. It also resets all menu customizations

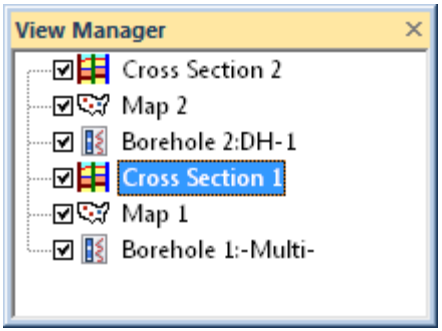
and custom shortcuts back to the defaults. In addition, all toolbars are reset to the default location and state.

This command is especially handy if your windows or managers become hidden by mistake.

You must restart **Strater** in order for this command to take effect. Click *Yes* in the dialog, close the program, and reopen **Strater**. The managers, toolbars, menus, and accelerators are now restored to the default states.

View Manager

In **Strater** you can have multiple view window types in one project. This is useful in displaying multiple graphics for multiple wells, displaying different layouts for the same data, or displaying maps or cross sections. Click the **View | Managers | View Manager** command to display the **View Manager**. The **View Manager** contains a list of the various borehole views, cross section views, and map views. You can open or close views, add or delete views, and save or load template files in the **View Manager**.



*The **View Manager** allows you to create new views, delete existing views.*

The check box to the left of a view name indicates if that view is displayed or hidden. If a view is not visible either check the box next to the view name or click the view name. Unchecking all view check boxes in the **View Manager** closes the entire project. When the last check box is unchecked a window appears asking you to save any unsaved work in the project. The project then closes.

To display the view properties associated with any view in the **View Manager** menu, click on the view name. The view properties are listed in the **Property Manager**.

Right-click in the **View Manager** to see options available for adding or deleting views or for loading templates.

- *New Borehole View* creates a new blank borehole view in the current project.
- *New Map View* creates a new blank map view in the current project.
- *New Cross Section View* creates a new blank cross section view in the current project.

- *Delete* deletes the currently highlighted borehole view from the project. There is no **Undo** for this operation so use caution when deleting views.
- *Save Template of Current View* saves the current view window as a template .TSF file.
- *Load Template* opens a template into a new borehole view.
- *View Properties* displays the currently selected view window's borehole, map, or cross section view properties in the **Property Manager**.

Object Manager

The **Object Manager** contains a list of all objects, separated into a list of each pane in the borehole view and cross section view. The objects can be selected, arranged, and edited in both the **Object Manager** and through the menu commands. Changes made in the **Object Manager** are reflected in the view window, and vice versa.

When an object is highlighted in the **Object Manager** it is also selected in the view window, indicated by a bounding box surrounding the object.

Opening and Closing the Object Manager

The **Object Manager** is opened and closed by clicking the **View | Managers | Object Manager** command. Alternatively, you can click  in the title bar of the **Object Manager** to close the window.

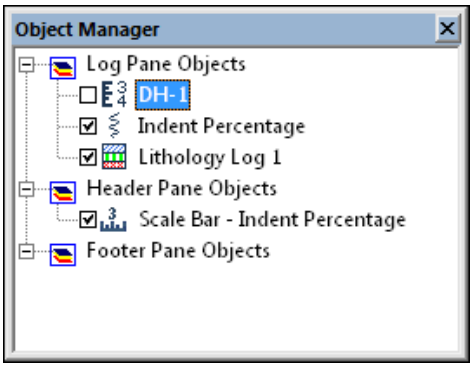
Panes

There are three groupings in the borehole view: *Log Pane Objects, Header Pane Objects,* and *Footer Pane Objects*. There are three groupings in the cross section view: *Cross Section Pane Objects, Header Pane Objects*, and *Footer Pane Objects*. Each object is listed in the **Object Manager** according to its location in the view window. For example, if there is a rectangle in the footer, it is listed under the *Footer Pane Objects* section.

Use the  or  located to the left of the pane name to expand or collapse the list of pane objects.

Object Visibility

Each item in the list consists of an icon indicating the type of object, a text label for the object, and a check box that indicates if the object is visible. To change the visible status of an object, click the check box to the left of the object icon. Invisible objects do not appear in the view window and do not appear on printed or exported output.

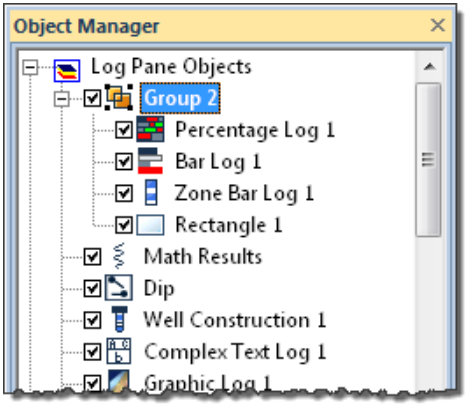


A check mark next to an object indicates that the object is visible. In this instance, the depth log associated with DH-1 is unchecked, so not visible.

Grouped and Ungrouped Objects

When two or more objects have been grouped, the objects appear under a special *Group* object. Grouped objects can be edited by clicking on the object in the group and editing in the **Property Manager** as normal. All grouped objects move together. Ungroup the grouped object to move individual objects outside the group.

To ungroup the objects from the **Object Manager**, select the *Group* name, right-click and select *Ungroup.* The objects are no longer grouped.

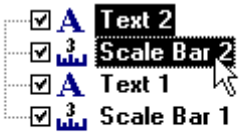


Grouped objects appear under a special Group *object in the* ***Object Manager****.*

Selecting Objects

To select an object, click the object name and the object name is highlighted. The selection handles in the graphical borehole view change to indicate the selected item.

To select multiple objects in a pane, hold down the CTRL key and click on each object. To select multiple contiguous objects, select the first object, and then hold down the SHIFT key and click on the last object.



Use the CTRL or SHIFT keys to select multiple objects in the ***Object Manager****.*

If you select an object in the view window, its name is selected in the **Object Manager** as well. Note that multiple objects cannot be selected in multiple pane

groups. For example, an object in the *Footer Pane Object* section and an object in the *Log Pane Object* section cannot be selected at the same time.

Opening Object Properties

To display the properties for an object, click the object name. The properties are displayed in the **Property Manager**.

Renaming Objects

To edit the text ID associated with an object in the **Object Manager**, select the object and click again on the selected item (two slow clicks). You must allow enough time between the two clicks so it is not interpreted as a double-click. Enter the new name into the box that appears. Alternatively, you can right-click on the object and select the *Rename Object* command or go to **Edit | Rename Object**.

Arranging Objects

To change the display order of the objects in a pane grouping with the mouse, select an object and drag it to a new position in the list. The pointer changes to a black arrow if the object can be moved to the pointer location or a black circle with a diagonal line  if the object cannot be moved to the indicated location. These actions are analogous to the **Arrange | Order Objects** commands, which include the **Move to Front**, **Move to Back**, **Move Forward**, and **Move Backward** options. These menu items are accessed through the borehole view **Arrange** menu or by right-clicking on an object in the **Object Manager**.

Deleting Objects

To delete an object, select the object and press the DELETE key on the keyboard. Some objects cannot be deleted.

Property Manager

The **Property Manager** allows you to edit the properties of an object. See the specific online help topic for the object you have selected for more information on the properties unique to that object.

Opening and Closing the Property Manager

The **Property Manager** is opened and closed with the **View | Property Manager** command. You can also click  in the title bar of the **Property Manager** to close it.

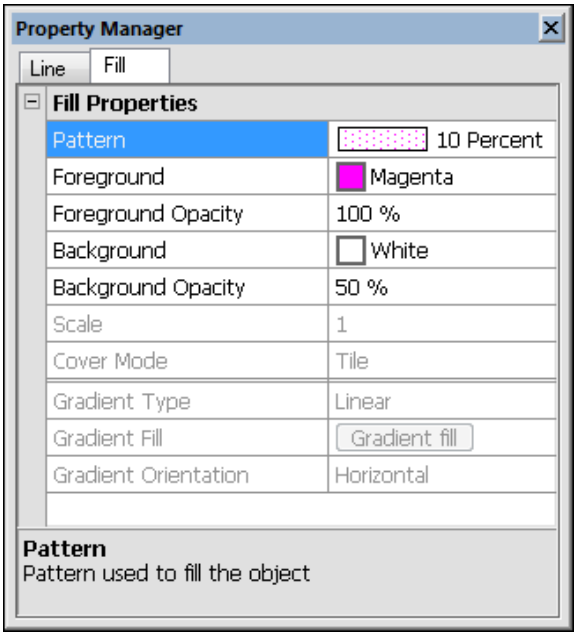
Opening and Closing Sections

Click the appropriate tab to open pages in the tab view.

In both tab and horizontal views, individual sections can be expanded or collapsed. A ⊞ or ⊟ is located to the left of the name if the section can be expanded or collapsed. To expand the section, click the ⊞, click the section name and press the plus key (+) on the numeric keypad, or press the right arrow key on your keyboard. To collapse a section, click the ⊟, click the section name and press the minus key (-) on the numeric keypad, or press the left arrow key.

Display info area

To display an area with field hints right-click in the **Property Manager** and select *Display info area*. When selected a hint area appears at the bottom of the **Property Manager**. When a field or label is selected a hint describing the function or type of data is displayed.



Right-click and select Display info area *to show hints about the currently highlighted field in the* ***Property Manager***.

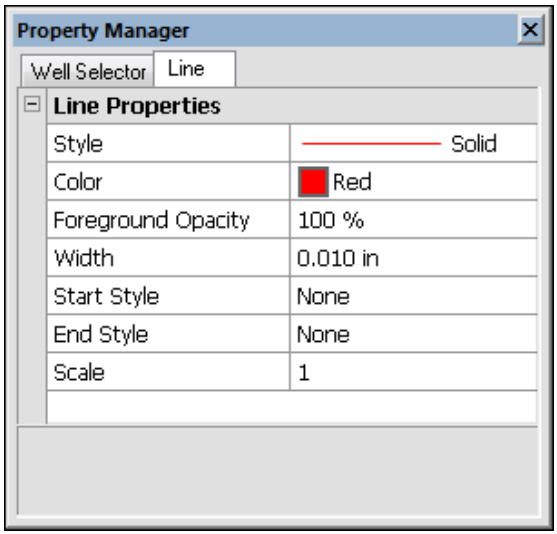
To disable the info area, right-click in the **Property Manager** and deselect *Display info area.*

Keyboard Commands

When working with the **Property Manager** the up and down ARROW keys move up and down in the **Property Manager** list. The ENTER key activates the highlighted property. The right arrow key expands collapsed sections (i.e. *Fill Properties*) and the left arrow collapses the section.

Changing Properties

The **Property Manager** displays the properties for selected objects. For example, this selected well selector line has *Style*, *Color*, *Foreground Opacity, Width*, *Start Style*, *End Style*, and *Scale* properties.



*Change any of the properties for the object in the **Property Manager**.*

To change a property, click the property's value and select a new property from the pop-up box, scroll to a new number using the buttons, or type new numbers or text. The method used to change a property depends on the property type. In the polyline example, changing the color requires clicking the current color box and selecting a new color from the color palette; changing the width requires typing a new number or scrolling to a new number. When you type the new number, press ENTER or click somewhere in the **Property Manager** to make the change permanent.

Occasionally, some properties are dependent on other selections. For example, in the fill properties there is a *Scale* option. This option is disabled (grayed out) unless you have selected an image fill type as the *Pattern* and *Cover Areas By* set to *Tile.*

Properties Tips

- If multiple objects are selected in the header or footer, only features common to all objects appear in the **Property Manager**.
- To change the default line, fill, symbol, or text properties for all borehole views and all sessions of **Strater**, use **Tools | Options**.

Tables

All data used to generate logs in a borehole view must be opened or imported into a **Strater** project. These data tables are represented by data tabs. Collar tables, depth tables, interval tables, lithology tables, project settings tables, survey tables, text item tables, and well construction tables can be created in **Strater**. Each table type has a different function in **Strater**. Refer to the *Table Types* section in *Chapter 3 – Data and Data Tables* for an in-depth discussion of the types.

One important aspect of **Strater** is that data for multiple boreholes may be entered in one or several tables. There is no limit to the number of boreholes that can exist in a table or the number of tables in any **Strater** file.

Opening a New Table

During a **Strater** session, new blank tables are created by clicking the **File | New | Table** command, clicking the  button, or by pressing CTRL+W on the keyboard.

Opening an Existing Table

To open existing data into the current project, click the **File I Open** command. If you want the worksheet to appear in a new data table, select the worksheet and click *Open*. Step through the opening process and a new data table is added.

To import existing data into the current project in an existing table, click on the table where you want the data to appear. Click **File | Import**. In the **Import Data** dialog, select the data file and click *Open*. Step through the importing process and the data is added to the current table.

Data Organization

The data to be represented in boreholes needs to be in column and row (record) format.

Columns

Each column contains three properties: a name, description, and units. The description and units are optional for every column.

If a column is required for a particular table type, for example the *To* column in an interval table, the column name cannot be changed. However, optional column names

can be changed. If the *Column Name* has a gray background in the Column Editor, the column is required and the name cannot be changed.

Columns can be added and deleted by either selecting **Edit | Append Column** or selecting a row, right-clicking, and selecting *Append Column*.

Rows

Typically, each row in the data is devoted to a depth or an interval in the borehole. Rows can be added by clicking the **Edit | Insert Rows** command, right-clicking and selecting the *Insert Rows* command, or by typing data into a new row.

Schemes and Tables

Strater uses schemes when "linking" the data in a table to a borehole design. A scheme associates information from the data table (such as text entries (keywords) or number ranges) with fill properties, line properties, font properties, etc. When **Strater** locates a keyword or number range in the column, the borehole is assigned the keyword or number range properties for the depth, interval, or well construction item. Scheme item names can be automatically created with Table | Create Scheme.

Data Selection

Use the cursor to drag and select any number of conterminous cells and rows.

File Formats

Strater can read numerous file formats such as data files (including Excel spreadsheets and ASCII text files), databases, and LAS files. **Strater** can also link to virtually any database system installed on your computer using the Data Link Source.

View Window Types

There are three different view types available in a **Strater** workspace: borehole views, map views, and cross section views. There is no limit to the number of views that can be associated with a **Strater** project.

Borehole View

The primary graphical component to a **Strater** document is a borehole view. A borehole view represents a collection of logs and drawing objects used to graphically display data for one or more boreholes. A borehole view may be derived from a

template file or it can be created from a default view window with the necessary log items defined to create the borehole. The borehole view displays the true data for the project once data are defined in the project file.

You are presented with an empty borehole view when you first start **Strater**.

Opening a New Borehole View

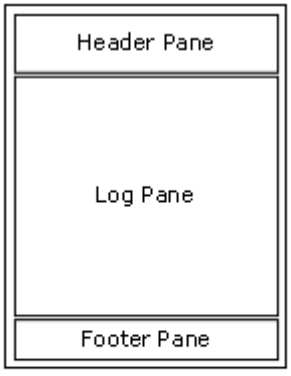
During a **Strater** session, new projects with an empty borehole view are created with the **File | New | Project** command. New borehole views in an existing project are created with the **File | New | Borehole View** command, clicking the  button, or right-clicking in the **View Manager** and selecting *New Borehole View*.

Opening an Existing Borehole View

Existing borehole views are opened by clicking the appropriate **Borehole** tab, clicking on the borehole name in the **View Manager**, or by selecting **Window | [Borehole name]**. By default, the first borehole view is named **Borehole 1** so this borehole view would be opened by choosing the **Window | Borehole 1** command. To open an existing project, use the **File | Open** command.

Panes

There are three main components of a borehole view: the log pane, header pane, and footer pane. The panes are outlined when you open a blank borehole view. The upper rectangle is the header pane, the middle rectangle is the log pane, and the bottom rectangle is the footer pane. You can change the rectangle line properties in the View Properties. The size of the header, log, and footer panes is defined by clicking File | Page Setup.



The top rectangle is the header pane, the middle rectangle is the log pane, and the bottom rectangle is the footer pane.

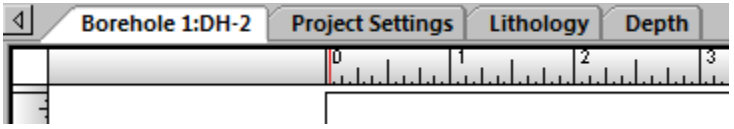
The header and footer panes generally contain static, unlinked information. The header and footer items are used repeatedly with minimal changes when different borehole data are applied to the view. Two objects are exceptions to the static unlinked information "rule": linked text and some scale bars. Linked text data changes as new data is applied to the view. Horizontal scale bars can be associated with some log items, a cross section, or they can be created as a stand-alone, static object. When the scale bar is linked to a log or cross section, the scale bar changes as changes are made to the linked item.

The log pane contains all the graphical log items to display the borehole data. This pane is dependent on linked tables and columns to create the graphical view. The log pane is also dependent on depth and scaling values. These values determine the size of the pane rectangle and/or the number of pages. The log pane can also contain legends, text and linked text, drawn objects, and imported images, as well.

Multiple Boreholes in the Borehole View

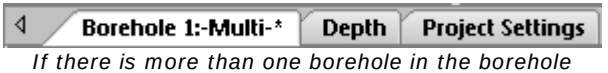
Strater permits multiple boreholes to appear in the same borehole view. You can define multiple boreholes with a single table, distinguished by a hole ID, or you can create several tables that define different boreholes in each table. This allows you to quickly change the borehole graphics in the borehole view.

Appended to the borehole view name is the borehole ID associated with the data displayed in the view. In the following example, the Hole ID of this borehole view is **DH-2**:



Click the borehole tab at the top of the ***Strater*** *window to open a borehole view.*

If there is more than one borehole represented by the logs in a borehole view, the associated borehole view tab's name ends with *-Multi-*.



If there is more than one borehole in the borehole view, the label of the tab reads -Multi-.

Adding Additional Information to the Borehole View

Scale bars, titles, linked text, drawing objects, legends, and images can be added to the borehole view at any location.

Creating a Log in the Borehole View

In general, you can add a log to any borehole view by following these steps:

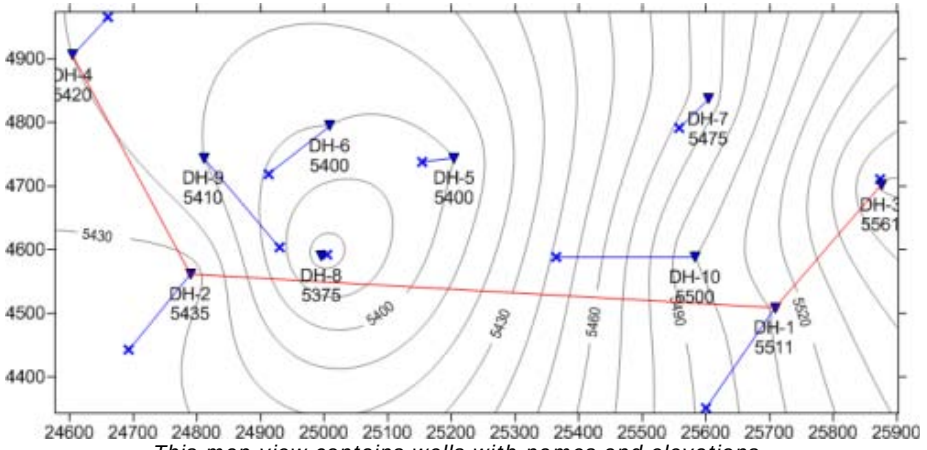
1. Click the **Log | [object type]** command for the object you want to create. For instance, if you want to create a line/symbol log, click the Log | Line/Symbol command.
2. Click on the log pane where you want the log to be located.

3. In the dialog, select the data file to use. An existing table can be selected in the *Use Current Table* list.
4. If a new data file was selected, step through the importing process. The log will be displayed.
5. Any customizations can be made by selecting the log and making changes in the **Property Manager**.

Map View

Map views graphically display wells on a map. Map views display any wells listed in the collars table. Each well in the collars table is displayed as a separate symbol. Wells can display deviation as a line with a symbol at the end of the well or only show the collar location of the well. Wells can be removed individually to customize the appearance of the map view. The map also contains a set of four axes, that can be edited individually. Map views also can display base maps, such as field outlines or exported **Surfer** maps. Drawing objects and labels can be added to a map view.

Map views can have maps from different projections and can convert the map into any supported projection. All map layers are positioned according to the map layer's coordinate system. Each layer can have a separate source coordinate system. All layers are reprojected into the *Map* target coordinate system.



This map view contains wells with names and elevations, a well selector line, and a contour map loaded as a base map.

Opening a New Map View

New map views are created in an existing project by clicking the **File | New | Map View** command, clicking the  button, or right-clicking in the **View Manager** and choosing *New Map View*.

Opening an Existing Map View

Existing map views are opened by clicking the appropriate **Map** tab, clicking the map view name in the **View Manager**, or by clicking **Window | [Map name]**. By default, the first map view is named **Map 1** so this map view would be opened by clicking the **Window | Map 1** command.

Creating Map Layers

Create the first map layer with the **Map | Create Well Map** or **Map | Create Base Map** command.

If creating a well map and a single collars table already has been created, the map view automatically uses that Collars table. If no Collars table exists, you are prompted for the data file. A Collars table is automatically created. If multiple Collars table exist, you are prompted to select one table.

If an existing map has already been created and the well map or base map should be added to the existing map, click the **Map | Add Well Layer** or **Map | Add Base Layer** commands. If the **Create Well Map** or **Create Base Map** command is used and a blank map view is available, the map is created in that map view, otherwise, the map is created in a new map view.

Adding Additional Information to the Map View

Base maps, additional well maps, and well selector maps can be added to an existing map view. Drawing objects can also be added to a map layer.

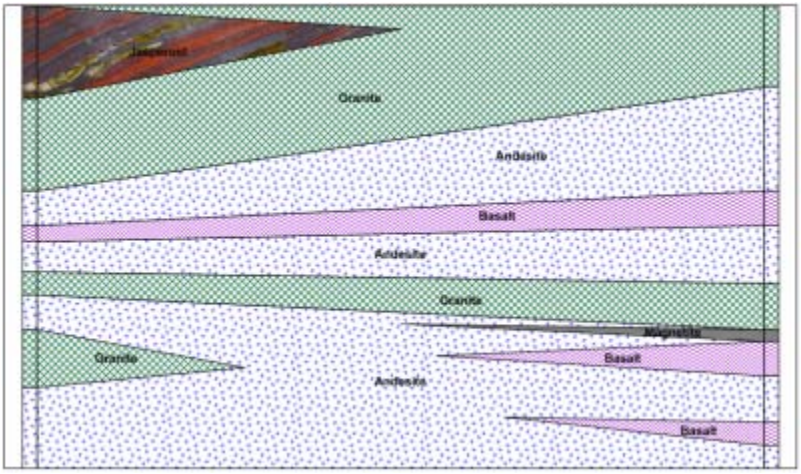
Cross Section View

Cross section views display multiple wells on a page. Cross sections can be created from zone bar, lithology, or line/symbol log types. Each well can have a variety of curves, similar to a borehole view. Other log types can be added to the display, similar to a borehole view, but these logs are not included in the automatic cross section connections.

Wells are connected to display layers, zones, or lithologies across the page, connecting information from the wells. Wells can be automatically connected to display layers, zones, or lithologies from a table view, connecting information from the wells across the page. The wells can also be displayed without connections or with manual connections, connecting the wells where you select.

Well spacing and elevation hanging can be altered to give you the look you need to display your data. Deviated wells can be displayed as vertical or with the deviation displayed in the cross section. The cross section view also allows data to be exported to a data file for use in **Surfer** or exported to a **Voxler** 3D display to create fence diagrams. Drawing objects and labels can be added to a cross section view.

The cross section view also allows data to be exported to a data file for use in **Surfer** or exported to a **Voxler** 3D display to create a fence diagram. Drawing objects, labels and other logs can be added to a cross section view.



This cross section displays two wells and the layers between.

Opening a New Cross Section View

Click the **File | New | Cross Section View** command, click the button, or right-click in the **View Manager** and choose *New Cross Section View* to add a new blank cross section view to the existing project.

A new cross section view window can also be created with the **Cross Section | Create Cross Section** command.

Opening an Existing Cross Section View

Existing cross section views are opened by clicking the appropriate **Cross Section** tab, checking the box next to the cross section view name in the **View Manager**, or by selecting **Window | [Cross Section name]**. By default, the first cross section view is named **Cross Section 1** so this cross section view would be opened by choosing the **Window | Cross Section 1** command.

Adding Additional Information to the Cross Section View

Drawing objects and inserted map layers can be added to a cross section view.

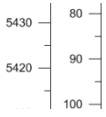
Types of Logs

Both borehole views and cross section views display logs. **Strater** creates 14 different types of logs in the borehole view. Refer to the specific chapter for more information on each of the log types.

- Bar Log
- Classed Post Log
- Complex Text Log
- Crossplot Log
- Depth Log
- Function Log
- Graphic Log
- Line/Symbol Log
- Lithology Log
- Percentage Log
- Post Log
- Tadpole Log
- Well Construction Log
- Zone Bar Log

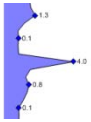
To create a log in either the borehole view or cross section view, click the **Log | [log type]** command. Click on the screen where the log should be created. In the **Open** dialog, select the table to use or data file to import and click *Open*. The log is displayed with the default options.

Depth



Depth logs are used as a scale bar to display the depth or elevation of the data in the log or cross section pane. True vertical depth can be displayed on a depth log, if azimuth and inclination (or dip) are available for the wells.

Line/Symbol



Line/symbol logs are used to display data as a symbols with connected lines. Line/symbol logs are useful for displaying assay values, geophysical parameters, moisture content, etc.

Crossplot



Crossplot logs are used to display intersections of two data curves on a graph. Crossplot logs can be used to characterize properties such as porosity, water saturation, or clay content by comparing where two logs intersect.

Zone Bar



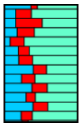
Zone bar logs display data as filled blocks within intervals, and can show a wide variety of logging data. For instance, zone bars can represent sample intervals, alteration zones, contamination layers, etc.

Bar



There are two types of bar logs: standard bars and polarity bars. Standard bar logs plot a bar from the data minimum value to the row's data value. Polarity bar logs plot data based upon zero so there are bars on both sides of zero if there is a mix of negative and positive data.

Percentage



Percentage logs are similar to bar logs. Percentage logs display the percentage of each alteration in a sample; the amounts of sand, clay, gravel, silt, etc. The percentage log uses data to create either a series of blocks (interval data) or polygons (depth data) that always add up to 100%.

Tadpole



Tadpole logs are used to display dip and dip direction down the borehole. This gives an indication of strike and dip of bedding planes, fractures, or any other structure along the depth of the borehole. The symbols, colors, and labels can be altered to display the most useful information along the well.

Post



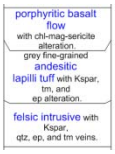
Post logs are used to display a symbol and text at the data position. The symbols can represent sample locations at depth or intervals, and in the case of monitoring wells, the depth to water, contamination, etc.

Classed Post



Classed post logs are similar to the post logs, except classed post logs use range schemes and numerical values to determine the symbol properties.

Complex Text



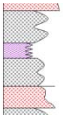
Complex text logs show text in intervals. This type of complex text is generally used for rock descriptions, alteration descriptions, or any general descriptive text that represents interval data. Long text blocks are wrapped to fit within the log width. Separator styles can be used to separate text in long descriptions, and if adjacent sections contain the same text they can be combined into a single, larger section.

Graphic



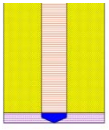
Graphic logs allow you to specify image file names and show the images at specified intervals. This is useful in displaying photos of the core, rock type, alteration, etc.

Lithology



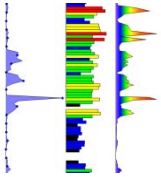
Lithology logs show the various stratigraphic layers in the borehole. The display can be as simple as a filled block from the top to bottom, or the display can be more elaborate and show weathering patterns and line types.

Well Construction



Well construction logs replicate a well construction diagram for the log, and is generally used in the environmental industry. This log type shows items such as screen, packing material, end caps, and covers.

Function



Function logs combine multiple existing log variables into a new log using mathematical formulas. The log variables being combined can contain different depth spacings and be from different tables. A new table is created from the output data of the input logs. *Example: 1*

Strater Help

There are several ways to obtain help in **Strater**:

Getting Help from the Help Menu

Within **Strater**, the online help file is opened through **Help | Contents** or **Help | Tutorial**. Alternatively, press F1 at anytime to open the help. You can navigate help using the **Contents**, **Index**, **Search**, and **Favorites** pages in the navigation pane to the left of the topic page.

- The **Contents** page allows you to search the predefined table of contents. The table of contents has a variety of help books and help topic pages. Double-click on a help book, or click the ⊞ button to the left of a book to open it.
- The **Index** page allows you to search index words to find a help topic. If you do not find a topic with an index word, try a search on the **Search** page.
- The **Search** page offers advanced search options including phrases, wildcards, boolean, and nested searching.
- The **Favorites** page allows you add help pages to a custom list. This allows you to quickly find favorite help topics that you reference frequently.

Navigating the Help

The navigation pane shows the **Contents, Index, Search,** and **Favorites** pages. The navigation page is displayed by default. The navigation pane can be displayed with the 

button and hidden with the 

button.

Internet Help Resources

There are several Internet help resources.

- Click the 

or 

buttons in online help to research a question or to post a question.
- Use the **Help | Feedback** commands to send a problem report, suggestion, or information request by email.
- Search our web page at www.goldensoftware.com or use the **Help | Golden Software on the Web** commands for links to the Golden Software Home Page, **Strater** Product Page, and Frequently Asked Questions.
- The Golden Software website has a variety of resources including training videos, a support forum, a newsletter, a user image gallery, a blog, and a variety of free downloads.

Obtaining Information on Dialogs and Commands

To obtain information about dialogs or highlighted commands:

- Press F1 at anytime to open help.
- Click  in dialogs to open the help topic pertaining to that dialog.
- Find out the function of highlighted menu commands or open dialogs by pressing F1.
- Click  , or press SHIFT+F1 on your keyboard, then click a menu command, toolbar button, or screen region to view information regarding that item.

Strater Overview

For general information on **Strater**, select Introduction to **Strater**, Borehole View, Creating a Borehole, and Log Items.

Context Sensitive Help

Click  or use SHIFT+F1 on your keyboard for help on menu commands, tool buttons, and screen regions. This method will produce a detailed help page for the item of interest.

F1 Key

Alternatively, you can obtain help for open dialogs and highlighted menu commands by pressing the F1 key on the keyboard.

Printing the Online Help

The online help topics may be printed. You can print a single topic, a section of the table of contents, or all topics in the table of contents. Open the online help by choosing the **Help | Contents** command in **Strater**.

Printing One Topic

To print one topic:

1. Open the online help by clicking the **Help | Contents** command in the **Strater** window.
2. Click on the topic you wish to print.
3. Click the 

button.
4. If the **Contents** tab is open in the help navigation pane, the **Print Topics** dialog appears. Select *Print the selected topic* and click *OK*.
5. The **Print** dialog opens. Click the *Print* button, and the individual topic is printed.

Printing One Book

To print one help book, such as the tutorial:

1. Open the online help file by clicking the **Help | Contents** command in the **Strater** window.
2. Click the **Contents** tab on the left side navigation pane.
3. Expand the ***Strater*** *3* book and click on the *Tutorial* book.
4. Click the 

button.
5. The **Print Topics** dialog appears. Select *Print the selected heading and all subtopics* and click *OK*.
6. The **Print** dialog opens. Click the *Print* button and all the topics included in the *Tutorial* book are printed.

Printing the Entire Help File

To print all of the topics in the help file table of contents:

1. Open the online help by clicking the **Help | Contents** command in the **Strater** window.
2. Click the **Contents** tab on the left side navigation pane.
3. Select the top-level book in the help file, ***Strater** 3*.
4. Click the 

button.
5. The **Print Topics** dialog opens. Select *Print the selected heading and all subtopics* and click *OK*.
6. The **Print** dialog opens. Click the *Print* button, and all the topics included in the online help table of contents are printed.

WARNING: Printing the entire help file takes hundreds of letter-sized sheets of paper and is very time consuming to print. There is no table of contents or index printed with the file.

Serial Number

Your **Strater**® serial number is located on the CD cover. If you purchased **Strater** with the download only option, the serial number was emailed to you with the download directions. Please take a minute to register your copy of **Strater** with us.

To register go online to www.GoldenSoftware.com.

Registering your serial number entitles you to free technical support, upgrade pricing announcements, and **Strater** upgrade pricing. Our database is confidential.

Technical Support

Golden Software's technical support is free to registered users of our products. Our technical support staff is trained to help you find answers to your questions quickly and accurately. We are happy to answer any of your questions about any of our products, both before and after your purchase. We also welcome suggestions for improvements to our software and encourage you to contact us with any ideas you may have for adding new features and capabilities to our programs. To allow us to support all customers equitably, an individual user's daily support time may be limited.

Technical support is available Monday through Friday 8:00 AM to 5:00 PM Mountain Time, excluding major United States holidays. We respond to email and fax technical questions within one business day. When contacting us with your question please have the following information available:

- Your **Strater** serial number
- Your **Strater** version number, found in Help | About **Strater**
- The operating system you are using (Windows XP, Vista, 7, or 8)
- The steps taken to produce the issue
- The exact wording of the first error message (if any) that appears

If you cannot find the answer to your question in the online help, on our web page frequently asked questions, in our support forums, on the knowledge base, or in the quick start guide please do not hesitate to contact us:

Phone: 303-279-1021

Fax: 303-279-0909

Email: StraterSupport@GoldenSoftware.com

Web: www.GoldenSoftware.com

Mail: Golden Software, Inc., 809 14th Street, Golden, Colorado, 80401-1866, USA

Chapter 2

Tutorial

Tutorial Introduction

This tutorial is designed to introduce you to some of **Strater's** basic features. After you have completed the tutorial, you should be able to begin to use **Strater** with your own data, creating your own boreholes, maps, and cross sections. We strongly encourage completion of the tutorial before proceeding with **Strater**. The lessons should be completed in order; however, they do not need to be completed in one session. The tutorial should take approximately one hour to complete.

The following is an overview of lessons included in the tutorial.

- *Lesson 1 - Opening Data* shows how to open a data file in a table view.
- *Lesson 2 - Creating Logs* shows how to create a Depth log, Line/Symbol log, and Zone Bar log.
- *Lesson 3 - Changing Properties* shows how to edit the log properties.
- *Lesson 4 - Creating and Editing Drawing Items* shows how to add text, linked text, and a legend to the borehole view.
- *Lesson 5 - Changing Boreholes* shows how to change all of the logs to another borehole and how to change an individual log to a different borehole.
- *Lesson 6 - Creating a Map View* shows how to import collar data into a table and create a map view with a well layer and a well selector line.
- *Lesson 7 - Creating a Cross Section View* shows how to create and edit a cross section view.
- *Lesson 8 - Saving Information* shows how to save the **Strater** project and how to create a template.

Advanced Tutorial Lessons

The advanced tutorial lessons are optional, but give additional information about working with legends, design mode, and LAS files.

- *Lesson 9 - Editing Legends* shows how to edit many of the properties of the legend object.
- *Lesson 10 - Design Mode and Activating Boreholes* shows how to create a log in design mode and activate the borehole with data after all of the logs are created.
- *Lesson 11 - Creating Logs from LAS* files shows how to import LAS data and create logs from it.
- *Lesson 12 - Creating a Cross Section from Line/Symbol Logs* shows how to create a cross section from line/symbol logs. It also steps through the process of creating manual layers and editing layers.
- *Lesson 13 - Displaying Deviated Maps and Cross Sections* shows how to change the display of wells on maps and cross sections to display deviation paths.

A Note about the Documentation

Various font styles are used throughout the **Strater** quick start guide and online help. **Bold** text indicates menu commands, dialog names, and page names. *Italic* text indicates items within a dialog such as group box names, options, and field names. For example, the **Save As** dialog contains a *Save as type* drop-down list. Bold and italic text may occasionally be used for emphasis.

In addition, menu commands appear as **Edit | Undo**. This means, "click on the **Edit** menu at the top of the **Strater** window, then click **Undo** within the **Edit** menu list." The first word is always the menu name, followed by the commands within the menu list.

Using the Tutorial with the Demo Version

If you are using the demo version of **Strater**, you will not be able to complete some of the steps due to disabled save, export, print, and copy features. The demo version is a fully functional read-only version of the program. When this is a factor it is noted in the text and you are directed to proceed to the next step that can be accomplished with the demo.

Starting Strater

To begin a **Strater** session:

1. Navigate to the installation folder, which is C:\Program Files\Golden Software\Strater 4 by default.
2. Double-click on the **Strater**.exe application file.
3. A new empty project is created with an empty borehole view and an empty project settings table. If this is the first time that you have opened **Strater**, you will be prompted for your serial number. Your serial number is located on the CD cover, or in the email download instructions, depending on how you purchased **Strater**.

If **Strater** is already open, click the **File | New | Project** command or the  button to open a new empty project before continuing with the tutorial.

Lesson 1 - Opening Data

Data can be opened in **Strater** before any logs are created, while creating the logs, or after the logs have been created. In this section, the initial data is opened before any logs are created. If you prefer to create a log design first, use design mode. Design mode is discussed in Lesson 10.

To open an existing data file into a table:

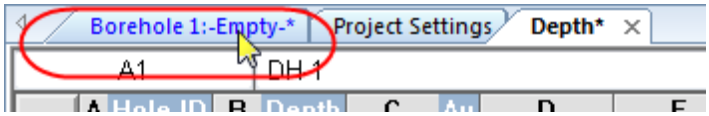
1. Click the **File | Open** command or click the  button.
2. In the **Open** dialog, navigate to the **Strater** Samples folder. By default, this is located in C:\Program Files\Golden Software\Strater 4\Samples. Click on the *Tutorial 1.xls* file and click Open.
3. In the **XLS Import Options** dialog, select the *Depth* sheet and click *OK*.
4. In the **Specify Worksheet Column Definitions** dialog, check the box next to *Specify Column Header Row*. This tells **Strater** that the column number specified contains text indicating the column name.
5. Click *Next*.
6. In the **Specify Data Type and Column Positions** dialog, set the *Data type* to *Depth (Single Depth)*.
7. Set the *Hole ID* and *Depth* columns to the appropriate columns.
8. Click *Finish*.

The data is displayed in a table view named *Depth*. This table can now be used to create logs.

Lesson 2 - Creating Logs

The most common types of logs that are created are depth logs and line/symbol logs. Data are immediately associated with the log when creating log items in active mode, providing an immediate image representing the log. This section will use the previously opened data file to create a line/symbol and depth log. Another table will be opened to create a zone bar log.

To create the logs in the borehole view, click on the *Borehole 1* tab.



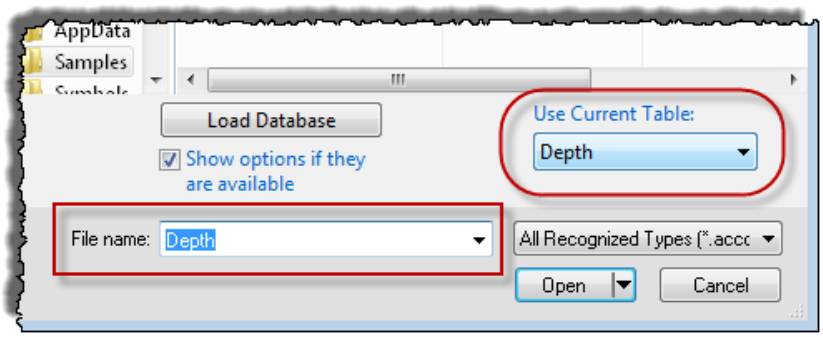
Click on the Borehole 1 *tab to switch to the borehole view, where logs are created.*

Creating a Depth Log

Depth logs display the borehole's depth or elevation information. For deviated wells, the depth log can be adjusted so that the true vertical depth can be displayed.

To create a depth log:

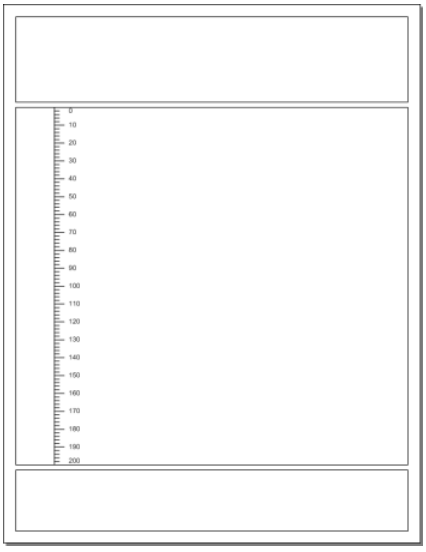
1. Click the **Log | Depth** command or click the button.
2. Click on the left side of the log pane, where you want the depth log to be located.
3. In the **Open** dialog, make sure that *Depth* is selected in the *Use Current Table* option and in the *File name* box.



Select the Depth *table in the* Use Current Table *section and make sure it is selected in the* File name *box.*

4. Click *Open*.

The depth log is created with the default properties.



The depth log is created where you clicked on the screen.

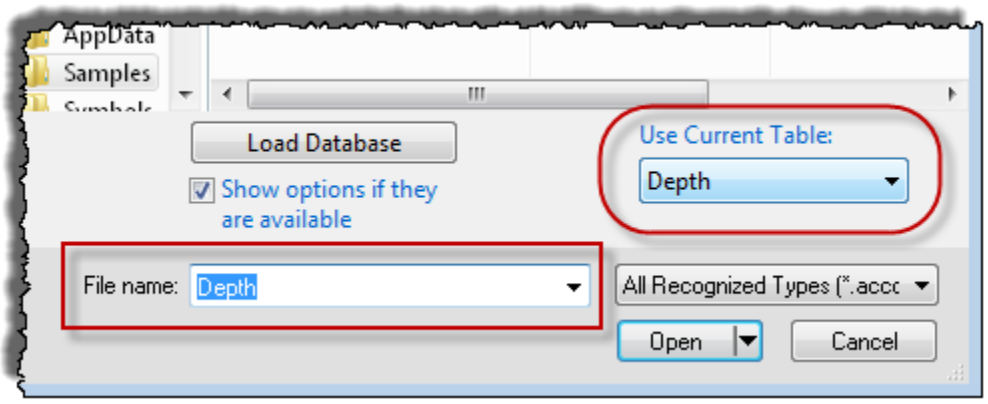
Creating a Line/Symbol Log

Line/symbol logs display table data connected with a line in depth order. Lines, symbols, or both line and symbols can be displayed.

To create a line/symbol log:

1. Click the **Log | Line/Symbol** command or click the button.
2. Click in the log pane in the location you want the line/symbol log drawn. For this tutorial, click near the center of the log pane. You will position the log item more exactly later.

3. In the **Open** dialog, make sure that *Depth* is selected in the *Use Current Table* option and in the *File name* box.

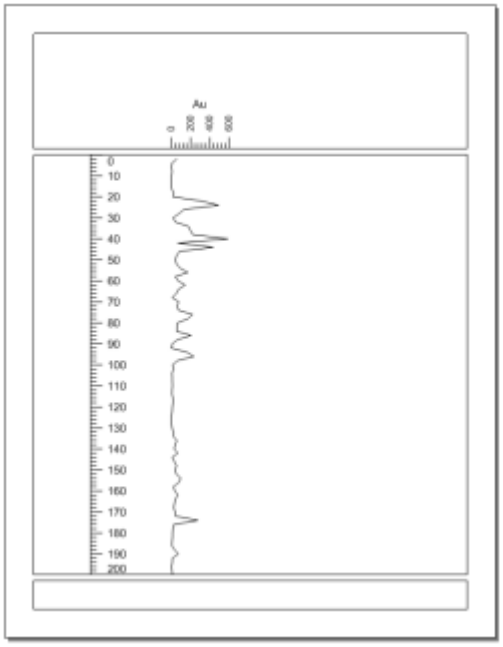


Select the Depth *table in the* Use Current Table *section and make sure it is selected in the* File name *box.*

4. Click *Open*.

The line/symbol log is created with the default properties.

Note that a scale appears in the header pane. The default option for line/symbol logs is to always create a scale bar. The scale bar shows the range of values for the variable being displayed. If scale bars are not desired by default, click the **Tools | Options** command. Uncheck the box next to the *Auto Create Scale Bar* option in the *General* section.



The borehole view should look similar to this, after adding the line/symbol log. Both the depth log and line/symbol log are shown, with the scale bar above the line/symbol log.

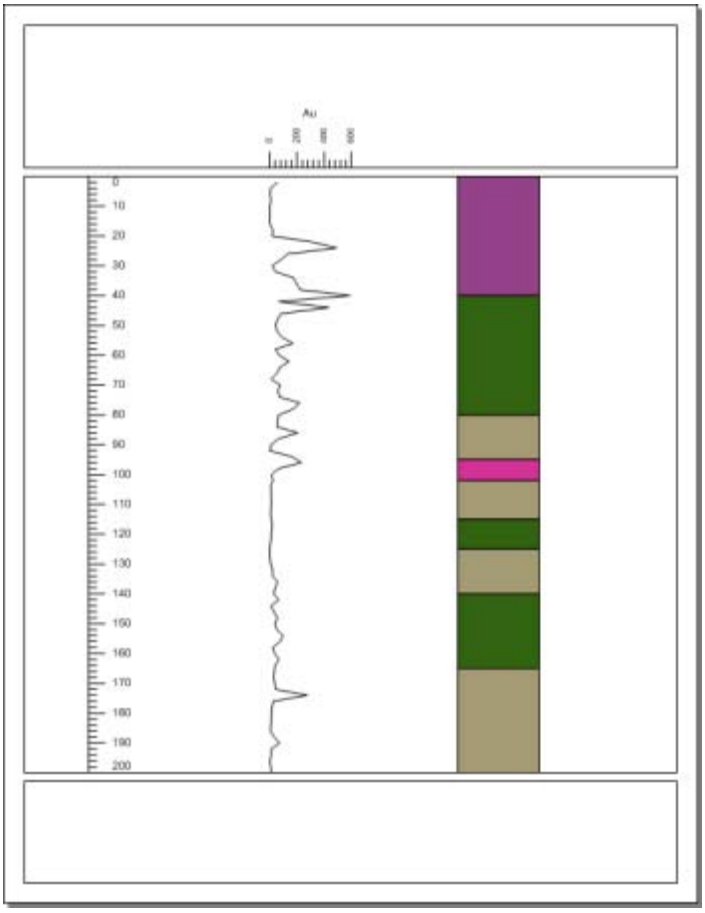
Creating a Zone Bar Log

Zone bar logs can display a variety of well log information, such as lithology or layer information. Zone bar logs include two columns of depth data, normally labeled as *From* and *To.* Because of this, each row contains data that represents conditions in a depth range.

To create a zone bar log:

1. Click the **Log | Zone Bar** command or click the  button .
2. Click in the log pane to the right of the line/symbol log.
3. In the **Open** dialog, select the *Tutorial 1.xls* file from the Samples folder and click *Open*.
4. In the **XLS Import Options** dialog, select the *Lithology* sheet and click *OK*.
5. In the **Specify Worksheet Column Definitions** dialog, check the box next to *Specify Column Header Row* option to set the contents of row 1 as the header row.
6. Click *Next.*
7. In the **Specify Data Type and Column Positions** dialog, verify that *Hole ID*, *From*, and *To* have the appropriate columns selected. The rest of the columns are not mapped to one of the remaining predefined columns but will be imported into the table.
8. Click *Finish*.

The zone bar log is created with the default properties. An interval table named *Lithology* is created with the data from the selected sheet.

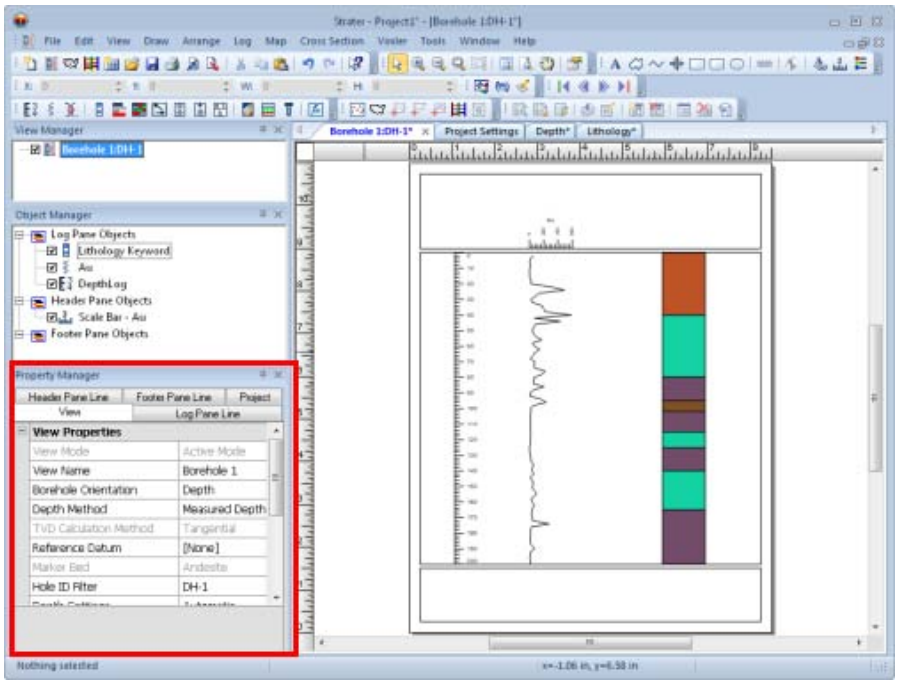


The zone bar is added to the existing borehole view.

Lesson 3 - Changing Properties

The properties of an object are edited by clicking on the object and changing the properties in the **Property Manager**. The **Property Manager** is displayed by default on the lower left side of the **Strater** window. If the **Property Manager** is not visible, click the **View | Managers | Property Manager** command. A check mark appears next to **Property Manager** if it is visible.

When an object is selected, its properties are displayed in the **Property Manager**.



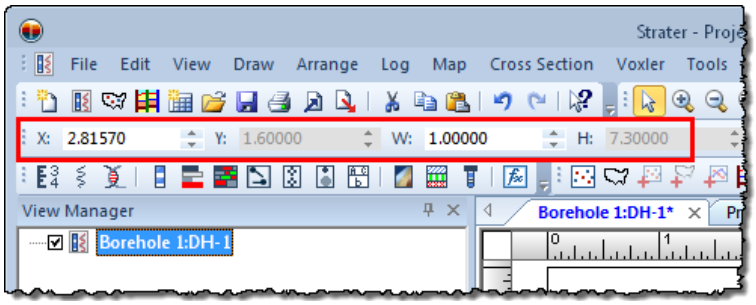
*The **Property Manager** is displayed in the lower left corner of the **Strater** window, by default.*

Editing Log Item Position and Size

The easiest way to position or size a log is to click on the log in the **Object Manager** or in the log pane and drag it to a new location or size. However, items can be more accurately positioned with menu commands and toolbars.

To accurately position and size the line/symbol log:

1. Click on the line/symbol log in the **Object Manager** or log pane to select it.
2. In the *Position/Size* toolbar, highlight the number next to *X:* and type in 2.0.



Highlight the existing value in the X box and type the new location.

3. Press ENTER on the keyboard and the line/symbol log is moved in the borehole view so its left edge is two inches from the left edge of the paper.
4. Highlight the number next to *W:* and type 1.5.
5. Press ENTER on the keyboard and the line/symbol log is resized so that the log is one and a half inches wide.
6. Repeat the above steps with the zone bar log and depth log.

An alternate method would be to press the CTRL key on the keyboard and click on all of the log objects in the **Object Manager**. Then, click the **Arrange | Size Objects | Specify Width** command. Type in 1.5 and click *OK*. All of the selected objects are resized to 1.5 inches wide with a single command.

Spacing Objects

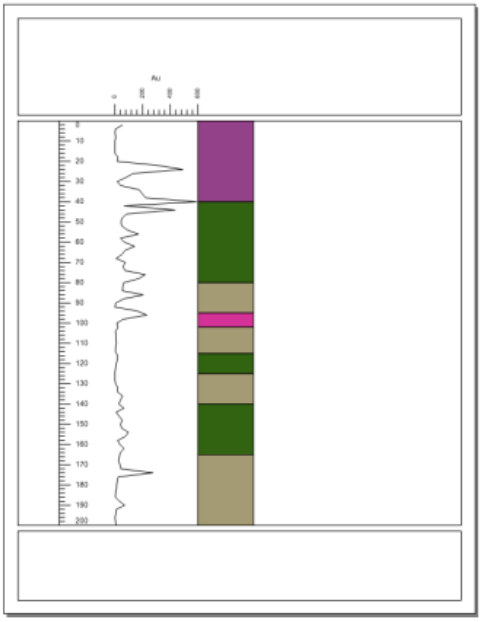
Log items can be positioned relative to one another with the Arrange menu commands.

To position the depth log relative to the line/symbol log:

1. The line/symbol log should be to the right of the depth log before completing the next section. If the line/symbol log is to the left of the depth log, click on the depth log. Hold down the left mouse button and drag the depth log to the left of the line/symbol log.
2. Select both the depth log and the line/symbol log. There are two ways to select multiple items in the log pane:
   - Click on the first log in the borehole view window. Press the SHIFT key on the keyboard. While holding the SHIFT key down, click the second log in the borehole view window.
   - In the **Object Manager** click the name of the first log. Press the CTRL key on the keyboard. While holding the CTRL key down, click the name of the second log.
3. When both logs are highlighted, click the **Arrange | Space Objects | Left to Right** command.

The line/symbol log remains in the fixed location. The depth log is moved so that the right edge of the depth log bounding box is at the same location as the left edge of the line/symbol log bounding box.

The **Arrange | Space Objects | Right to Left** command can be used when selecting the line/symbol log and the zone bar log to move the zone bar log to the immediate right of the line/symbol log.



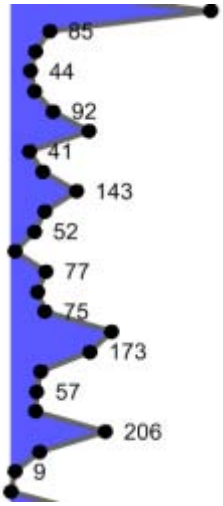
*The **Space Objects** commands remove the spaces between adjacent objects to maximize the space available in the view window.*

Editing Line/Symbol Log Properties

Each object has unique properties that can be changed. Line/symbol logs can change the column that is being displayed, the scaling, the line, fill, and symbol properties, add labels, and add a background grid behind the line/symbol log.

To change the line/symbol plot properties:

1. Click on the line/symbol log in either the **Object Manager** or in the plot window to select it.
2. In the Property Manager, click on the Display Properties tab.
3. Click the ⊞ next to *Line Properties* to open the line properties section.
4. To increase the line thickness, highlight the value next to *Width* and type a new value, such as 0.04 inches.
5. Press ENTER on the keyboard to make the change.
6. To open the fill properties section, click the ⊞ next to *Log Fill Properties*.
7. To fill the curve to the left of the line with a blue color, make sure that the *Display Log Fill* option is set to *Left*.
8. Click the *Black* color next to *Foreground* and select *Blue* from the color list. The log is filled to the left with a blue color.
9. To open the symbol properties section, click the ⊞ next to *Symbol Properties*.
10. Highlight the zero next to *Symbol Frequency* and type 1.
11. Press ENTER on the keyboard to show a symbol at all points in the table.
12. Click on the **Label** tab to set label properties.
13. Change the *Show Label* to *Data* by clicking on the existing option and selecting *Data* from the list.
14. Click the ⊞ next to *Layout* to open the label layout section.
15. To reduce the number of labels, highlight the number next to *Frequency* and type 2.
16. Press ENTER on the keyboard and every other label is displayed.
17. Click the word *Center* next to *Offset Types* and select *User Defined* from the list.
18. Highlight the value next to *X Offset* and type 0.150 inches.



Display fill, symbols, and labels on the line/symbol log.

Press ENTER on the keyboard and the labels are moved to the right side of the symbols and offset by 0.150 inches from the center of the symbol.

Editing Zone Bar Properties

Zone bar logs can change the column that is displayed, add labels, change line and fill properties, and add grid lines behind the log. Normally, the fill is controlled by a scheme, which is discussed in the next section.

To edit the zone bar log:

1. Click on the zone bar log in the **Object Manager** or in the log pane to select it.
2. Click on the **Label** tab in the **Property Manager**.



Display labels and colors in the zone bar log.

To display the name of the lithological layer in each zone on the zone bar, change the *Show Label* option to *Show Label With Fill*. The labels are added to the display.

Editing Schemes

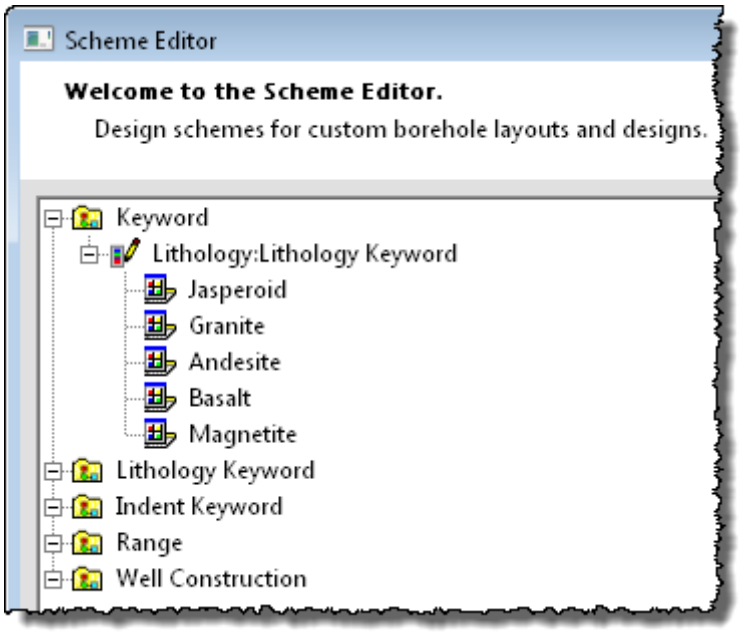
Schemes are an important part of **Strater**. Schemes provide a mechanism to define drawing properties, such as line, fill, symbol, and text properties, from a table value. Once a scheme is created, it can be used in many logs, cross sections, and other projects. This avoids the need to duplicate work.

Schemes are not used in all log types, but they are used in several, including the zone bar log. Schemes are required for lithology, percentage, and well construction logs. Schemes are optional for bar, classed post, post, and zone bar logs. Scheme properties can be edited from any view by clicking the **Draw | Scheme Editor** command or clicking the  button.

A zone bar log uses a keyword scheme to relate data table information to interval block properties, such as fill color or fill pattern. When this log was created, **Strater** automatically created a basic, default scheme to fill the log with random colors.

To edit the scheme connected with the zone bar log:

1. Click on the  button to open the **Scheme Editor**.
2. On the left side of the **Scheme Editor**, click the ⊞ next to *Lithology: Lithology Keyword*. The five scheme items are displayed below the scheme name.



Expand a scheme to view all scheme items. You can select each item to set its properties.

3. Click the *Jasperoid* item. The item properties are displayed on the right side of the **Scheme Editor.**
4. Set the fill properties to any desired pattern and color you wish. For instance, you may click next to *Pattern* and select the *BIF* image.
5. Select the *Granite* item on the left side of the dialog.

6. Set different fill properties. For instance, click next to *Foreground* and set the color to a dark green.
7. Click the solid fill next to *Pattern* and select a diagonal cross fill pattern.
8. Continue changing the properties for each of the remaining items until the fill properties for all five items have been changed.
9. Click *OK* and the **Scheme Editor** closes. The scheme properties are automatically applied to the zone bar log.



Change the fill properties for each item in the scheme.

Note that the scheme item names are case-sensitive. If you were to change *Granite* to *granite* in one cell in the table, the scheme item properties would not be displayed for that interval.

Lesson 4 - Creating and Editing Drawing Items

The header and footer panes typically contain information about the company, borehole, etc. Most of this information is static; however, some of the information can change depending on data changes. You can create a variety of objects such as rectangles, lines, and text to display information anywhere in the view window.

This tutorial lesson creates a text object, creates multiple linked text objects, and aligns the text. A legend is also added to the view.

Creating Text

The **Draw | Text** command is used to create text anywhere in the view window.

To add text to the borehole view:

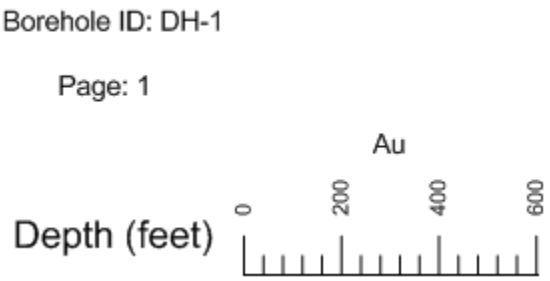
1. Click the **Draw | Text** command or click the  button.
2. Move the cursor into the borehole view. Click the left mouse button when the cursor is above the depth log in the header pane.
3. The **Text Editor** opens. Type *Depth (feet)*.
4. Click *OK* and *Depth (feet)* appears in the location where the mouse was clicked.
5. Press ESC on the keyboard to end drawing mode.
6. Click on the text. A bounding box appears. You can click and drag the text to move the text to the desired location.
7. With the text selected, highlight the number next to the *Points* option in the *Font* section of the **Property Manager**.
8. Type a new size value and press ENTER on the keyboard to increase the size of the text.

Creating Linked Text

Linked text shows information that changes with the borehole being displayed, such as location information, depth, driller name, or page number. Linked text is derived from a table or borehole view property setting. So, when the data changes, the text automatically updates.

1. Click the **Draw | Linked Text** command or click the  button.
2. Near the top left of the header section, click to add linked text. The default linked text object, the *Hole ID*, appears.
3. Click a second time below the *DH-1* text. Another *DH-1* appears.

4. Press ESC on the keyboard to end drawing mode.
5. Click on the first *DH-1* text in either the **Object Manager** or in the header pane.
6. In the **Property Manager**, click on the **Label** tab.
7. Click the ⊞ next to *Format* to open the text format section.
8. Next to *Prefix*, type *Borehole ID:* with a space after the colon.
9. Press ENTER on the keyboard and the text appears to the left of the borehole ID number.
10. Click on the second *DH-1* text in either the **Object Manager** or in the header pane.
11. Click on the **Linked Text** tab in the Property Manager.
12. Click the *Hole ID* text next to the *Linked Text Type* option and select *Current Page* from the list. The page number is displayed.
13. Click on the **Label** tab.
14. Next to *Prefix,* type *Page:* with a space after the colon.
15. Press ENTER on the keyboard and the contents of the linked text box changes.



Before the text is aligned, it may look something like this, with the text appearing at the locations where you clicked on the screen. It is often desirable to move the text to a specific location.

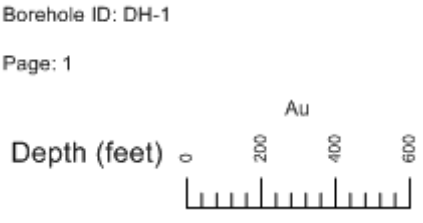
Aligning Text

There are several ways to position objects, including text boxes, in **Strater**.

- Click and drag objects to new locations.
- Click the **Arrange | Align Objects** command to automatically position objects relative to other objects.
- Click the **Arrange | Space Objects** command to control spacing between objects.
- Use the *Position/Size* toolbar to manually and precisely position objects.

To align the text and linked text:

1. Select the first linked text box by clicking on the *Linked Text 1* object in the **Object Manager**.
2. Press and hold the CTRL key on the keyboard.
3. In the **Object Manager**, click on *Linked Text 2*.
4. Click the Arrange | Align Objects | Left command. The text blocks are now horizontally aligned along the left edge of the text.
5. Click on the *Text 1* object in the **Object Manager**.
6. Press and hold the CTRL key on the keyboard.
7. Click on the *Scale Bar - Au* object in the **Object Manager**.



Align text to create a more organized layout for your borehole.

8. Click the **Arrange | Align Objects | Middle** command. The depth text and the scale bar are now vertically aligned.

Creating a Legend

Legends can be added to explain information contained in a log, such as the zone bar log. To add a legend:

1. Click on the zone bar log to select it.
2. Click the **Draw | Legend** command or click the  button.
3. Click on the borehole view where the legend should be located. The legend can appear in any of the panes. After clicking, the legend automatically appears.
4. Press the ESC key on the keyboard to end drawing mode.

The legend can be edited in the **Property Manager** to show fill properties, symbol properties, or both. The options can appear in multiple columns and with the text on the left or right side. Refer to the Lesson 9 - Editing Legends lesson for additional information about formatting the legend.



Add a legend to explain items displayed in the borehole view.

Lesson 5 - Changing Boreholes

It is very easy to change boreholes in **Strater**. As mentioned earlier, the tables can contain data for more than one borehole and the project can reference more than one table.

Changing All Logs to a New Borehole

In our example, the *Lithology* and *Depth* tables both contain DH-1 and DH-2 in the *Hole ID* column. You can easily change the borehole from DH-1 data to DH-2 data. To change the borehole:

1. Click the **View | View Properties** command, click in the white space in the log pane, click the  button, or click on the *Borehole 1: DH-1* view name in the **View Manager**.
2. Click *DH-1* next to *Hole ID Filter* and select *DH-2* from the list. The borehole log items and linked text change to reflect the DH-2 data.

Changing One Log to a New Borehole

To change only one log to a different borehole:

1. Click on the log that should be changed, such as the zone bar log.
2. In the **Property Manager**, click on the **Base** tab.
3. Click the well name next to *Hole ID Filter* and select the appropriate borehole name, such as *DH-1*. The zone bar log automatically updates to show the new borehole's data.

When changing only a single log, only the selected log changes to the new data. In this case, the depth log, line/symbol log, and linked text continue to show DH-2 data. Only the zone bar log shows the DH-1 data. The borehole view tab and the *Hole ID Filter* in the **Property Manager** show *-Multi-* to indicate that multiple logs are displayed in this borehole view.

Lesson 6 - Creating a Map View

A map view represents each of the wells in a collars table as a symbol on a map. Each well in the collars table is displayed as a separate symbol. Wells can be edited as a group or individually. The map also contains a set of four axes, that can be edited individually. Maps can add base layers, additional well layers, or well selector lines.

Opening a New Map View

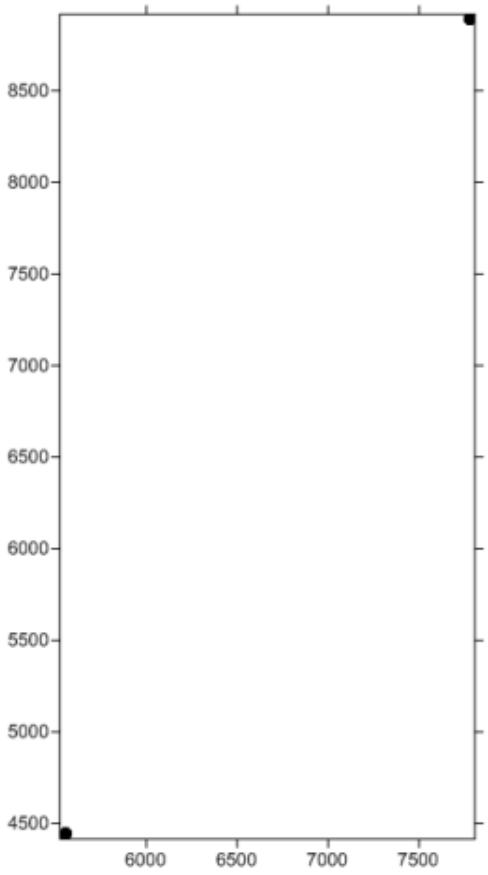
New map views in an existing project are created by clicking the **File | New | Map View** command or clicking the  button.

Displaying the Well Locations

In the new map view, wells can be displayed based on information in the collars table. A collars table can be opened using the **File | Open** command or can be opened when creating the well map.

1. Click the **Map | Create Well Map** command or click the  button.
2. In the **Open Collars File** dialog, select the *Example Data.xls* file and click *Open*.
3. In the **XLS Import Options** dialog, select the *Collars* table and click *OK*.
4. In the **Specify Worksheet Column Definitions** dialog, make sure that *Specify Column Header Row* is checked and click *Next*.
5. In the **Specify Data Type and Column Positions** dialog, set the *Hole ID, Starting Depth, Ending Depth, Elevation, Easting,* and *Northing* columns to the appropriate columns and click *Finish*. The two wells appear on the map.

The well map is displayed with the default properties. Because only two wells are visible, the wells are located at the extremes of the map limits.

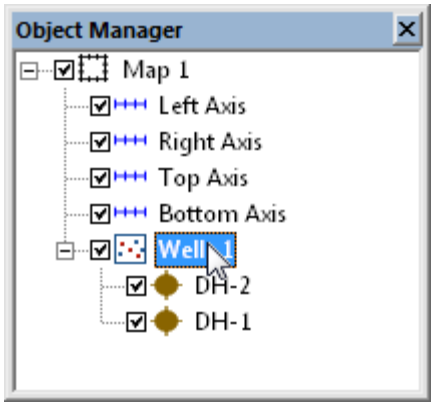


The two wells are shown at the top right and bottom left corners of the map.

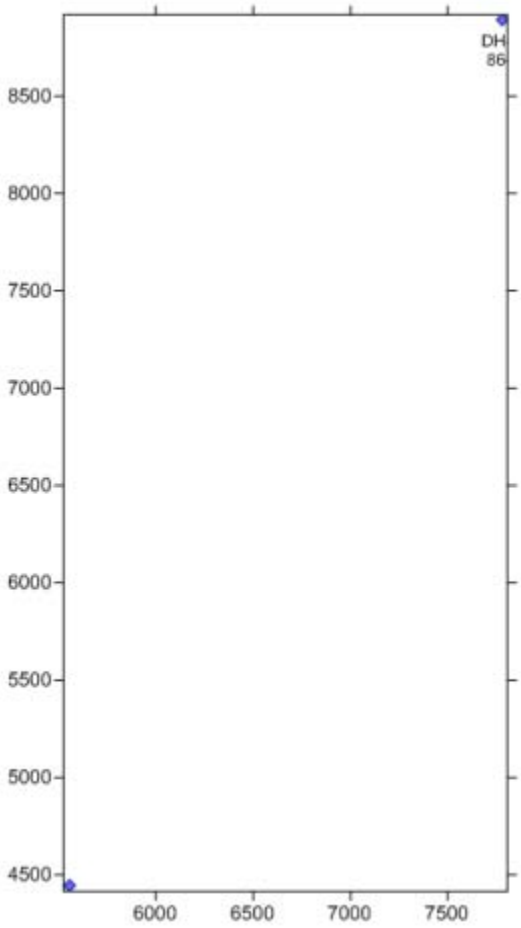
Changing the Well Properties

All of the well properties can be edited. To make changes to the well symbol and add well labels:

1. Click on the *Wells 1* map layer in the **Object Manager**.
2. In the **Property Manager**, click on the **Label** tab.
3. Next to the *Label 1* option, click on *[None]* and select *Hole ID* from the list. By default, the name appears below the symbol.
4. Next to the *Label 2* option, click on *[None]* and select *Elevation* from the list. This displays the elevation of the well below the well name.
5. Currently, a scheme is used to display wells, but all symbols can be the same. To not use a scheme, click on the **Wells** tab in the **Property Manager**.
6. Uncheck the box next to the *Use Keyword Scheme For Symbols* option.
7. Click on the **Symbol** tab.
8. Change the *Symbol* by clicking on the existing symbol and selecting the desired symbol from the list.
9. Change the *Fill Color* or *Line Color* of the symbol by clicking on the existing colors and selecting the desired color from the list.



Click on the Wells 1 *map layer in the* ***Object Manager****.*

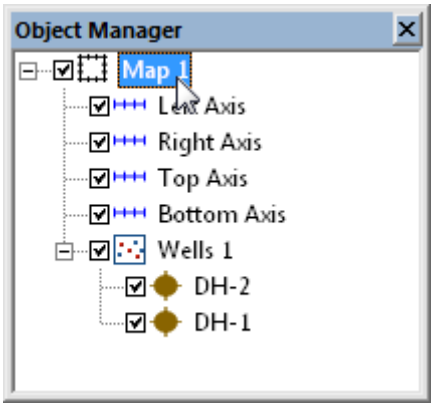


The wells are changed to use a uniform symbol. Labels are also displayed below the wells.

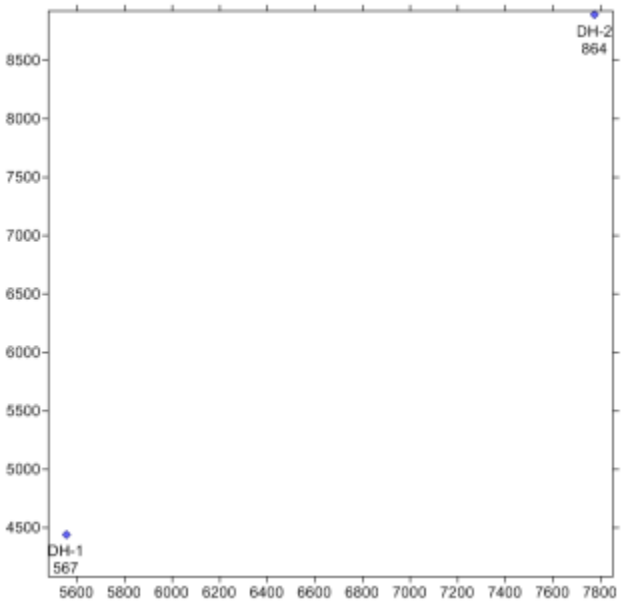
Changing the Map Properties

The map properties control the size of the map and the symbol, line, and font properties for all of the objects in the map. To change the limits and scale of the map:

1. Click on the *Map 1* object in the **Object Manager**.
2. In the **Property Manager**, click on the **Scale** tab.
3. To use different scales in the X and Y directions, uncheck the box next to *Proportional XY Scaling*.
4. Set the *Length (Page Units)* to 7 inches for both the *X Scale* and *Y Scale* by highlighting the existing value and typing 7.0.
5. Press ENTER on the keyboard to make the change. Creating a map that fits nicely within the page boundaries is important if you are going to insert the map view in a borehole view or cross section view because the entire map view page boundary is inserted.
6. Click on the **Limits** tab to set the size of the map.
7. Check the box next to *Use Data Limits* to have the limits controlled exactly by the objects in the map.
8. Click the *Fit All* button to expand the limits to include all of the text associated with the wells.



Click on the Map 1 *object in the* ***Object Manager****.*



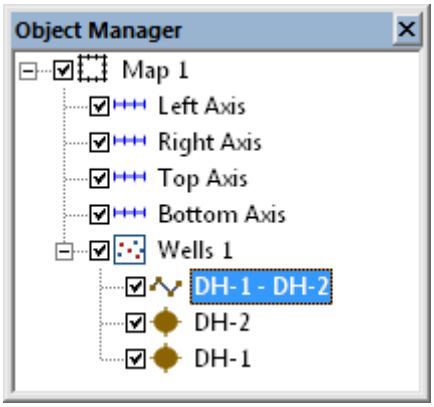
Reset the size and limits to show all of the information for both wells in the map.

Adding a Well Selector Line

A well selector line can be used to create a cross section or to show multiple wells connected on the map. Wells are selected in the order that they should appear in the cross section with the furthest left well in the cross section selected first on the map. To connect wells:

1. Click the *Wells 1* map layer.
2. Click the **Map | Add Well Selector** command, click the  button, or right-click on the map and choose **Add | Well Selector**.
3. The cursor changes to . As the cursor approaches a well, the well name appears in a floating box. This makes selecting the right well easier. Click on the first well, *DH-1*, to select it.

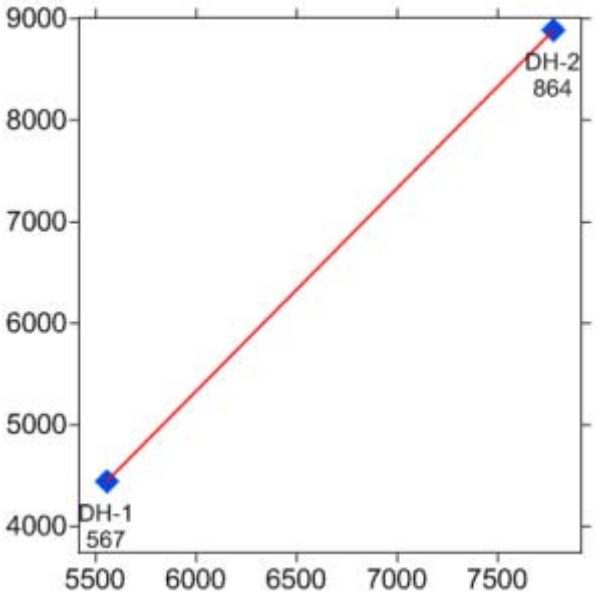
4. Click on each additional well in the order that the logs will appear in the cross section. Click on *DH-2* next.
5. Press the ENTER key on the keyboard or double-click on the last well to end the current well selector line.
6. Press ESC on the keyboard to end selector mode.



The cross section will have two wells: DH-1 on the left side of the cross section and DH-2 on the right side of the cross section.

The order the wells will be displayed in the cross section is shown in the **Object Manager** by the well order in the name for the well selector line. DH-1 appears first in the well selector name, so it will appear on the left side of the cross section. DH-2 appears last, so it will appear on the right side of the cross section. Had the wells been selected in the reverse order, DH-2 would be on the left side in the **Object Manager** name and in the cross section.

The wells are connected with a line. This line connects the wells that will be displayed in the cross section.



The well selector line is added to the map, connecting the wells.

Lesson 7 - Creating a Cross Section View

A cross section can be created displaying lithology and zone bar logs or displaying line/symbol logs. Wells can be connected with layers, representing lithologies or zones in the data. Layers can be edited or manually created.

Opening a New Cross Section View

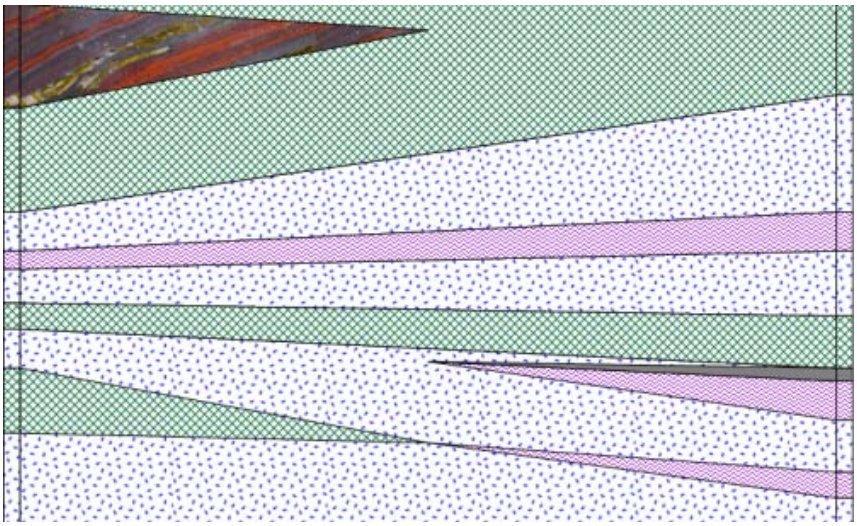
New cross section views in an existing project are created by clicking the **File | New | Cross Section View** command or clicking the  button.

Displaying Wells in the Cross Section View

To add the wells to the cross section view:

1. Click the **Cross Section | Create Cross Section** command.
2. On the right side of the **Create Well Selector** dialog, select the order the wells should be displayed in the cross section. The *Wells in selector* should show DH-1 and then DH-2.
3. Click *OK*.
4. To create the cross section from lithology or zone bar logs, set the *Type of cross section logs to be created* to *Lithology/Zone bar log* in the **Import Or Select Data To Create Cross Section Logs** dialog.
5. Since the *Table* and *Data Column* are already defined for both logs, click *OK*.

The default cross section is created, displaying zone bar logs for both wells and connected lithologies.

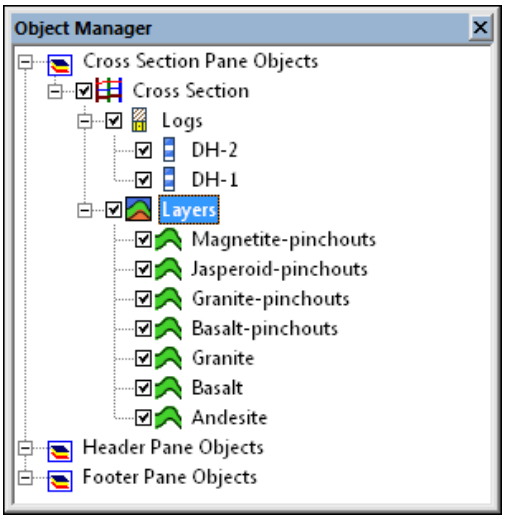


The default cross section is created from the wells in the order they were selected in ***Create Well Selector*** *dialog.*

Editing Cross Section Properties

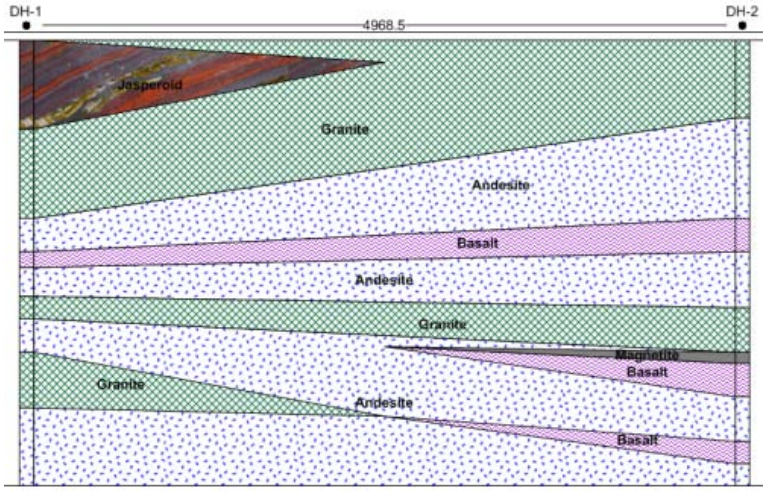
Some properties control options for the entire cross section, such as layer labels, well headers, and distances between wells.

1. To add layer names, click on the *Layers* object in the **Object Manager**.
2. In the **Property Manager**, click on the **Layers** tab.
3. Check the box next to *Show Layer Labels* and the layer names are automatically displayed.
4. To change the font properties for the layer labels, uncheck the *Use Scheme For Label Font* option.
5. Click on the **Label** tab in the **Property Manager**.
6. Click the ⊞ next to *Font* to open the font properties.
7. Highlight the value next to the *Points* option and type a new value to increase the size.



Click on the Layers *object in the* ***Object Manager****.*

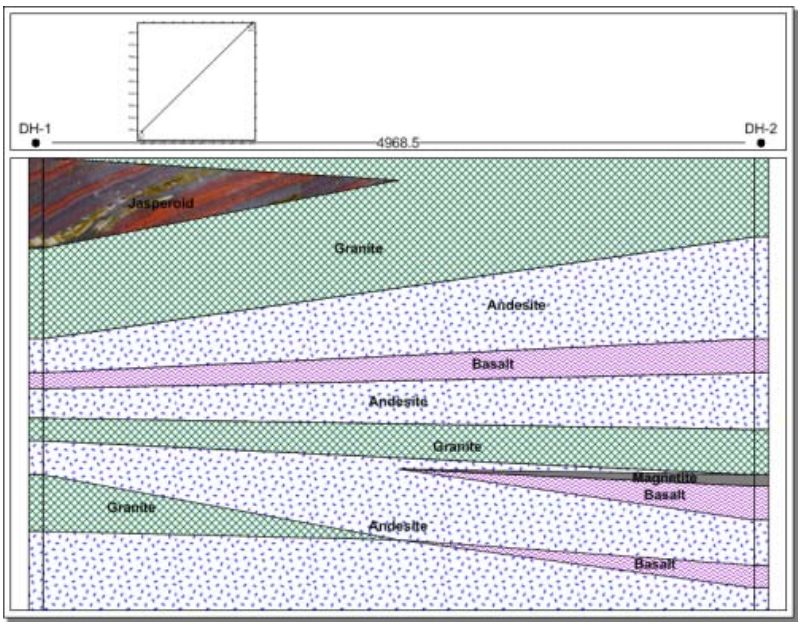
8. Press ENTER on the keyboard to make the change.
9. Check the box next to *Bold* to make the text darker.
10. To add well headers, click the **Cross Section | Add Well Headers** command. The well name and symbol are automatically added to the header section.
11. To display distances between wells, click the *Well Header 1* object in the **Object Manager**.
12. In the **Property Manager**, click on the **Distance** tab.
13. Check the box next to *Show Distance*. The distances are displayed between wells in map units.



The cross section can be updated to include labels for each layer and well header information.

Inserting the Map View

The map view can be inserted into the cross section by clicking the **Draw | Insert Map View** command. After the map view appears, you can click on it and drag it to the desired location. To edit the inserted map view, edit the original map view. The inserted map automatically updates.



The inserted map view can be added to any location in the cross section view, as a reference to where the wells in the cross section are located.

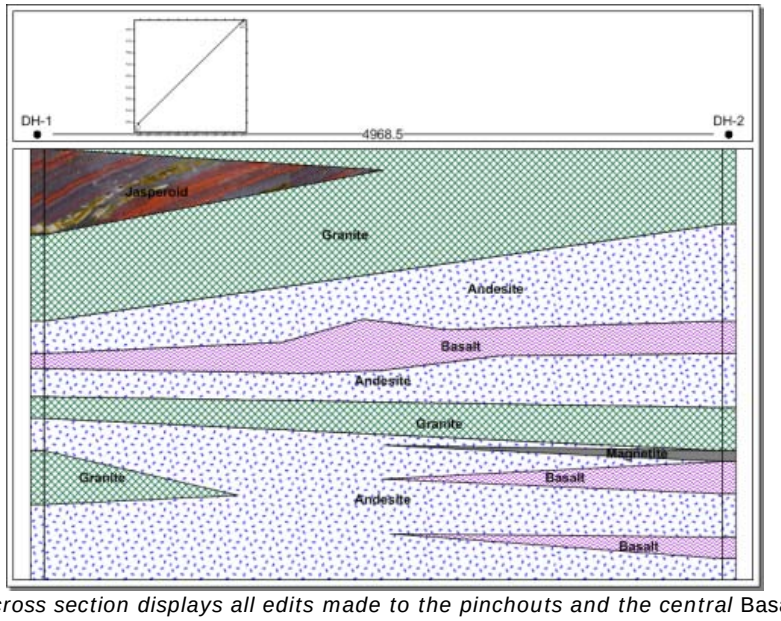
Reshaping the Cross Section Connections

The layers connecting wells in the cross section can be individually edited. After selecting a layer in the cross section view window, click the **Draw | Reshape** command to enter reshape mode. All the nodes that make up the layer polygon are viewable. Although all of the reshape commands are applicable, there are a few key functions that make reshaping cross section layers easier:

- Click on a node to select it and move it to a new location.
- Delete a node by selecting it and pressing DELETE on the keyboard.
- Add a new node by pressing and holding the CTRL key on the keyboard when clicking.
- If a node is shared (it affects more than one layer), you can separate it by holding the SHIFT key down and then moving the node. This may be useful when editing pinchout nodes, or when moving nodes that connect the layer to the log.
- Press the ALT key to link a node to a node in another layer so that the nodes move together.

Currently, two pinchouts are shown connecting toward the bottom of the cross section. To separate these layers:

1. Click on the *Granite* pinchout on the left side of the cross section to select it.
2. Click the **Draw | Reshape** command.
3. Because the *Granite* and *Basalt* pinchouts share a common central node, you can separate the two pinchouts by using the SHIFT key. Hold the SHIFT key down on the keyboard and drag the right most node toward the left side of the cross section.
4. Click on the *Basalt* pinchout on the right side of the cross section.
5. Hold down the SHIFT key on the keyboard and drag the left most nodes toward the right side of the cross section. Holding down the SHIFT key separates the upper *Basalt* pinchout from the *Magnetite* pinchout.
6. Let's assume that we know that the basalt layer near the center of the cross section has a thick section in the middle. Click on the *Basalt* layer in the cross section view window to select it.
7. Hold down the CTRL key on the keyboard. Click several points above the *Basalt* area to create a curved area at the top of the layer.
8. Continuing to hold down the CTRL key on the keyboard, click several points below the *Basalt* area to create a curved area at the bottom of the layer.
9. Press ESC on the keyboard to end reshape mode when all edits have been made.



The final cross section displays all edits made to the pinchouts and the central Basalt *layer.*

Refer to Lesson 12 - Creating a Cross Section from Line/Symbol Logs for information on manually picking layer tops or other cross section editing methods.

Lesson 8 - Saving Information

When you have completed the project, you can save the file to a **Strater** file or a template file. **Strater** files save the schemes, data, and all view windows to the file. Templates can save a single borehole or cross section view window or the entire project, but without the actual data. If you are using the demo version, the save command is not available. To save the file:

1. Click the **File | Save As** command or click the  button.
2. Set the *Save as type* to ***Strater*** *Files (*.sdg)* or to ***Strater*** *Template Files (*.tsf)*. Saving a template in this manner saves the entire project to the template.
3. Type a *File name*.
4. Click *Save* and the file is saved.

Advanced Tutorial Lesson 9 - Editing Legends

In Lesson 4 – Creating and Editing Drawing Items, a legend was created. Many of the properties of the legend can be edited, including the text that is displayed, whether symbols or filled rectangles are displayed, and how many columns are displayed. Legends are for any log type that uses a scheme.

If you have completed lesson 4 and the borehole view is available, click on the *Borehole 1* tab. You can then continue to the next lesson.

If you do not have a borehole view available with a legend:

1. Create a new borehole view by clicking the **File | New | Borehole View** command or clicking the  button.
2. Create a zone bar log by completing the steps on the Creating a Zone Bar Log tutorial page.
3. Edit the scheme associated with the zone bar log by completing the steps on the Editing Schemes tutorial page.
4. Add a legend by following the steps on the Creating a Legend tutorial page.



The default legend displays symbols and fill boxes. This can be changed to be more meaningful for the zone bar log.

Now that a log and legend exist, we are ready to edit the legend properties.

Editing Legend Properties

To edit the legend, click once on the legend to select it in either the view window or the **Object Manager**. Once the legend is selected, all the properties of the legend are available in the **Property Manager**.

Changing Sample Layout

To change the sample layout:

1. Click on the **Legend** tab in the **Property Manager.**
2. The *Number of columns* contains the number of columns that should appear in the legend. Highlight the 1 and type 2. Press ENTER on the keyboard to make the change. Two separate columns appear.
3. The *Sample Options* describe what should appear for each sample. Click on *Both* and select *Rectangle* from the list. The symbols are removed and only the filled rectangles remain.



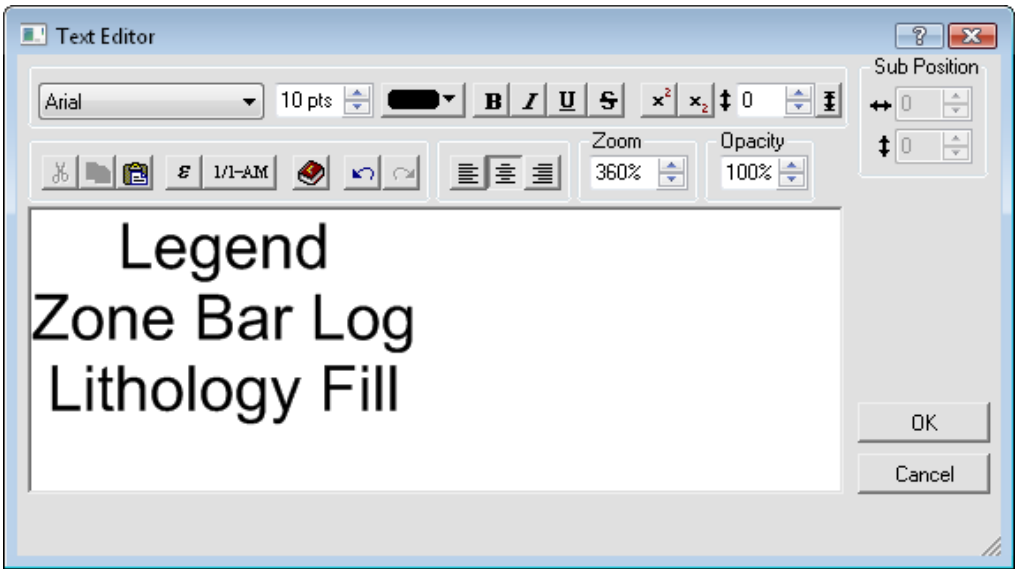
The legend appears with two columns without spaces between rows.

4. To remove the spaces between rows of the legend, uncheck the *Space Between samples* option.

Changing Title Options

To change the title of the legend:

1. To change the title, click on the **Title** tab in the **Property Manager**.
2. Expand the *Text* section by clicking the ⊞ next to *Text.*
3. Click the *Advanced* button next to *Advanced Properties*.
4. In the **Text Editor**, type the text that should appear, such as:



*Type the text in the **Text Editor** that should appear as the legend title.*

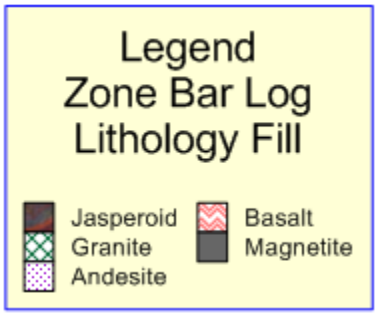
5. Click *OK* in the **Text Editor** and the legend title appears.
6. To change the size of all of the text in the title, scroll down and open the *Font* section by clicking the ⊞ next to *Font*.
7. Highlight the 10 next to *Points* and type 20.

8. Press ENTER on the keyboard to make the change.

Changing Frame Options

To set the line and fill style for the area behind the samples and text:

1. Click on the **Legend** tab.
2. Next to *Frame Style*, click the word *None* and select *Rectangle* or *Rounded Rectangle* from the list. The *Rounded Rectangle* option rounds the corners of the rectangle.
3. Click on the **Frame Line** tab.
4. Increase the line thickness by highlighting the value next to *Width* and typing a new value.
5. Change the line color by clicking the color next to *Color* and selecting a different color from the list.
6. Click on the **Frame Background** tab.
7. To fill the area, click on the *None* next to *Pattern* and select the desired pattern from the list.
8. To change the frame background colors, click on the color next to *Foreground* or *Background* and select the desired color.



*Legend properties are edited in the **Property Manager**.*

Advanced Tutorial Lesson 10 - Design Mode and Activating Boreholes

This is an optional, advanced topic in **Strater** that shows how to work in design mode and then attach data to the design.

There are two "modes" in the borehole view and cross section view: design mode and active mode. Design mode is used to create placeholders for graphics without attaching them to data. Design mode is useful when designing complex logs and designing templates when you do not want to import any data. After loading a template and importing data, you can switch between design mode and active mode.

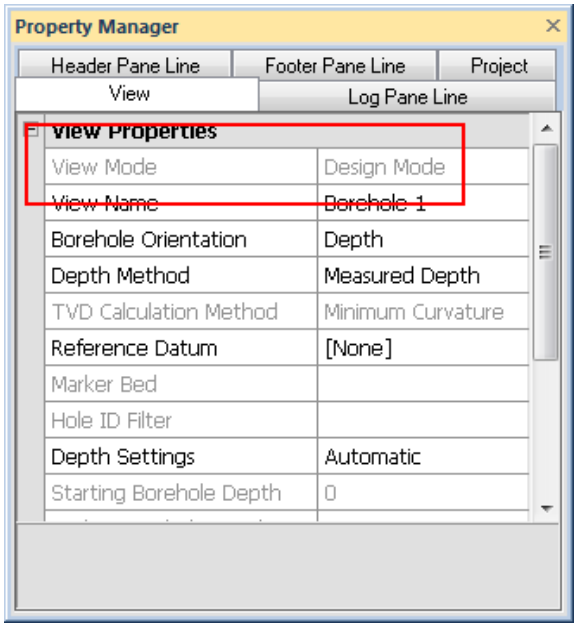
Before proceeding with this lesson, open a new **Strater** project by selecting **File | New | Project** or clicking the  button. If you are prompted to save the existing project, save it if desired.

Entering Design Mode

To enter design mode, click the **Log | Design Mode** command, click the  button, or press F4 on the keyboard. In the **Property Manager**, on the **View** tab, the *View Mode* should indicate *Design Mode*.

Creating a Design

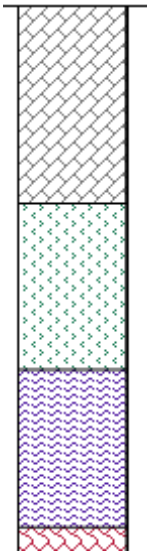
Design mode is useful when creating complex boreholes, creating templates, and when creating more complex log items like lithology or well construction logs. We will create only a single log item, a lithology log, for this lesson.



*The borehole **View Properties** indicate if you are in* Design Mode *or* Active Mode.

To add a lithology log in design mode:

1. Click the **Log | Lithology** command or click the button.
2. Click in the log pane to position the lithology log. A lithology log place holder appears.



The patterns in design mode are placeholders only.

3. Notice that you are not prompted for data when creating log items in design mode.

Opening Data

Since you are not prompted for data in design mode, data needs to be added to the project. To open existing data files into new tables:

1. Click the **File | Open** command or the button.
2. In the **Open** dialog, click on *Tutorial 1.xls* and click *Open*.
3. In the **XLS Import Options** dialog, select *Lithology* and click *OK*.
4. In the **Specify Worksheet Column Definitions** dialog, check the box next to *Specify Column Header Row* and click *Next*.
5. In the **Specify Data Type and Column Positions** dialog, select *Lithology* as the *Data type.*
6. Verify the columns are selected correctly and click *Finish*.

The data appears in a new table named *Lithology*. You can now attach the opened data to the design you previously created.

Attaching a Table to the Design

Once a table is opened, you can assign data to the lithology log in the borehole view. First, switch back to the borehole view by clicking the appropriate *Borehole* tab or by clicking the **Window | Borehole 1** command.

To assign data to the lithology log:

1. Click on the lithology log in either the view window or the **Object Manager**.
2. In the **Property Manager**, click on the **Lithology Log** tab.

3. The *Lithology Table* field is blank. Click in the blank box and select *Lithology* from the list. This is the table that was just opened.
4. Next to the *Lithology Keyword Column* option, click in the blank box and select *Lithology Keyword*.
5. Next to the *Indent Percentage Column* option, click on *[Unspecified]* and select *Indent Percentage.*
6. Next to the *Indent Keyword Column* option, click on *[Unspecified]* and select *Indent Keyword*.
7. Next to the *Indent Line Scale Column* option, click on *[Unspecified]* and select *Indent Line Scale*.

At this point, the log is ready to be activated.

Activating the Borehole

Once the lithology log properties are assigned, you can activate the borehole by selecting a borehole name. When a borehole name is selected, the data are linked to the borehole design. If there are multiple items in the borehole, each of the items must have tables and columns specified before activating the borehole.

To activate the borehole:

1. Click the **View | View Properties** command or click the button.
2. In the **Property Manager**, click on the **View** tab.
3. Next to the *Hole ID Filter* option, click on the word *-Empty-* and select *DH-1* from the list.
4. Activate the borehole by clicking the **Log | Design Mode** command, clicking the button, or pressing F4 on the keyboard.

The borehole is active, and the log displays empty fill patterns for each block. This is because fill patterns have not yet been set for the lithologies.

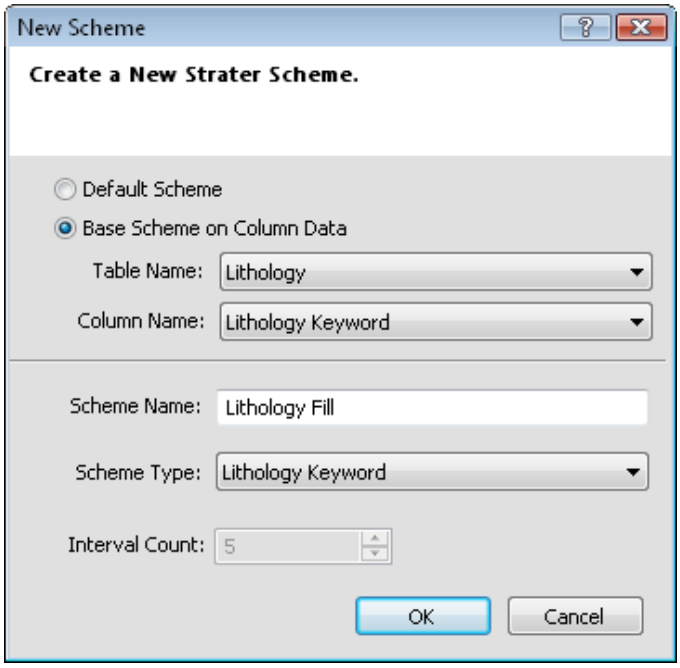
Creating a Lithology Scheme

This tutorial assumes you have completed the Editing Schemes lesson. You will now create a lithology scheme and link it to the lithology log you have created.

Creating the Scheme

To create a new lithology scheme:

1. Click the **Draw | Scheme Editor** command or click the button.
2. Click the button at the bottom of the dialog to create a new scheme. The **New Scheme** dialog opens.
3. In the **New Scheme** dialog, select the *Base Scheme on Column Data* option.
4. Select *Lithology* as the *Table Name*.
5. Select *Lithology Keyword* as the *Column Name*.



*The **New Scheme** dialog lets you quickly create schemes based on a column.*

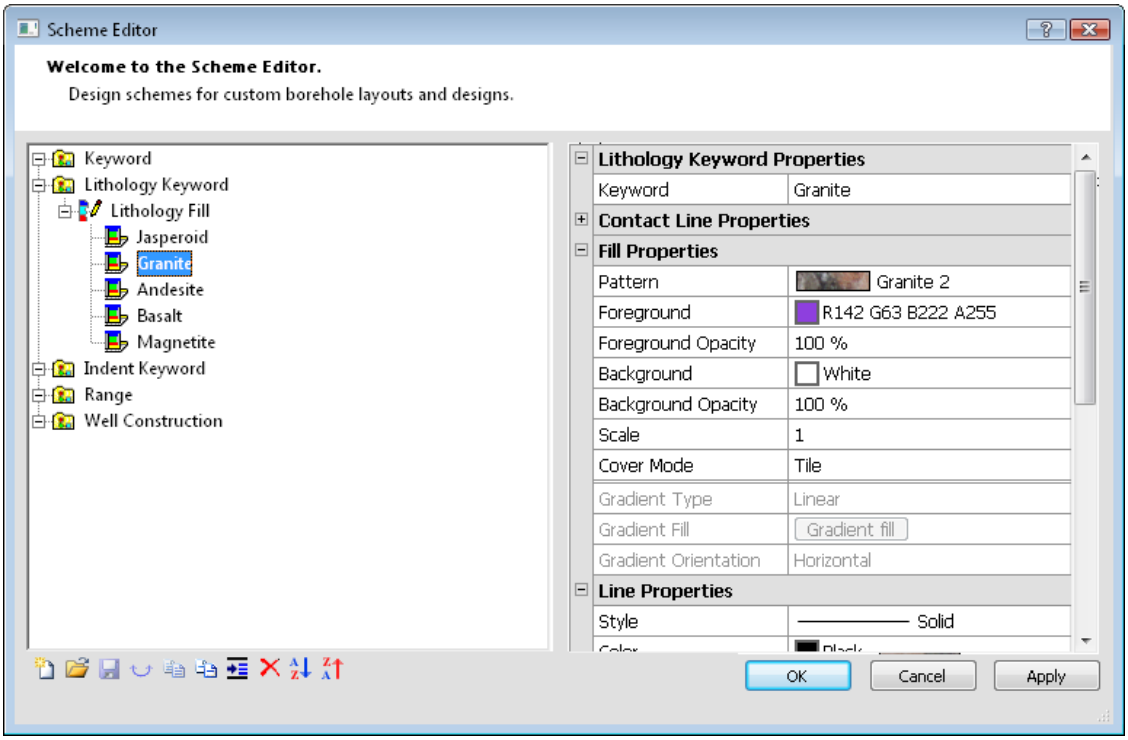
6. Enter the text *Lithology Fill* as the *Scheme Name*.
7. Select *Lithology Keyword* as the *Scheme Type*.
8. Click *OK*. The new scheme appears in the **Scheme Editor** under the *Lithology Keyword* section.

Editing the Scheme Properties

The new *Lithology Fill* scheme appears under the *Lithology Keyword* scheme types. Click the ⊞ next to *Lithology Fill* to open the list of the scheme item names. These scheme item names match the keywords in the table's *Lithology Keyword* column. You can click on each scheme item name and edit the properties for the item.

To edit the scheme item properties:

1. Click *Jasperoid* on the left side of the **Scheme Editor**.
2. The *Jasperoid* properties appear on the right side of the **Scheme Editor**.
3. Expand the *Fill Properties* section by clicking the ⊞ next to *Fill Properties* and set the fill pattern and colors for the *Jasperoid* scheme item.
4. Select *Granite* on the left side of the **Scheme Editor**. Set fill properties for the *Granite* scheme item.
5. Continue selecting fill properties for the rest of the scheme items and click *OK*.



*Click the scheme item names on the left side of the **Scheme Editor** and then change the scheme item properties on the right side of the **Scheme Editor**.*

Applying the Scheme

After creating the scheme, you can assign the lithology log to use the scheme in the **Property Manager**. To apply the scheme:

1. Click on the lithology log in the view window or **Object Manager**, if it is not already selected.
2. In the **Property Manager** select *Lithology Fill* as the *Lithology Scheme*.

Advanced Tutorial Lesson 11 - Creating Logs from LAS Files

LAS Files contain curve information about a single well. To display an LAS curve in just a few steps:

1. Create a new project by clicking the **File | New | Project** command or the  button.
2. Click the **Log | Line/Symbol** command or click the  button.
3. Click in the log pane area where the line/symbol log should appear.
4. In the **Open** dialog, select the *SB16.LAS* file and click *Open*.
5. In the **LAS Import Options** dialog, set any necessary options and click *Import*.

The LAS data was opened into a new table and a line log was created using the first variable in the LAS file. You can change the variable the line log displays.

1. Click on the line/symbol log in the view window or **Object Manager**.
2. In the **Property Manager**, click on the **Line/Symbol Log** tab.
3. Click on the *DT* next to the *Data Column* option and select the desired column. The line/symbol log automatically updates to display the new data.

To create additional logs using the same LAS file:

1. Click the **Log | Line/Symbol** command or click the  button.
2. Click in the log pane area where the line/symbol log should appear.
3. In the **Open** dialog, select the existing *SB16* table from the *Use Current Table* list and click *Open*. The new curve is created from the existing table.

Advanced Tutorial Lesson 12 - Creating a Cross Section from Line/Symbol Logs

This is an optional, advanced topic in **Strater** that shows how to create cross sections from line/symbol logs and manually create the layers.

Opening a New Project

Before proceeding with this lesson, open a new **Strater** project by clicking the **File | New | Project** command or clicking the button. If you are prompted to save the existing project, save it if desired.

Downloading the Data

For this tutorial, let's use real world data, downloaded from the United States Geologic Survey (USGS). Some good sample data is available at http://energy.cr.usgs.gov/OF00-200/WELLS/WELLIDX.HTM. The location information displayed in the table has been copied to the **Strater** samples directory. This information will be used for the collars table.

Click on *Tunalik 1*, *Kugrua 1*, *Walakpa 2*, and *Walakpa 1* well names. After clicking on each well name, click the *LAS Format Log Data* link. On the new page, right-click on the *LAS File* name link to download the LAS data. Save all the LAS files to the same directory.

Opening the Data

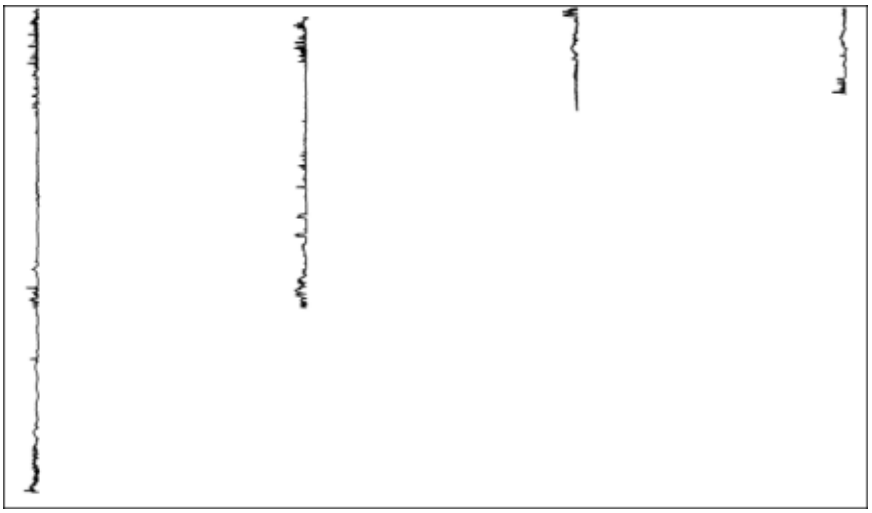
Once the data is downloaded, open the location collars information into a new **Strater** table and open the LAS data into a single depth table. Use these steps:

1. Click the **File | Open** command.
2. Select the *LAS Collars.xlsx* file from the **Strater** Samples directory and click *Open*.
3. Select the *Collars* sheet and click *OK*.
4. In the **Specify Worksheet Column Definitions** dialog, check the box next to the *Specify Column Header Row* option and click *Next*.
5. In the **Specify Data Type and Column Positions** dialog,
    a. Set the *Data type* to *Collars*.
    b. Set the *Hole ID* to *Well Name*.
    c. Set the *Starting Depth* to *Datum, Kelly Bushing, ft*.
    d. Set the *Ending Depth* to *Total Depth, ft.*
    e. Set the *Elevation* to *Datum, sea level, ft*.
    f. Set the *Easting* to *Longitude*.
    g. Set the *Northing* to *Latitude*.
    h. Click *Finish*.
6. Click the **File | New | Table** command.
7. Set the *Table Name* to *LAS Data* and the *Base Table Type* to *Depth Table* in the **Create New Table** dialog and click *Create*.
8. Click the **File | Import** command. In the **Import Data** dialog,
    a. Browse to the directory where the LAS files have been saved.
    b. Click on the first LAS file in the directory.
    c. Hold down the SHIFT key on the keyboard and click on the last LAS file in the directory.
    d. The *KG1.LAS, TU1.LAS, WA1.LAS,* and *WA2.LAS* files should be selected.
    e. Click *Open*.
9. In the **LAS Import Options** dialog,
    a. Check the box next to *Import Well Data* option.
    b. Click the *Create Table* button.
    c. Type *LAS Information* in the **Select Name** dialog and click *OK*.
    d. Check the box next to the *Use same settings for subsequent LAS files* option.
    e. Click *Next*.
10. In the **Import Data Into Current Table** dialog,
    a. Click the *Create Columns from Source* button.
    b. Click on *Depth* in the *Current Table Mapped Columns* list.
    c. Select *M_DEPTH* in the *Import Source Data Columns* list.
    d. Click the  button and the *M_DEPTH* is mapped to the *Depth* column.
    e. Click *Import* and the data is loaded into two tables, an *LAS Data* table and *LAS Information* table.

Creating the Cross Section

New cross section views in an existing project are created by clicking the File | New | Cross Section View command or clicking the  button.

1. Click the **Cross Section | Create Cross Section** command.
2. In the **Create Well Selector** dialog, click the *Minimum* button to remove all but two wells from the list.
3. On the left side of the dialog,
    a. Select the *Tunalik 1* well and click *Add*.
    b. Select *Kugrua 1* and click *Add*.
    c. Select *Walakpa 2* and click *Add*.
    d. Select *Walakpa 1* and click *Add*.
4. On the right side of the dialog,
    a. Select *Awuna 1* and click *Remove*.
    b. Select *East Simpson 2* and click *Remove*.
    c. The well order on the right side is the order the wells should be displayed in the cross section. The *Wells in selector* should show *Tunalik 1*, *Kugrua 1*, *Walakpa 2*, and *Walakpa 1*, in this order. If the wells are not in this order, click on the well name and drag the wells so that the order is the same as listed here.
    d. Click *OK*.
5. Click *Yes* in the warning dialog.
6. In the **Import Or Select Data To Create Cross Section Logs** dialog,
    a. To create the cross section from line/symbol logs, set the *Type of cross section logs to be created* to *Line/symbol log.*
    b. Since the *Table* is set to *LAS Data*, the table is defined correctly.
    c. Set the *Data Column* for each well to *SP.*
    d. Click *OK* and the line logs are displayed for each well.



The line logs are displayed for each well.

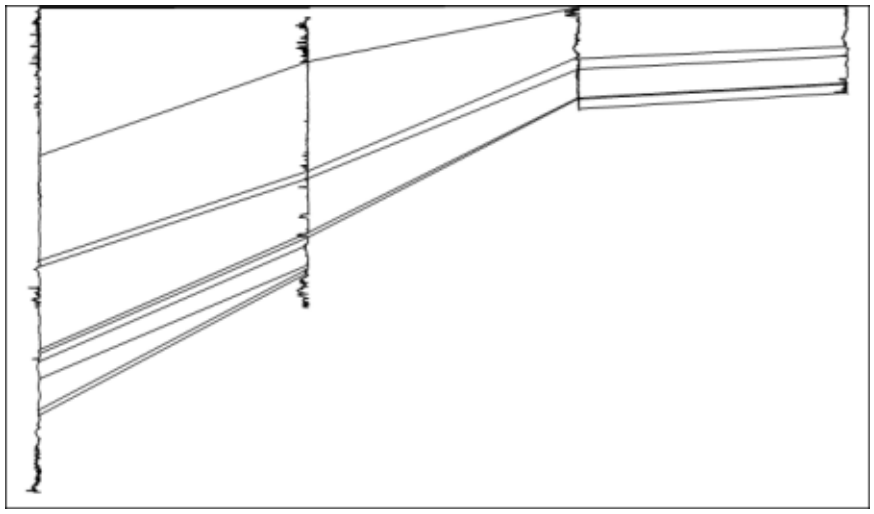
Importing and Filling Layers

To add the layers, you can either click on each log at the top or bottom of each layer or you can import a table of top or bottom values.

Adding the Layers

Since the USGS already determined the top values for several layers in each of these logs, we will import the layer tops.

1. Click on the *Cross Section* object in the **Object Manager** to select it.
2. Click on the **Cross Section | Layer Marks | Import** command.
3. In the **Import Layer Marks** dialog, select the *LAS Collars.xlsx* file.
4. Select the *Tops* sheet and click *OK*.
5. In the **Specify Worksheet Column Definitions** dialog, check the *Specify Column Header Row* box and click *Next*.
6. In the **Specify Data Type and Column Positions** dialog,
    a. Set the *Data type* to *Depth (Single Depth)*.
    b. Set the *Hole ID* to WELL NAME.
    c. Set the *Depth* to DEPTH, feet.
    d. Click *Finish*.
7. In the **Select Layer Mark Column** dialog, select ROCK UNIT as the *Column Name* and click *OK*.
8. Click *Yes* in the warning dialog and the layer lines are displayed.



The logs are connected with the layer marks from the Tops *table.*

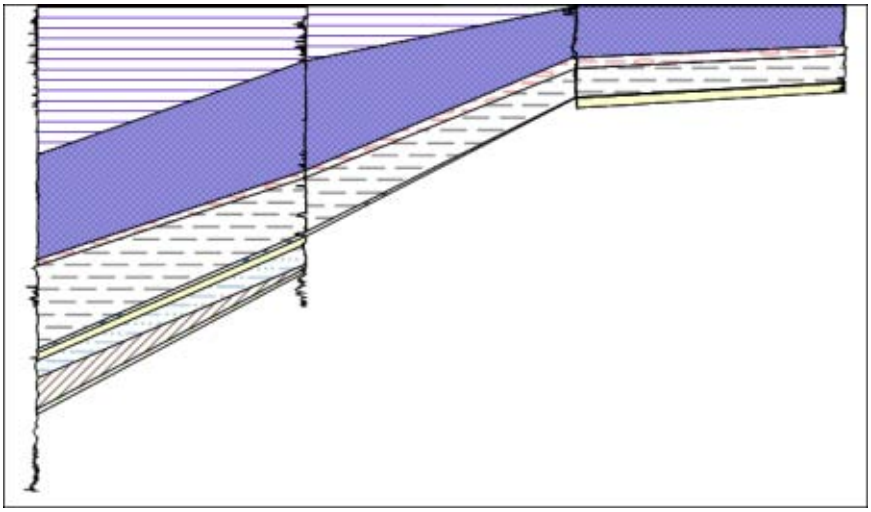
Filling the Layers

To fill the layers, a scheme will need to be created and the layer fill property will need to be activated.

1. Click the **Draw | Scheme Editor** command.
2. Click the  button at the bottom of the **Scheme Editor** dialog.
3. In the **New Scheme** dialog,
    a. Select *Base Scheme on Column Data*.
    b. Set the *Table Name* to *Tops*.
    c. Set the *Column Name* to ROCK UNIT.
    d. Type a name for the scheme, such as *Cross Section Units.*

e. Click *OK*.

4. Click the ⊞ next to the new scheme name.
5. Click on each scheme item and set the properties for that layer on the right side of the dialog.
6. Click *OK* to exit the **Scheme Editor**.
7. Click on the *Layers* object in the **Object Manager**.
8. In the **Property Manager**, click on the **Layers** tab.
9. Next to *Keyword Scheme*, click on the existing scheme name and select the *Cross Section Units* scheme from the list.
10. Check the box next to *Fill between Layer Lines* to fill the layers with color.
11. Click *Yes* in the warning dialog and the layers are filled with the colors, as determined by the scheme.



The layers are filled with the information from the scheme.

Advanced Tutorial Lesson 13 - Displaying Deviated Boreholes in Maps and Cross Sections

Strater can create boreholes as vertical or as deviated. To display boreholes as deviated in both the map view and the cross section view, the deviation information is required. This data can be in a deviated survey table, a collars table, or in a depth or interval table.

Opening the Data

Before creating a map or cross section, we will open all the data tables first. There is an easy way to open multiple sheets from an Excel file in a **Strater** table. So, we will use this method to open all the required sheets for this tutorial.

1. Click the **File | New | Project** command or click the  button to open a new blank project.
2. Click on the *Project Settings* tab to open a table view.
3. Click the **File | Open Multiple** command.
4. In the **Open Data** dialog, click on *Tutorial 3.xlsx* file and click *Open*.
5. In the **Multisheet Selection** dialog, leave all three sheets selected and click *OK*. Because the sheets are opened in the order listed, you will step through the next steps for each sheet.
6. For the *Collars* sheet:

a. In the **Specify Worksheet Column Definitions** dialog, make sure *Specify Column Header Row* is checked and set to 1. Click *Next.*

b. In the **Specify Data Type and Column Positions** dialog, make sure that the *Data type* is set to *Collars* and all of the columns are defined correctly. Click *Finish*.

7. For the *Survey* sheet:

a. In the **Specify Worksheet Column Definitions** dialog, make sure *Specify Column Header Row* is checked and set to 1. Click *Next.*

b. In the **Specify Data Type and Column Positions** dialog, make sure that the *Data type* is set to *Survey* and all of the columns are defined correctly. Click *Finish*.

8. For the *Stratigraphy* sheet:

a. In the **Specify Worksheet Column Definitions** dialog, make sure *Specify Column Header Row* is checked and set to 1. Click *Next.*

b. In the **Specify Data Type and Column Positions** dialog, make sure that the *Data type* is set to *Lithology* and all of the columns are defined correctly. Click *Finish*.

Now that all of the data tables are opened, the map and cross section can be created.

Creating Deviated Boreholes in a Map View

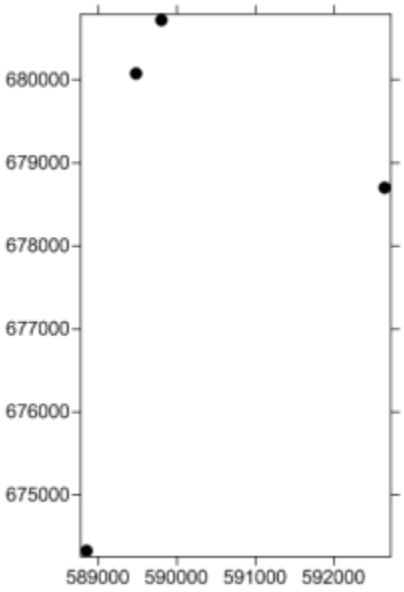
To create the deviated boreholes in the map view, a new map view must be created with the wells map layer. The properties of the wells layer are then edited to display the deviations from the survey table.

Creating the Map

1. Click the **File | New | Map View** command or click the  button to open a new map view.

2. Click the **Map | Create Well Map** command or click the  button to create a new well map layer.

The wells map is created, showing a point at each well location on the map.



The map is created with the well locations for each well in the collars table.

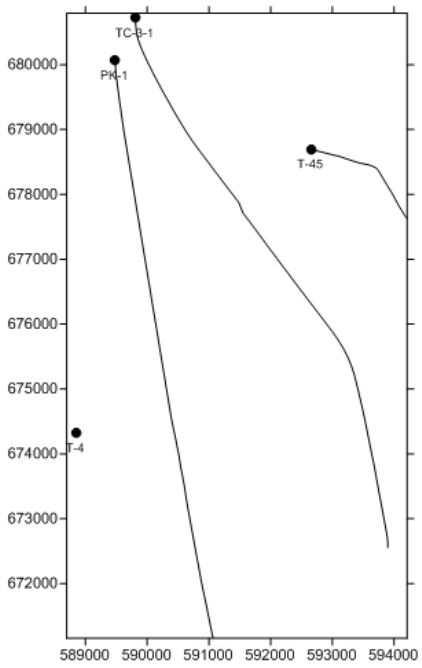
Displaying the Map with Deviated Wells

Once the map is created, the wells layer can be edited to show the deviations.

1. Click on the *Wells 1* layer in the **Object Manager** to select the well map layer.
2. In the **Property Manager**, click on the **Deviation Path** tab.
3. Check the box next to the *Show Deviation Path* option.
4. Click the empty box next to *Deviation Table* and select *[Survey Table]*.
5. To show the well labels, click on the **Label** tab.
6. Click on the *[None]* option next to *Label 1* and select *Hole ID*. The borehole names are added to the map.

The wells map updates to show the deviation on the two center wells. The far right T-45 well's deviation path is outside the limits of the map. To update the limits,

1. Click on the *Map 1* object in the **Object Manager** to select the entire map.
2. Click on the **Limits** tab in the **Property Manager**.
3. Click the *Fit All* button next to the *Fit All* command. All of the wells and their deviations are displayed.



The well locations and deviation paths are displayed in the map view.

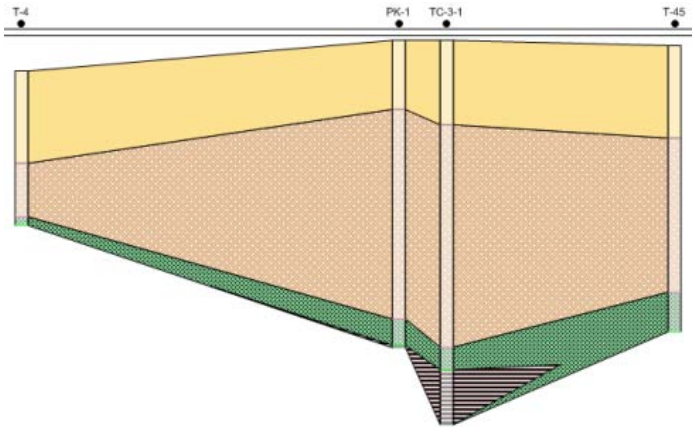
Creating Deviated Boreholes in a Cross Section View

To create the deviated boreholes in the cross section view, a new cross section view must be created with the wells to be displayed. The properties of the cross section are then edited to display the deviations from the survey table.

Creating the Cross Section

1. Click the **File | New | Cross Section View** command or click the  button to open a new cross section view.
2. Click the **Cross Section | Create Cross Section** command or click the  button to create a new cross section.
3. In the **Create Well Selector** dialog,
    a. Click on the T-4 well in the *Wells in selector* list. Click and hold the left mouse button and drag the T-4 well to the top of the list.
    b. Click on the T-45 well in the *Wells in select* list. Click and hold the left mouse button and drag the T-45 well to the bottom of the list.
    c. Click *OK*.
4. In the **Import Or Select Data To Create Cross Section Logs** dialog, notice that *Lithology/Zone bar log* is selected and that each *Hole ID* has a *Table* and *Data Column* defined. Click *OK*.
5. To show the well labels, click the **Cross Section | Add Well Headers** command.

The cross section is created, showing a lithology log for each well and the connecting layers between wells.



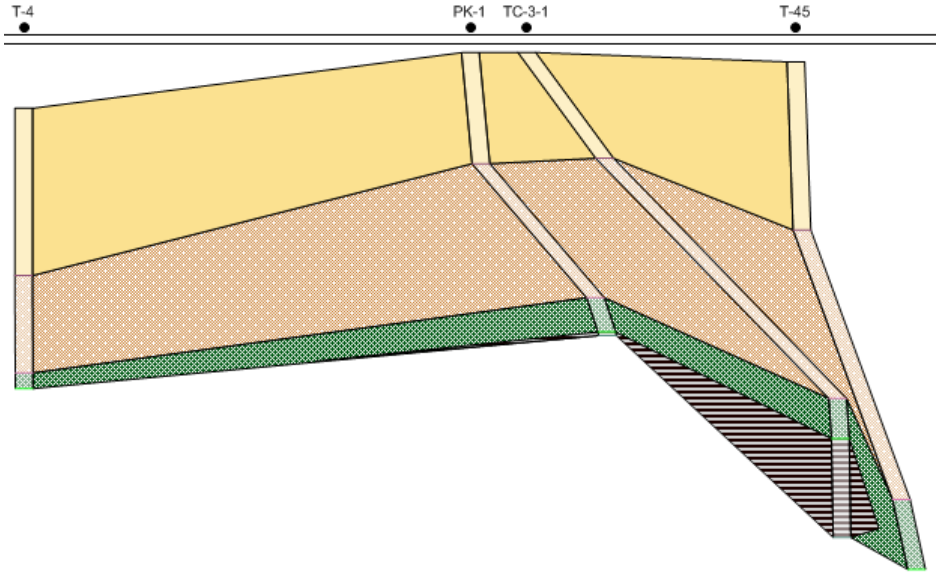
The original cross section is created with the wells displayed as vertical.

Displaying the Cross Section with Deviated Wells

To change the wells so that the deviation paths are displayed, the *Logs* layer, *Cross Section* object, and cross section View properties need to be edited.

1. Click on the *Logs* item in the **Object Manager**.
2. In the **Property Manager**, click on the **Logs** tab.
3. Set the *Hole Inclination Column* to *[From survey table]: Survey*.
4. Notice that the *Hole Azimuth Column* automatically changes to the survey table.
5. Click on the *Cross Section* object in the **Object Manager**.
6. On the **Cross Section** tab, check the box next to the *Display Logs As Deviated* option.
7. If desired, click *Yes* in the dialog so that the *Depth Method* is automatically set to *True Vertical Depth*. Alternatively, click *No* and set the *Depth Method* manually.
    a. Click the **View | View Properties** command.
    b. Click on the **View** tab in the **Property Manager**.
    c. Set the *Depth Method* to *True Vertical Depth*.
8. If prompted to recreate the cross section, click *Yes* and the deviated wells are displayed in the cross section view.

The cross section is updated showing the deviations for the wells.



The wells in the cross section are updated to show the deviations.

Congratulations! You have now completed all of the tutorial lessons.

Chapter 3

Data and Data Tables

Introduction to Data and Data Tables

All data used to generate logs in a borehole view must be opened or imported into a **Strater** project. These data tables are represented by data tabs. Collar tables, depth tables, interval tables, lithology tables, project settings tables, survey tables, text item tables, and well construction tables can be created in **Strater**. Each table type has a different function in **Strater**. Refer to the Table Types sectionfor an in-depth discussion of the types.

Creating Data

Data can be opened, imported into an existing project data table or entered into a new, blank table. **Strater** can read numerous file formats such as data files (including Excel spreadsheets and ASCII text files), databases, and LAS files. **Strater** can also link to virtually any database system installed on your computer using the Windows Data Link Source options.

Opening a New Table

During a **Strater** session, new blank tables are created by clicking the **File | New | Table** command, clicking the  button, or by pressing CTRL+W on the keyboard.

Opening an Existing Table

To open existing data into the current project, click the **File | Open** command. If you want the worksheet to appear in a new data table, select the worksheet and click *Open*. Step through the opening process and a new data table is added.

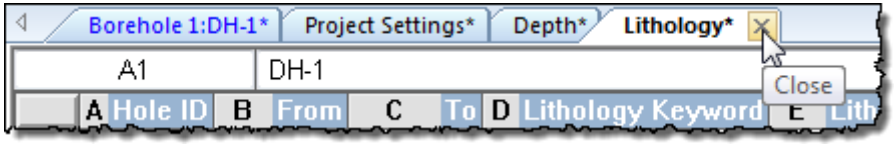
To import existing data into the current project in an existing table, click on the table where you want the data to appear. Click **File | Import**. In the **Import Data** dialog, select the data file and click *Open*. Step through the importing process and the data is added to the current table.

Closing a Table

Closing a table means removing its tab from the array of tabs. It does not mean deleting the table from the current project. When a table is closed it is still part of the project but is simply not displayed.

To close a table, either:

- Right-click the table's tab and select *Close*, or
- Select the table's tab and click the **X** to the right of the tab name:



*To close a selected tab click the **X** to the right of the tab array.*

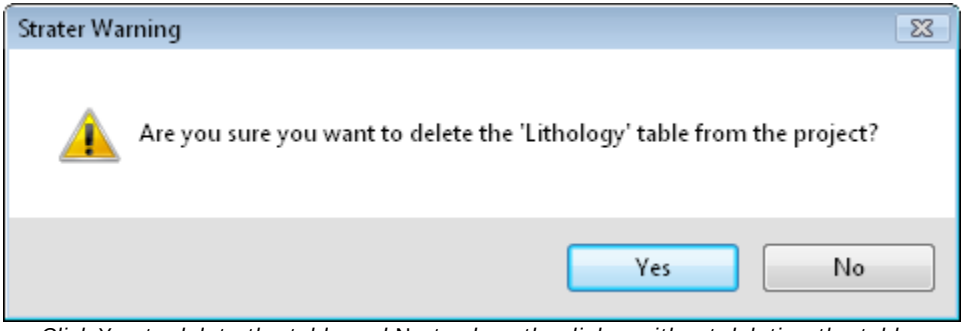
To open a closed table, click the **Window | Show All Tables** command.

Showing All Tables

Click the **Window | Show All Tables** command to display every data table imported into the current project.

Deleting a Table

To delete the current active table click the **Table | Delete Table** command or click the  button. A **Strater** warning dialog appears.



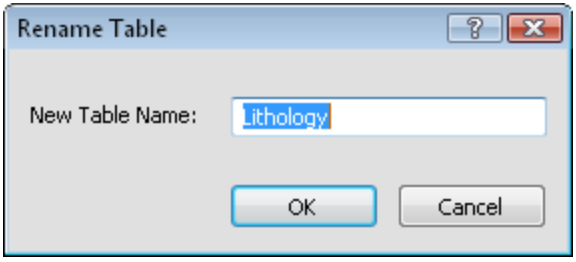
Click Yes *to delete the table and* No *to close the dialog without deleting the table.*

Click *Yes* in the dialog to remove the table and its data from the current project. Click *No* to return to the table without deleting it.

To undo the deletion, click on a borehole view or cross section view and click the Edit | Undo command.

Renaming a Table

To rename a table, click on the table to rename to make it the active sheet. Click the **Table | Rename Table** command. The current table name is displayed in the **Rename Table** dialog.



Type the new table name and click OK.

Type the new name and click *OK*. To cancel the rename process, click the *Cancel* button.

Note: The new table name cannot be the same as any other table name in the project, including the selected table. The table name cannot be empty, either. The process cannot be undone with the **Edit | Undo** command, although the table can be renamed as many times as desired.

Reloading Data

Click the **File | Reload Data** command, click the  button, or right-click in a table and choose *Reload Data* to reload data from the original data source. When the data are reloaded, any previous changes made to the original data in the data table are overwritten.

If you import data and plan to make changes to the data within **Strater** do not use **File | Reload Data**. Undo is not available for this command.

If you do not want a data table to update ever again with the **Reload Data** or **Reload All** commands, you can unlink the data from the original source with the **Table | Table Browser** command.

When reloading data, only the data that was originally imported into the data table is reloaded. Any new data added to the data file will not be loaded into the data table.

When a data table cannot be found, the **Reload Data** dialog appears. The header bar in the dialog displays the original external source name. Select the new appropriate data file and click *Open* to update the data. If a table is not linked to an external file, the **File | Reload Data** command will not be available. Use the Table | Table Browser command to link the data to the new external data file.

Reloading All Data

Click the **File | Reload All** command to reload all the data for all data tables in a **Strater** project. When the data are reloaded, any previous changes made to the original data in the data table are overwritten.

If you import data and plan to make changes to the data within **Strater** do not use **Reload All**. Undo is not available for this command.

If you do not want a data table to update ever again with the **Reload Data** or **Reload All** commands, you can unlink the data from the original source with the **Table | Table Browser** command.

When reloading data, only the data that was originally imported into the data table is reloaded. Any new data added to the data file will not be loaded into the data table.

When a data table cannot be found, the **Reload Data** dialog appears. The header bar in the dialog displays the original external source name. Select the new appropriate data file and click *Open* to update the data. If a table is not linked to an external file, the **File | Reload All** command will not be prompt for a new data file. Use the **Table | Table Browser** command to link the data to the new external data file.

Data Organization

The data to be represented in boreholes needs to be in column and row (record) format.

Columns

Each column contains three properties: a name, description, and units. The description and units are optional for every column.

If a column is required for a particular table type, for example the *To* column in an interval table, the column name cannot be changed. However, optional column names can be changed. If the *Column Name* has a gray background in the **Column Editor**, the column is required and the name cannot be changed.

Columns can be added and deleted by either selecting **Edit | Append Column** or selecting a row, right-clicking, and selecting *Append Column*.

Rows

Typically, each row in the data is devoted to a depth or an interval in the borehole. Rows can be added by clicking the **Edit | Insert Rows** command, right-clicking and selecting the *Insert Rows* command, or by typing data into a new row.

Data Selection

Use the cursor to drag and select any number of conterminous cells and rows.

File Formats

Strater can read numerous file formats such as data files (including Excel spreadsheets and ASCII text files), databases, and LAS files. **Strater** can also link to virtually any database system installed on your computer using the *Data Link Source*.

Math Text and Linked Text

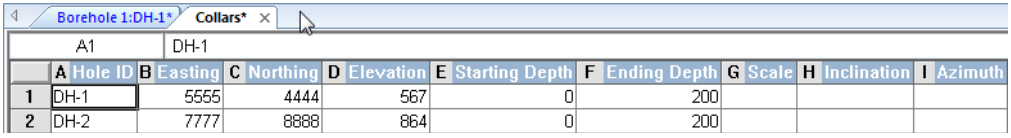
You can use math text to alter the appearance or add mathematical concepts or symbols to text entries in a data table. For example, if collar table data or lithology table data is actually displayed in a borehole view you can modify its appearance (or add symbols, etc.) using math text. See Math Text Instructions for detailed information.

Table Types

Collars tables, depth tables, interval tables, lithology tables, project settings tables, survey tables, text item tables, and well construction tables can be created in **Strater**. Each table type has a different function in **Strater**. Each table has different default required columns. Although these columns are all created, all of the columns do not need to have data stored in the column to create the logs.

Collars Table

Collars tables contain location information for each borehole. The default column definitions include *Hole ID, Easting, Northing, Elevation, Starting Depth, Ending Depth, Scale, Inclination* (or *Dip*), and *Azimuth*. The data in this table can be used for linked text, setting the scaling parameters for the borehole view, or specifying the elevation of the borehole collar for depth logs. The *Inclination* (or *Dip*) and *Azimuth* columns can be used to calculate true vertical depth for deviated borehole displays. The collars table is also used for placing borehole locations in a map view and for calculating distances in a cross section view.



	A Hole ID	B Easting	C Northing	D Elevation	E Starting Depth	F Ending Depth	G Scale	H Inclination	I Azimuth
1	DH-1	5555	4444	567	0	200			
2	DH-2	7777	8888	864	0	200			

In a collars table each row contains the information for a separate borehole. All information for one borehole must be on a single line.

Note that a project can have multiple collars tables, but each borehole should be listed in only a single collars table.

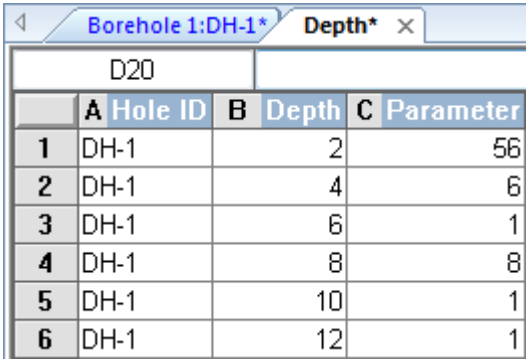
Column Definitions

Hole ID	Contains the borehole ID, one borehole per line. Each borehole should only be listed in a single collars table.
Easting	Contains the X value, easting, longitude, or other horizontal location value of the borehole.
Northing	Contains the Y value, northing, latitude, or other vertical location value of the borehole.
Elevation	Contains the Z value or elevation of the borehole.

Starting Depth	Contains the starting Z value for the borehole in depth or elevation units. This is useful when using the Print Multiple Logs or Export Multiple Logs commands with different boreholes. If all boreholes have the same starting depth, select *[0]* from the list.
Ending Depth	Contains the ending Z value for the borehole in depth or elevation units. This is useful when using the Print Multiple Logs or Export Multiple Logs commands with different boreholes.
Scale	Contains the Scaling Depth Per Inch value. This is useful when using the Print Multiple Logs or Export Multiple Logs commands with different boreholes.
Inclination	The angle the borehole is oriented, in degrees. Inclination varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same. When recorded in a collars table, the azimuth and inclination apply to the entire borehole length.
Dip	*Dip* is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up
Azimuth	The compass orientation of the borehole. Azimuth is in degrees and varies from 0 (true vertical north) to 360. When recorded in a collars table, the azimuth and inclination (or dip) apply to the entire borehole length.

Depth Table

Depth tables are used for depth and variable information. The default column definitions include *Hole ID, Depth,* and additional parameter columns. The depth information is contained in one column. All variable information relates to that specific depth. Depth tables are used for depth, line/symbol, crossplot, bar, percentage, tadpole, post, classed post, and function logs.



	A Hole ID	B Depth	C Parameter
1	DH-1	2	56
2	DH-1	4	6
3	DH-1	6	1
4	DH-1	8	8
5	DH-1	10	1
6	DH-1	12	1

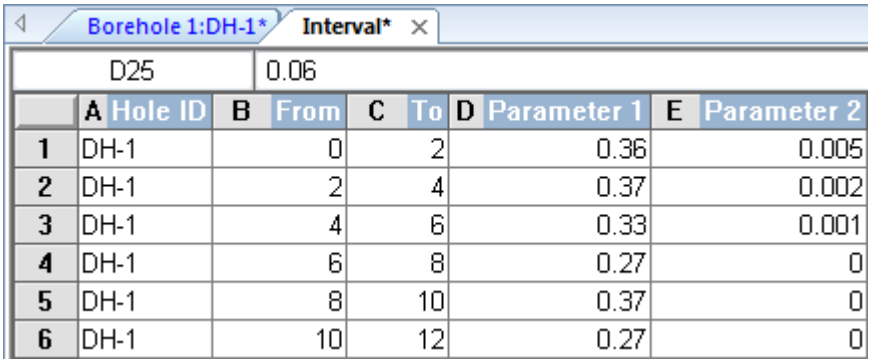
Depth tables include a single depth measurement and parameter values associated with that specific measurement.

Column Definitions

Hole ID	Contains the borehole ID associated with the depth.
Depth	Contains the depth or elevation of the recorded parameter.
Parameter(s)	One or more columns that contain information, such as contamination, chemical concentration, etc. The parameter value is recorded at the depth.

Interval Table

Interval tables are used to show a variable that occurs over a distance interval. There are two depth columns (From and To) in an interval table. The default column definitions are *Hole ID, From, To*, and any additional parameter columns. The interval lengths can vary in the table. Interval tables are used for depth, line/symbol, crossplot, zone bar, bar, percentage, tadpole, post, classed post, complex text, graphic, lithology, well construction, and function logs.



	A Hole ID	B From	C To	D Parameter 1	E Parameter 2
1	DH-1	0	2	0.36	0.005
2	DH-1	2	4	0.37	0.002
3	DH-1	4	6	0.33	0.001
4	DH-1	6	8	0.27	0
5	DH-1	8	10	0.37	0
6	DH-1	10	12	0.27	0

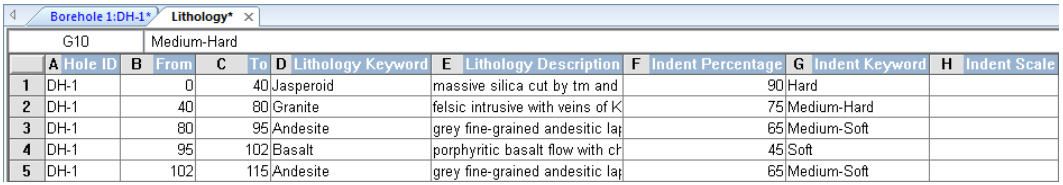
Interval tables measure variables within a defined interval depth based on From *and* To *measurements.*

Column Definitions

Hole ID	Contains the borehole ID associated with the interval.
From	Contains the top depth or elevation of the recorded parameter.
To	Contains the bottom depth or elevation of the recorded parameter.
Parameter(s)	One or more columns that contain information, such as contamination, chemical concentration, etc. The parameter value is recorded across at the interval.

Lithology Table

Lithology tables are a special type of interval table. These tables define the properties of lithology logs using keywords and schemes. The default column definitions include *Hole ID, From, To, Lithology Keyword, Lithology Description, Indent Percentage, Indent Keyword,* and *Indent Scale*. Although the primary purpose of a lithology table is to create a lithology log, the lithology table can also be used for depth, line/symbol, crossplot, zone bar, bar, percentage, tadpole, post, classed post, complex text, graphic, well construction, and function logs.



Borehole 1:DH-1* | Lithology*

G10 | Medium-Hard

	A Hole ID	B From	C To	D Lithology Keyword	E Lithology Description	F Indent Percentage	G Indent Keyword	H Indent Scale
1	DH-1	0	40	Jasperoid	massive silica cut by tm and	90	Hard	
2	DH-1	40	80	Granite	felsic intrusive with veins of K	75	Medium-Hard	
3	DH-1	80	95	Andesite	grey fine-grained andesitic la	65	Medium-Soft	
4	DH-1	95	102	Basalt	porphyritic basalt flow with cl	45	Soft	
5	DH-1	102	115	Andesite	grey fine-grained andesitic la	65	Medium-Soft	

Lithology tables use schemes extensively and describe lithographic features in great detail.

Column Definitions

Hole ID	Contains the borehole ID associated with the interval.
From	Contains the top depth or elevation of the recorded parameter.
To	Contains the bottom depth or elevation of the recorded parameter.
Lithology Keyword	Contains keywords to match the corresponding lithology scheme items. This is usually the rock name. This column is used to create fill patterns for the various interval blocks in the log.
Lithology Description	Contains full text descriptions, typically for the rock type, and can be used for complex text logs.
Indent Percentage	Contains the percentage of the interval block to display in the left-right direction. The normal range is zero to 100. None of the block is displayed with a zero percentage and 100 percent displays the whole block. The indent percentage can be used to display weathering resistance in a lithological unit.
Indent Keyword	Contains keywords for the lithology keyword scheme items. The indent keyword can be used to define the shape of the indent line.

Indent Scale	Controls the overall scaling width of the lithology indent line definition. The range is zero to 100. All values greater than 100 are set to 100 and all values less than zero are set to zero. A zero scale flattens the line and a 100 scale sets the width of the line to half the width of the lithology log. Therefore, if the lithology log is three inches wide, the range of the lithology line represents 1.5 inches. The indent scale should be used with the indent percentage.

Project Settings Table

The project settings table is a special type of text table and is automatically created when you open a new project. It is used to store project information, such as the project name, project location, project leader, and miscellaneous comments. The default column definitions are *Project Name, Company Name, Location, Project Leader, Drilling Date,* and *Comments*. The information stored in this table is for the whole project; it is not borehole specific. This table stores data that is often used in linked text objects.

Borehole 1:DH-1* | Project Settings*

A8

	A Project Name	B Company Name	C Location	D Project Leader	E Drilling Date	F Comments
1	Tutorial	Golden Software	Golden, CO	StraterSupport	April 7, 2013	Sample project
2						

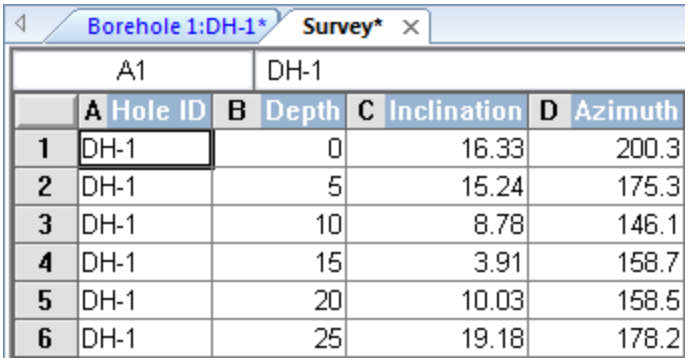
A single row in the project settings table includes all pertinent information for the entire project.

Column Definitions

Project Name	Contains the name or description of the project.
Company Name	Contains the company name or identifying feature.
Location	Contains the location of the project.
Project Leader	Contains the name of the person or group leading the project.
Drilling Date	Contains the date that the project or borehole was started.
Comments	Contains any additional comments that should be recorded for the project.

Survey Table

Survey tables are a special type of depth table used to indicate the direction and azimuth of a directional borehole as it changes down the hole. The default column definitions include *Hole ID*, *Depth*, *Inclination*, and *Azimuth*. The survey table *Inclination* and *Azimuth* columns can be used for calculating the true vertical depth of boreholes. The survey table is used in conjunction with depth or interval tables for deviated boreholes.



	A Hole ID	B Depth	C Inclination	D Azimuth
1	DH-1	0	16.33	200.3
2	DH-1	5	15.24	175.3
3	DH-1	10	8.78	146.1
4	DH-1	15	3.91	158.7
5	DH-1	20	10.03	158.5
6	DH-1	25	19.18	178.2

The survey table contains inclination (or dip) and azimuth information down the borehole.

Note that a project can have multiple survey tables, but each borehole should only be listed in a single survey table.

If deviated boreholes are defined, the inclination (or dip) and azimuth should both come from the same table. The order **Strater** looks for the inclination (or dip) and azimuth is first measured depth table, then in the survey table, then from a collars table. If inclination (or dip) and azimuth are not found in any location, the measured depth is used as the true vertical depth.

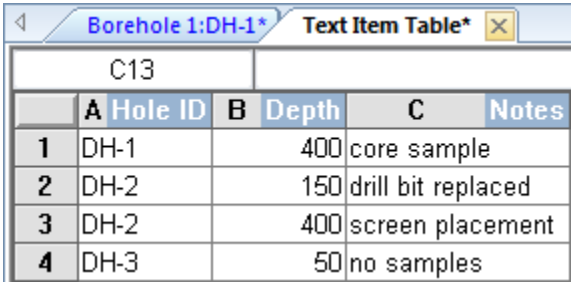
Column Definitions

Hole ID	Contains the borehole ID, one borehole per line. Each borehole should only be listed in a single survey table.
Depth	Contains the depth or elevation for the recorded deviation.

Inclination	The angle the borehole is oriented in degrees. Inclination varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. When recorded in a survey table, the azimuth and inclination apply from the depth to the next recorded depth.
Dip	*Dip* is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up
Azimuth	The compass orientation of the borehole's deviation. Azimuth is in degrees and varies from 0 (true vertical north) to 360. When recorded in a survey table, the azimuth and inclination (or dip) apply from the depth to the next recorded depth.

Text Item Table

Text tables are tables designed to store attributes for the particular borehole. The default column definitions include *Hole ID* and *Depth*. Other columns can be added, depending on the project. For example, drilling date, temperature, geologist, location, etc. can be stored in a text item table. Any type of data can be imported into this table. If there is a Hole ID defined in the table, the data can be used for linked text.



	A Hole ID	B Depth	C	Notes
1	DH-1	400	core sample	
2	DH-2	150	drill bit replaced	
3	DH-2	400	screen placement	
4	DH-3	50	no samples	

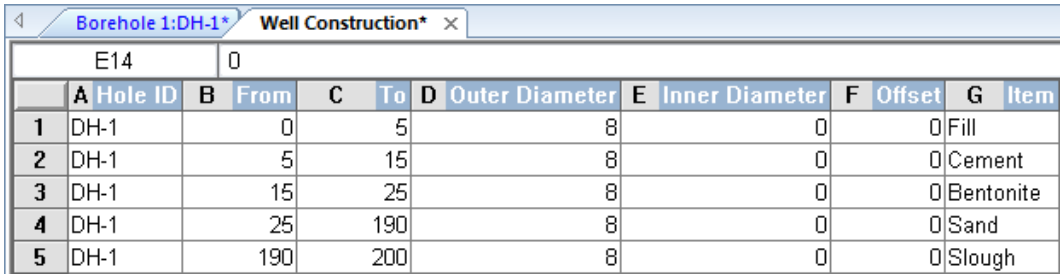
The text item table is a good place to store miscellaneous information about the various boreholes.

Column Definitions

Hole ID	Contains the borehole ID associated with the depth.
Depth	Contains the depth or elevation of the recorded text.
Text	One or more columns that contain information, such as contamination, chemical concentration, notes, etc. The parameter value is recorded at the depth.

Well Construction Table

Well construction tables are a special type of interval table used to define the geometry of specific items in a well construction log, such as casing and cap information. The default column definitions include *Hole ID, From, To, Outer Diameter, Inner Diameter, Offset,* and *Item information*. Well construction logs use keywords and schemes to define the properties for each item in the well construction table. You can have any number of well construction tables with different schemes within the project. Although the primary purpose of a well construction table is to create a well construction log, the well construction table can also be used to create depth, line/symbol, crossplot, zone bar, bar, percentage, tadpole, post, classed post, complex text, graphic, lithology, and function logs.


Borehole 1:DH-1* | Well Construction*

E14 | 0

	A Hole ID	B From	C To	D Outer Diameter	E Inner Diameter	F Offset	G Item
1	DH-1	0	5	8	0	0	Fill
2	DH-1	5	15	8	0	0	Cement
3	DH-1	15	25	8	0	0	Bentonite
4	DH-1	25	190	8	0	0	Sand
5	DH-1	190	200	8	0	0	Slough

Well construction tables include all information necessary to create well construction logs.

Note

The order in which these items are listed in the table is the order they will be created. Therefore, solid items or items to be layered in the back must be added first in the borehole order.

Column Definitions

Hole ID	Contains the borehole ID associated with the interval.
From	Contains the top depth or elevation of the recorded well construction item.
To	Contains the bottom depth or elevation of the recorded well construction item.
Outer Diameter	Contains the outside diameter of the item.
Inner Diameter	Contains the inside diameter of the item, used to create a cut-out section out of the middle of the items so that the center has no line or fill properties.

Offset	Contains the offset of the item within the well. Positive values move the item away from the center.
Item	Contains the keyword for the well construction scheme items. This is usually the name of the item (fill, cement, screen, etc).

Schemes and Tables

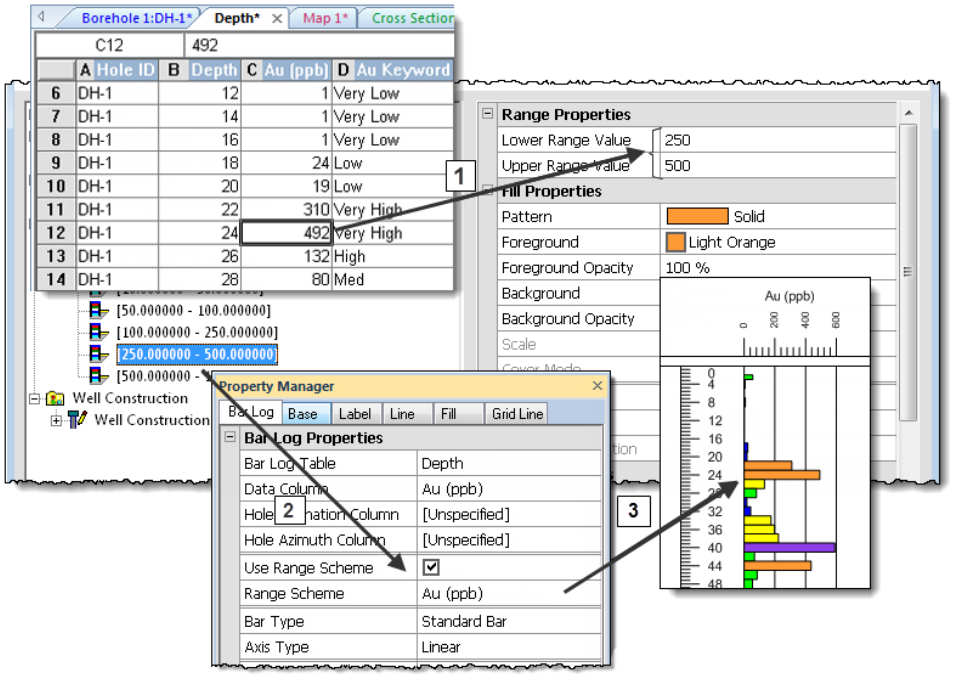
Strater uses schemes when "linking" the data in a table to a borehole design. A scheme associates information from the data table (such as text entries (keywords) or number ranges) with fill properties, line properties, font properties, etc. When **Strater** locates a keyword or number range in the column, the borehole is assigned the keyword or number range properties for the depth, interval, or well construction item. Scheme item names can be automatically created with **Table | Create Scheme**.

Data, Schemes, and Log Properties

The data, scheme, and log, map, or cross section properties are all related in the process of creating a log in a borehole view or cross section view, creating a map Wells layer, or creating layers in a cross section. The data contains depth information (either single depth or from-to interval depth), borehole names, and the data to be displayed on the log. Schemes contain line, symbol, label, and fill property information that links the data to the log. When scheme information (keywords or numeric ranges) is found in the data, the logs in the borehole or cross section displays the properties of the scheme. The **Property Manager** determines which data table and column are used to create the log, the scheme to use (if any), and properties such as the log width. Each log item can use a different data table, column, scheme, and properties.

Project data, schemes, and log properties are all related in the process of creating a borehole log.

1. The data in each row is linked to a scheme item. This scheme links the *Au (ppb)* values from column C. In this case, the data in row 12 has a value of 492 and appears at a depth of 24. The data in row 12 falls within the range scheme item of 250 to 500. Note the fill is a solid light orange.
2. A bar log is created displaying the *Au (ppb)* data column. The *Au Concentration* scheme is selected.
3. The bar log is displayed. The *Au Concentration* scheme determines the appearance of the log. The color at the depth 24 is light orange, as indicated by the scheme.



This diagram shows the connection between a value in the table column, the scheme, and the log being displayed.

Importing Data

Strater allows you to import data from various data sources. You can maintain your data in other applications, such as a database, and import the tables you need into **Strater** to create boreholes. Any changes made to the data in the original application can be updated in **Strater** with the **File | Reload Data** or **File | Reload All** commands. Data imported into **Strater** can be edited and transformed. When changes are made to data in **Strater** the original data external to **Strater** is not changed.

Opening Data into a New Table

To open data into a new data table in the current project:

1. Click the **File | Open** command, click the  button, or press CTRL+O on the keyboard.
2. In the **Open** dialog, select the file and click *Open*.
3. Set any options in the dialog:

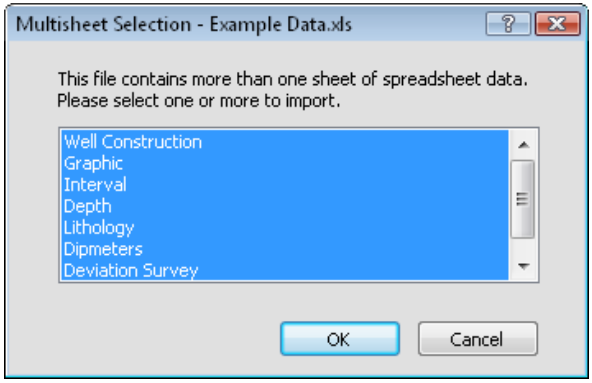
- If the file is an Excel file containing multiple worksheets, the **XLS** or **XLSX Import Options** dialog opens. Select the data sheet to open and click *OK*.
- If the file is an .ACCDB or .MDB file, select the specific table or query in the **Database Tables and Fields** dialog and click *OK*.
- If the file is a .LAS file, set the .LAS specific options in the **LAS Import Options** dialog and click *OK*.
- If the file is a database, click the *Load Database* button in the **Open** dialog. Data linking provides a method to link to virtually any database supported by Microsoft via an OLE DB Provider, ODBC, or some other supported format. Set the information in the **Data Link Properties**, and **Database Tables and Fields** dialogs.
- In the **Specify Worksheet Column Definitions** dialog enter the column definition information and click *Next*.
- In the **Specify Data Type and Column Positions** dialog enter the definition information and click *Finish*.

4. The data is added to the project as a new data table tab.

Opening Multiple Data Files at Once

When a table view is currently open, click the **File | Open Multiple** command to open multiple data files with a single command. Use the CTRL and SHIFT keys in the dialog to select multiple files in the **Open Data** dialog. The **Multisheet Selection** dialog appears when importing or opening an Excel file with multiple sheets into a table.

After the **Multisheet Selection** dialog appears, select all of the worksheets that should be imported. To select all tables, click on the first table, press and hold the SHIFT key on the keyboard, and click on the last table. To select several tables, click on the first table, press and hold the CTRL key on the keyboard, and click on each additional table. Only selected sheets are imported into tables in **Strater**.



*Select all of the sheets to import in the **Multisheet Selection** dialog.*

Importing Data into an Existing Table

To add data to any existing data table:

1. Click the table tab that should have the new data.
2. Click the **File | Import** command, click the  button, or right-click inside the data table and select the *Import* command.
3. In the **Import Data** dialog, select the data file and click *Open*.
4. Set any import options, including in the **Import Data Into Current Table** dialog. Assign the new data to existing columns or create new columns and click *Import*.
5. The data is added to the current data table.

Note About Importing Data Into an Existing Table

Data are imported into a current table when that data table is selected in the workspace. If you open data during log item creation, the data are always opened into a new table.

Import Data Into Current Table Dialog

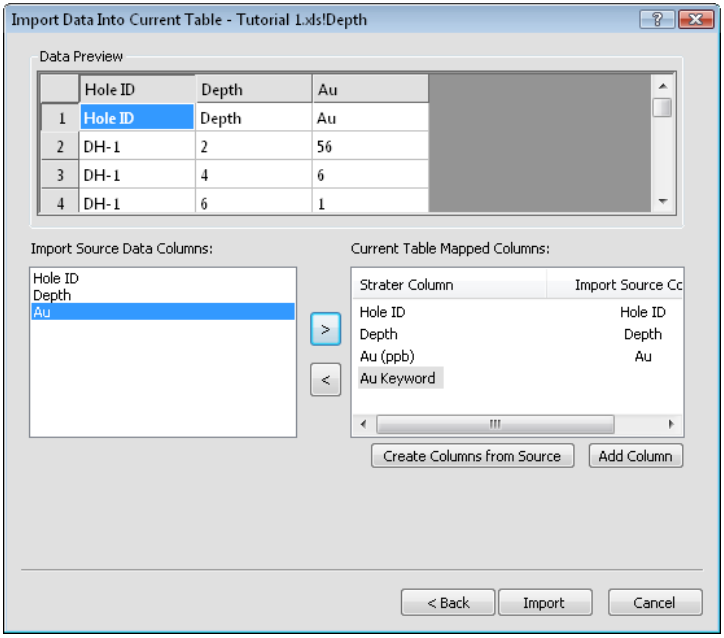
In the **Import Data Into Current Table** dialog, assign the new data to existing columns or create new columns and click *Import*.

Data Preview

The *Data Preview* section displays the data contents of the file to import.

Import Source Data Columns

The *Import Source Data Columns* has a list of all column in the file being imported.



*Use the **Import Data Into Current Table** dialog to map the columns of data in the source file to the appropriate column in the existing data table.*

Current Table Mapped Columns

The *Current Table Mapped Columns* shows columns in the current table and the data that will be imported into those columns. If the new data columns have the same names as the current table columns, the columns are automatically mapped to each other. For example, if the current table contains a *Hole ID* column and the data being imported contains a *Hole ID* column, these columns are automatically mapped to one another and the ID data are imported into the *Hole ID* column.

Mapping Columns

If the imported data columns and current table columns do not match or if you do not want a column mapped to a existing column, you can manually map the columns.

To map columns:

1. Highlight a data table column name in the *Strater Column* list on the right.
2. Highlight the corresponding column name in the *Import Source Data Columns* list on the left.
3. To map these columns click the  button or double-click the column name in the *Import Source Data Columns* list.

Removing Mapped Columns

To remove column mapping:

1. Click the column name in the *Strater Column* list you wish to remove.
2. Click the  button and the imported data column is removed from the *Strater Column* list.

Add Columns

If there are columns in the *Import Source Data Columns* that are not present in the existing table you can add columns to the table and import into these new columns.

Click *Create Columns from Source* to add all columns in the source data that do not exist in the existing **Strater** table.

Click *Add Column* to open the Append Column dialog. In the dialog, create a new column by defining a *Column Name, Column Description,* and *Column Units.* Once an added column is defined it can be mapped as described in the **Mapping Columns** section above.

Back, Import, and Cancel

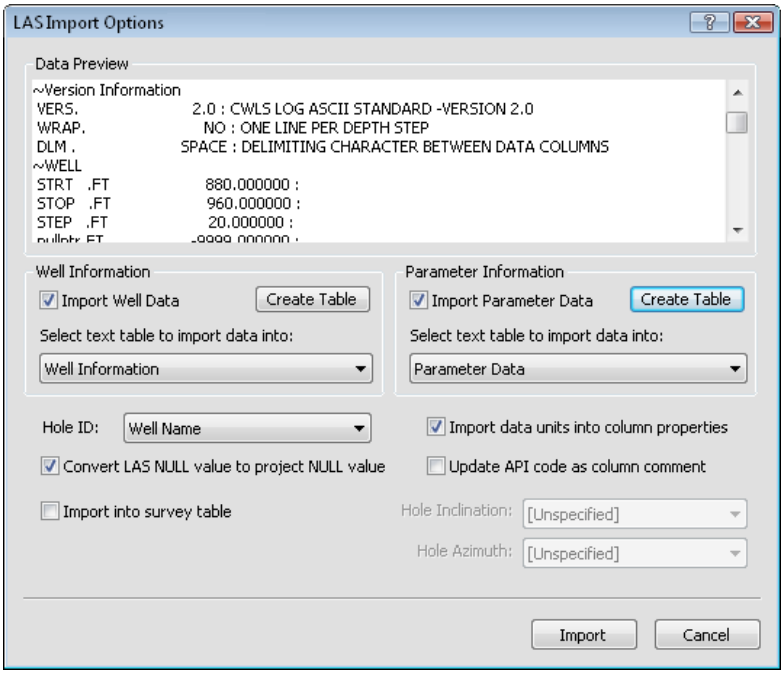
Click the *Back* button to return to the previous dialog. Click the *Import* button to finish the importing process. The data is displayed in the selected table. Click *Cancel* to cancel the importing process.

LAS Import Options Dialog

Click the **File | Open** command or click the  button to open a new data file into a **Strater** project. In the **Open** dialog, select an LAS file and click *Open*. The **LAS Import Options** dialog is displayed.

To open multiple LAS data files at once, click the **File | Open Multiple** command in an existing table view window. To import multiple LAS data files into a single table view, click the **File | Import** command in the table view and select all of the files.

The **LAS Import Options** dialog is used to set the LAS-specific (Log ASCII Standard) importing options.



*Set options for importing the LAS file in the **LAS Import Options** dialog.*

LAS Version

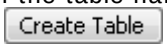
LAS versions 1.2, 2.x and 3.x can be imported into **Strater**. For more information on LAS files, refer to the Canadian Well Logging Society web page.

Data Preview

The *Data Preview* section displays the LAS file contents.

Well Information and Parameter Information

The *Well Information* and *Parameter Information* groups allow you to import various LAS file information from the LAS header into text tables. *Well Information* is everything under the ~WELL INFORMATION section in the LAS file and can be data such as *Start depth, Stop depth, Step, NULL Value, Location, Log Date,* and *Unique Well ID* information. *Parameter Information* is everything under the ~PARAMETER INFORMATION section in the LAS file and can be data such as *Depth Logger, Run Number, Depth Driller, Engineer's Name,* and *Logged by* information. Not all LAS files have parameter information. Not all LAS files contain information for all items.

Check the *Import Well Data* or *Import Parameter Data* boxes to import the information. If an LAS information table is already created, click on the table names and select the appropriate table from the list. Otherwise, click the 

button to create a new table. The resulting table contains all the columns of information available in the LAS file.

Hole ID

Click the box next to *Hole ID* to change the field that is used to name the well. Available options include *Well Name, API,* and *UWI*. Select the appropriate option to use that field name for the hole ID in **Strater**. If *API* or *UWI* are selected and that field is empty or missing from the LAS file, a dialog appears prompting you to provide a *Hole ID*.

Convert LAS NULL Value to Project NULL Value

The *Convert LAS NULL value to project NULL value* option is checked by default and is used if you prefer to use the null value you have defined in **Strater** instead of the null value defined in the LAS file. This option is checked by default, which means the LAS null values are automatically converted to the **Strater** null values. Uncheck this box if you do not want to use the **Strater** null values. You can also define a null value in **Strater** by clicking the **Tools | Options** command.

Import Into Survey Table

Check the box next to *Import into survey table* to import the directional information from the LAS file into a survey table. When checked, set the *Hole Inclination* and *Hole Azimuth* to the appropriate parameter by clicking on the existing option and selecting the appropriate parameter name from the list.

Import Data Units Into Column Properties

Check the box next to *Import data units into column properties* to have the units assigned for each parameter in the LAS file automatically added as the column units in

the **Strater** table. This option is checked by default, importing the parameter information into the table. Uncheck the box to not import the data units. Note, the file may not contain unit types for all columns.

Update API Code As Column Comment

The *Update API code as column comment* option assigns the LAS file API comments into the column description box for each column in the **Strater** table. The *Column Description* can be used with linked text. Note, the file may not contain API codes for all columns.

Data Column

When a line/symbol, zone bar, bar, post, classed post, complex text, or graphic log is selected before the **LAS Import Options** dialog appears, an extra *Data Column* option is available. Click on the existing column name and select the desired column from the list. The log type is automatically created with the *Data Column* set to the selected column. If left to *[Auto]*, the first column of data is displayed for the log.

Use Same Settings for Subsequent LAS Files

When the **File | Open Multiple** command is used to open multiple LAS files at once, check the box next to *Use same settings for subsequent LAS files* to use the same settings for all LAS files imported. If this box is not checked, the **LAS Import Options** dialog appears once for each LAS file.

Import or Cancel

When all parameters for the LAS import are selected click *Import* to open the LAS file in a new table view in the current project. To exit the dialog without importing data click *Cancel*.

Load Database

Click the *Load Database* button in the **Open** dialog to open the data linking function. Data linking provides a method to link to virtually any database supported by Microsoft via an OLE DB Provider, ODBC, or some other supported format. Set the database information in the dialogs **Data Link Properties**, **Database Tables and Fields**, and **Specify Data Type and Column Positions**.

Specify Worksheet Column Definitions Dialog

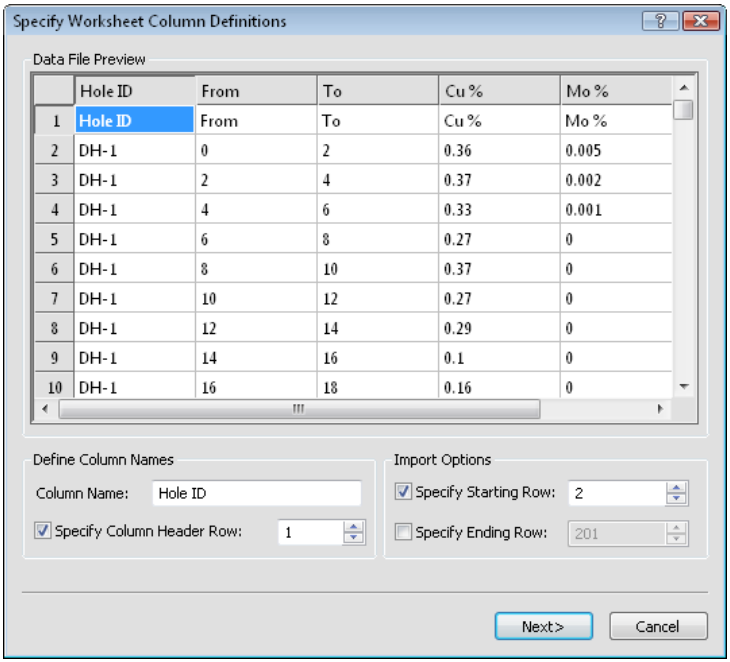
The **Specify Worksheet Column Definitions** dialog is used to select the column names and number of rows to import.

Data File Preview

The *Data File Preview* section displays the contents of the data being imported. The *Data File Preview* box is also used in manually defining column names.

Define Column Names

When importing data, you have the option of manually defining column names or using the column headers (if any) in a row. If the column names match the default **Strater** table column names, they are automatically matched in the next **Specify Data Type and Column Positions** dialog.



	Hole ID	From	To	Cu %	Mo %
1	Hole ID	From	To	Cu %	Mo %
2	DH-1	0	2	0.36	0.005
3	DH-1	2	4	0.37	0.002
4	DH-1	4	6	0.33	0.001
5	DH-1	6	8	0.27	0
6	DH-1	8	10	0.37	0
7	DH-1	10	12	0.27	0
8	DH-1	12	14	0.29	0
9	DH-1	14	16	0.1	0
10	DH-1	16	18	0.16	0

*Set the rows to import and the header row in the **Specify Worksheet Column Definitions** dialog.*

To manually define column names:

1. Click in a cell in the *Data File Preview* section.
2. Type the desired column name in the box next to the *Column Name* option.
3. Click in a cell in another column. Notice that the previously selected column has the new name listed.
4. Type the desired column name in the *Column Name* option.
5. Repeat until all of the columns are named.

To automatically define column names, check the box next to the *Specify Column Header Row* option. To change the row to use for the header names, highlight the

existing row number and type the row number containing the header names.

Alternatively, click the  to increase or decrease the row.

Import Options

When importing data, you can import all rows or limit the rows to a specified range. By default, all rows are imported.

To limit the row range:

1. Check the box to the left of the *Specify Starting Row* option.
2. In the box to the right of *Specify Starting Row*, highlight the existing row number and type the row number that contains the first row to import. Alternatively, click the  button to increase or decrease the starting row.
3. Check the box to the left of the *Specify Ending Row* option.
4. In the box to the right of *Specify Ending Row*, highlight the existing row number and type the row number that contains the last row to import. Alternatively, click the  button to increase or decrease the ending row.

Specify Data Type and Column Position Dialog

The **Specify Data Type and Column Position** dialog is used to define the table type and match the data to the table's required columns.

Data Table Preview

The *Data Table Preview* section displays the data contents.

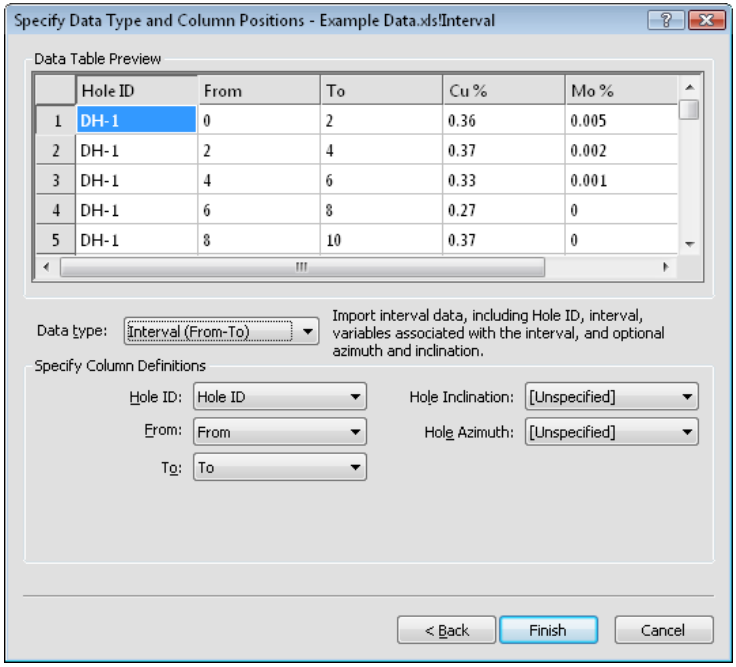
Data Type

The data should fall into one of six types of tables: *Depth (Single Depth)*, *Interval (From-To)*, *Lithology, Well Construction, Collars*, *Survey,* or *Text (General)*. Select the desired table type. Notice that the *Specify Column Definitions* change based on the type of table selected. To set the type, click on the existing type and select the desired table type from the list. A description of the selected type appears to the right of the *Data type* list.

Specify Column Definitions

Once the data type is determined in the *Data type* section, the required data column for the data type are shown in the *Specify Column Definitions* section. Match the data to the columns for the table type. Each column definition can be set to any column in

the file by clicking on the existing column name and selecting the desired column from the list. If a column should not be imported, select *[Unspecified].* The column is created, but contains no data. If you are unsure which column is appropriate for a required column definition you can select the *[Unspecified]* option and make the selection after the data appears in a table.



Set the Data type *and columns in the* ***Specify Data Type and Column Positions*** *dialog.*

- *Depth (Single Depth)* tables have a single column containing depth information. You must assign a data column to the *Hole ID* and *Depth* columns. The *Depth* column information is required. The *Hole Inclination* (or *Hole Dip*) and *Hole Azimuth* columns can remain *[Unspecified].*
- *Interval (From-To)* tables have two columns containing depth information: *From* and *To*. You must assign data to the *Hole ID*, *From*, and *To* columns. The *From* and *To* columns are required. The *Hole Inclination* (or *Hole Dip*) *and Hole Azimuth* columns can remain *[Unspecified].*
- *Lithology* tables have two columns containing depth information: *From* and *To*. You must assign data to the *Hole ID*, *From, To,* and *Lithology Keyword* columns. The *Lithology Description, Hole Inclination* (or *Hole Dip*), *Hole Azimuth, Indent Percentage, Indent Keyword,* and *Indent Line Scale* columns can remain *[Unspecified].* The columns are created, but can remain empty.
- *Well Construction* tables have two columns containing depth information: *From* and *To*. You must assign data to the *Hole ID, From, To, Offset, Well Item, Inner Diameter*, and *Outer Diameter* columns. The *Hole Inclination* (or *Hole Dip*) *and Hole Azimuth* columns can remain *[Unspecified].*
- *Collars* tables are informational tables that typically contain information about a borehole such as the location. You can assign data to the *Hole ID*, *Starting Depth*,

Ending Depth, *Elevation*, *Hole Inclination* (or *Hole Dip*), *Hole Azimuth, Easting*, *Northing,* and *Scale* columns. The *Hole ID* is the only required column. All other columns can remain *[Unspecified].* The *Starting Depth* can be set to [0] if all boreholes have the same starting depth and the starting depth is not listed in a column in the file.

- *Survey* tables are information tables that contain downhole directional information. You can assign data to the *Hole ID, Depth, Hole Inclination* (or *Hole Dip*), and *Hole Azimuth* columns. All four columns are required if you wish to use the *Survey* table for true vertical depth calculations.
- Text tables are general tables. You can assign to the *Hole ID* column. There are no required columns in this table.

All other data are imported into columns with the column title indicated in the **Specify Worksheet Column Definitions** or Database Tables and Fields dialogs.

Data Column

When a line/symbol, zone bar, bar, post, classed post, complex text, or graphic log is selected before the **Specify Data Type and Column Positions** dialog appears, an extra *Data* column is available. Click on the existing column name and select the desired column from the list. The log type is automatically created with the *Data Column* set to the selected column. If left to *[Auto]*, the first column of data is displayed for the log.

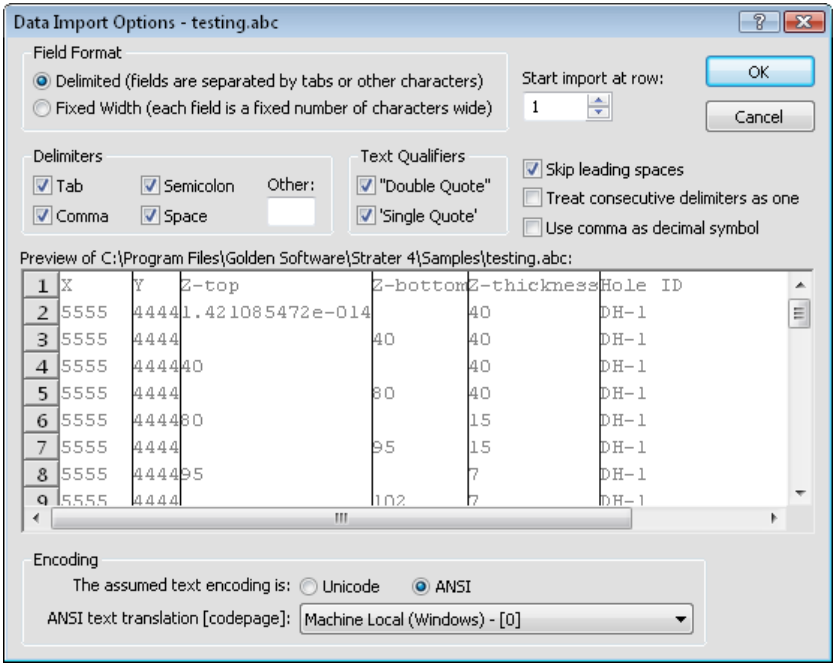
Data Import Options Dialog

If a file is in an ASCII text format with an unrecognized file extension, the **Data Import Options** dialog appears when opening the file. Choose the *Delimiters* used in the file (*Tab*, *Comma*, *Semicolon*, *Space*, or *Other*), and the *Text Qualifiers* used in the file (*Double Quote* or *Single Quote*).

The **Data Import Options** dialog may appear when importing tabular data from delimited text files (i.e. .DAT, .CSV, .TXT). These file formats are assumed to have one record per line in which each record contains a fixed number of numeric data fields.

Field Format

Specify the format of the input fields in the *Field Format* group. The options are *Delimited* or *Fixed Width*.



*The **Data Import Options** dialog allows you to specify import options.*

Delimited

Choose *Delimited (fields are separated by tabs or other characters)* if the imported data uses delimiters (tab, semicolon, comma, space, other) to separate data fields. The *Delimiters* group is used to specify how the fields are separated if *Delimited (fields are separated by tabs or other characters)* is the selected *Field Format*.

Fixed Width

Choose *Fixed Width (each field is a fixed number of characters wide)* if the imported data uses a fixed width to separate data fields.

Start Import at Row

Specify the row number at which to start the data import in the *Start import at row* box. To change the first row to import, highlight the existing value and type a new value or click the  buttons to increase or decrease the value. For example, a value of one will start the data import at row one. A value of five will start the data import at row five and ignore the data in rows one through four.

Delimiters

Choose the desired delimiters to be used during the import process by checking the box next to *Tab*, *Comma*, *Semicolon*, or *Space*. You may also enter a custom delimiter in the *Other* box. More than one delimiter may be checked.

Text Qualifiers

Check the box next to *Double Quote* or *Single Quote* in the *Text Qualifiers* group to indicate the correct qualifier to identify text values in the data file. Everything between the selected characters will be interpreted as a single value, and any delimiter characters between text qualifiers are ignored and treated as part of the text.

Double Quote

Check the box next to *"Double Quote"* to specify that everything between those marks should be interpreted as a single value, and any delimiter characters between any two quote characters are not treated as a delimiter.

For example, if *Space* is chosen as the delimiter and *Double Quote* is chosen as the text qualifier, the string "Aspen Park" is treated as a single data value due to the double quotes surrounding it, and the space delimiter between the words is treated as part of the value.

Single Quote

Check the box next to *'Single Quote'* to specify that everything between those marks should be interpreted as a single value, and any delimiter characters between any two quote characters are not treated as a delimiter.

For example, if *Space* is chosen as the delimiter and *Single Quote* is chosen as the text qualifier, the string 'Aspen Park' is treated as a single data value due to the single quotes surrounding it, and the space delimiter between the words is treated as part of the value.

Skip Leading Spaces

Check the box next to *Skip leading spaces* to tell the software to ignore spaces that appear before initial text.

Treat Consecutive Delimiters as One

Check the box next to *Treat consecutive delimiters as one* to instruct the software to interpret any consecutive delimiters into a single delimiter rather than breaking to a new column for each consecutive delimiter.

Use Comma as Decimal Symbol

Check the box next to *Use comma as decimal symbol* to interpret every comma as the decimal symbol. The number 123,45 in the file would be displayed as 123.45 in the program worksheet with this option checked.

Preview

The parsed data are shown in the *Preview* section.

Encoding

The *Encoding* section allows the choice of *Unicode* data or *ANSI* data when importing or opening an ASCII data file. Unicode data is often referred to as international data. It would include character sets from Russia, Israel, China, Greece, Hungary, among others. After selecting *Unicode*, select the *ANSI text translation [codepage]* option that will read the data correctly. If the data does not appear correctly in the *Preview* window, the *Encoding* may be specified incorrectly.

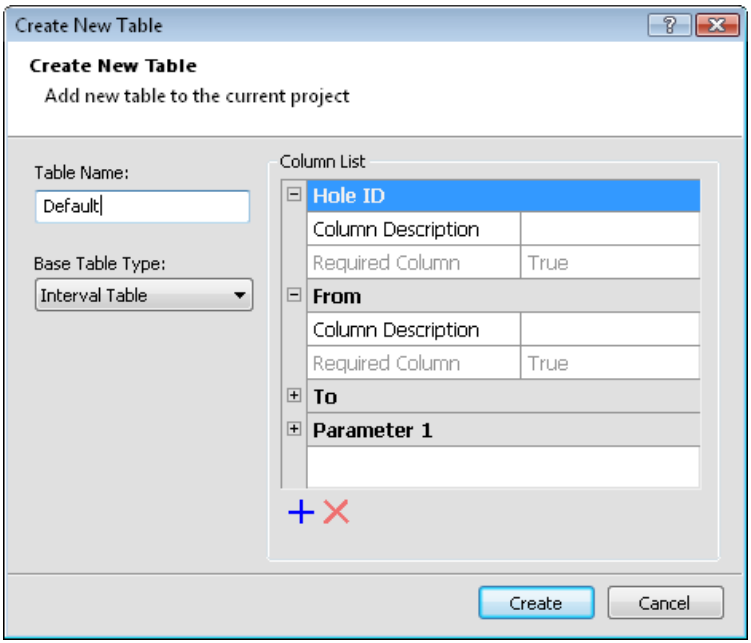
ANSI encoding contains characters within the first 256 characters of a font. These are normally in English.

OK or Cancel

Click *OK* to proceed with the import process. Click *Cancel* to close the dialog without importing the data set.

Create New Table Dialog

To create a new, empty table in the project, select **File | New | Table** or click the  button. The **Create New Table** dialog opens.



*You can define all aspects of a new table in the **Create New Table** dialog.*

The **Create New Table** dialog contains options for naming the table, selecting the table type, and defining the table columns.

Table Name

Enter the name of the new table in the *Table Name* field. The table name cannot be a duplicate of an existing table name in the project.

Base Table Type

Select the table type from the *Base Table Type* list. There are eight table types: *Collars*, *Depth*, *Interval*, *Lithology*, *Project Settings*, *Survey*, *Text Item*, and *Well Construction*.

Column List

The *Column List* shows the pre-defined columns for the table, based on the table type you selected. The tables have a specified set of columns that are required. Each column contains:

- A column name, such as *Hole ID*. The column name can be modified for non-required or custom columns.
- An optional *Column Description*, that gives additional information about the column.
- A *Required Column* option which indicates whether or not the column is required.

Adding Additional Columns

To add additional columns click the  button. A new row appears in the *Column List*. Enter a name in the *Modify Column Name* box and an optional *Column Description*. It is not necessary to add additional columns in the dialog for each column in an existing worksheet, as all data in the worksheet are imported into appropriate columns.

Deleting Custom Columns

To delete an optional column in the table, click the  button. Only non-required or custom columns can be deleted.

Create or Cancel

To create the table and place it in the current project click *Create*. To close the dialog without creating a new table click *Cancel* or the **X** in the upper right corner of the dialog.

Modifying Imported Data for use with Logs

Many users have data in external tables (such as .XLS) that they want to import into **Strater** to be used in logs. Use the following information to make this importing process as easy as possible.

Strater Data Table Requirements

Strater data tables have specific requirements for column names and types of data in columns, and each log type has required columns that must be present in order for **Strater** to even recognize the table as usable for a particular log type.

In some cases, the external data is not formatted in a manner usable by **Strater**. However, the data importing process includes dialog boxes that allow you to modify and adjust the data being imported to conform with the data table requirements.

Using Data Tables Without Headers

Strater assumes that the first row is the default location for column header information. If a imported data table does not include this information you can add it during the import process or edit the row number for the row containing the header. Column header labels are not required, but do make working with data easier.

As an example, the data table to the right does not include header column information:

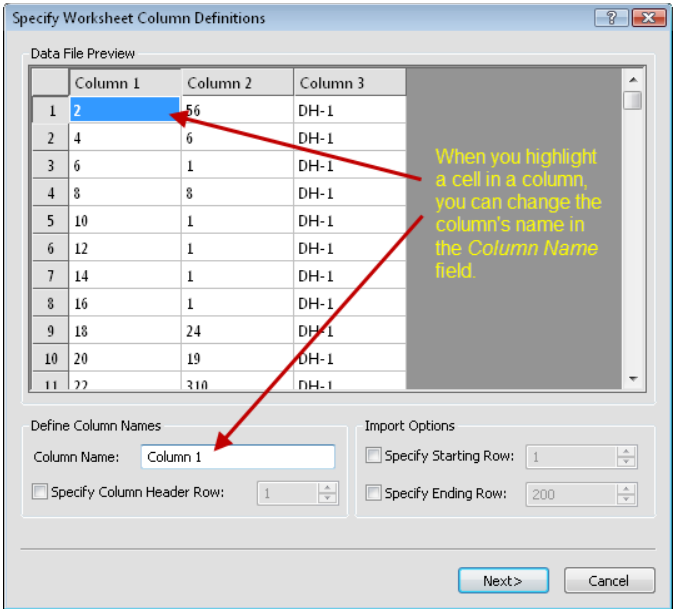
log symbol data no headers.xls

	A	B	C
1	2	56	DH-1
2	4	6	DH-1
3	6	1	DH-1
4	8	8	DH-1
5	10	1	DH-1
6	12	1	DH-1
7	14	1	DH-1
8	16	1	DH-1
9	18	24	DH-1
10	20	19	DH-1
11	22	310	DH-1

Strater *can use data tables that do not have column header information.*

There is usable data in this table, but because the columns are not labeled you can add the column headers during the import function:

1. Click the **Log | Line / Symbol** command or click the  button.
2. Click inside the log pane to fix the position where a line/symbol log will be displayed.
3. The **Open** dialog is displayed. Navigate to the location of the file to open, click on the file name to select it, and click *Open*.
4. The **Specify Worksheet Column Definitions** dialog opens. Note the content of the *Column Name* field:



The ***Specify Worksheet Column Definitions*** *dialog allows you to name each column in an imported data table.*

5. Enter a name for the first column in the *Column Name* field.
6. Click a cell in column 2, which changes the contents of the *Column Name* field.

7. Enter the name for column 2 in the *Column Name* field.
8. Repeat this process for Column 3.
9. Do not click the *Specify Column Header Row* check box because the actual column header is not in a table row.
10. Click *Next*.
11. In the **Specify Data Type and Column Positions** dialog, link the data columns and click *Finish*. The data appears in the table, ready to use.

Associating Data Table Columns to Required Log Columns

Each log type has specific required columns of data that must appear in a specific location in the table. As an example, the *Hole ID* column is always in the first (far left) position in the **Strater** data tables.

You can specify which column of data in the data file corresponds to the required column in the data table. **Strater** will then change the location of the columns to match the position you specified during the import process.

Let us use as an example an Excel spreadsheet data table, such as the one to the right:

All the required columns (Hole ID, Depth) are present for a line/symbol log, but they are named differently and not in the default order.

log symbol data.xls

	A	B	C
1	drill depth	Au	Borehole Name
2	2	56	DH-1
3	4	6	DH-1
4	6	1	DH-1
5	8	8	DH-1
6	10	1	DH-1
7	12	1	DH-1
8	14	1	DH-1
9	16	1	DH-1
10	18	24	DH-1
11	20	19	DH-1

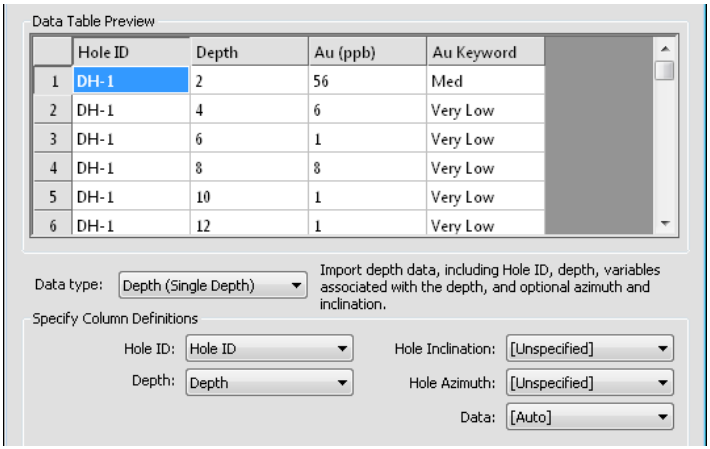
*You can import from .XLS files even if the columns are not named or placed in accordance with **Strater** default values.*

To import into **Strater** for a line/symbol log:

1. Click the **Log | Line/Symbol** command or click the  button.
2. Click inside the log pane to fix the position where a line/symbol log will be displayed.
3. The **Open** dialog is displayed. Navigate to the location of the file to import, highlight the file and click *Open*.
4. The **Specify Worksheet Column Definitions** dialog opens. Click the *Specify Column Header Row* check box because the column header information (Drill

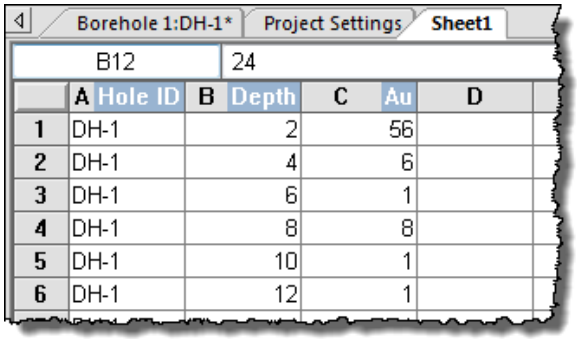
Depth, Au, Borehole Name) is in row 1, which is the default row for header information.

5. Click *Next*. The **Specify Data Type and Column Positions** dialog opens:
6. Note that the contents of the *Hole ID* and *Depth* fields are incorrect. They display the column names associated with the default positions for these two required data columns. Because the columns of the imported .XLS file has these required columns in different locations you must change these two fields.
7. Use the drop-down boxes to select the appropriate columns for *Hole ID* and *Depth*:



Change the required column definitions to match the column locations in the imported data table.

8. Click *Finish*. The log is correctly displayed.
9. Click the **Sheet1** tab. Note that the names of the required columns have changed from their names in the imported .XLS file. In addition, their positions have changed:



The required column names will always appear as the default names, even when the source data has different names for these columns.

By using this technique you can adapt data files in **Strater** without having to go into the source data file location and make edits in the original file. As long as the required data is present in columns, you can make the necessary adjustments during the data importing process.

Exporting Data

With a table view selected, click the **File | Export** command to export the current table into one of several common data file types.

To export a table in .SDG format click the **File | Save** or **File | Save As** commands.

To export the data in a table:

1. Click the **File | Export** command or click the  button. The **Save As** dialog opens.
2. Set the *Save in* field to the folder where you want to save the data.
3. Enter a *File name* for the new data file.
4. Set the *Save as type* to the desired type of file to save. The default type is .XLS. File types include .BLN, .BNA, .CSV, .DAT, . SLK, .TXT, .XLS, and .XLSX.
5. Click **Save** and the data is saved to the file.

Data Export Options Dialog

The **Data Export Options** dialog may appear when exporting tabular data from delimited text files (i.e. .DAT, .TXT). These file formats are assumed to have one record per line in which each record contains a fixed number of numeric data fields.

Delimiter

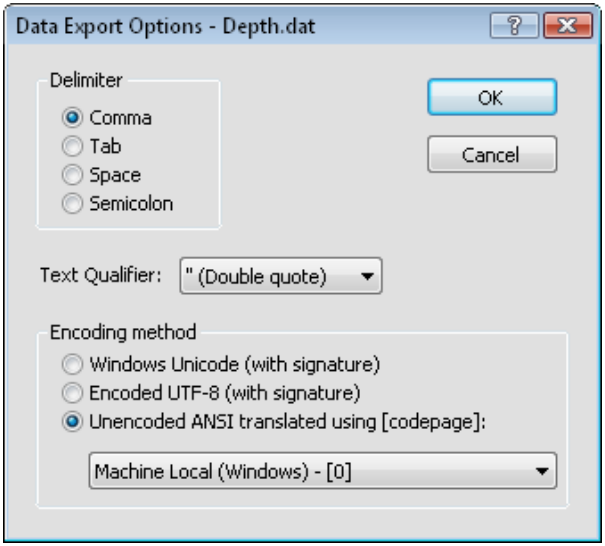
Choose *Comma*, *Tab*, *Space*, or *Semicolon* as the character to use to delimit fields in the saved .DAT, or .TXT file.

Text Qualifier

Select *(none)* for no qualifiers in the export file. Select *Double quotes* to place double quote characters “” around fields in the export file. Select *Single quotes* to place single quote characters ‘’ around fields in the export file.

Encoding Method

The *Encoding method* section allows the choice of *Windows Unicode* data, *Encoded UTF-8* data, or *Unencoded ANSI translated using* data when exporting or saving an ASCII data file. *Windows Unicode* and *Encoded UTF-8 data* are often referred to as international data. It would include character sets from Russia, Israel, China, Greece, Hungary, among others. If the data does not appear correctly in the exported file, the *Encoding method* may be specified incorrectly.



*Specify the delimiter and text qualifier in the **Data Export Options** dialog.*

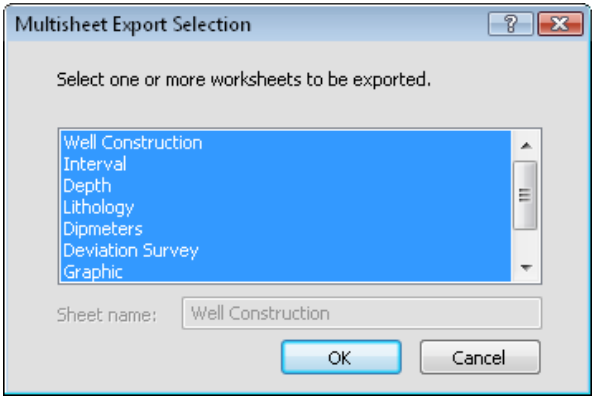
ANSI encoding contains characters within the first 256 characters of a font. These are normally in English. After selecting *Unencoded ANSI translated using [codepage]*, select the *codepage* from the list that will read the data correctly.

OK and Cancel Buttons

Click the *OK* button to proceed with the export process, or click the *Cancel* button to close the dialog without exporting the data set.

Export To Multi-Sheet XLSX

The **File | Export To Multi-Sheet XLSX** command exports all of the selected tables to a single Excel .XLSX file. To save the tables to a multiple sheet Excel file, click on any of the tables and select the **File | Export To Multi-Sheet XLSX** command. In the **Export To Multi-Sheet XLSX** dialog, set the *File name* and file location and click *Save*.



*Select the sheets to export in the **Multisheet Export Selection** dialog.*

Selecting the Tables to Save

In the **Multisheet Export Selection** dialog, select all of the worksheets that should be exported. To select all tables, click on the first table, press and hold the SHIFT key on the keyboard, and click on the last table. To select several tables, click on the first table, press and hold the CTRL key on the keyboard, and click on each additional table. Only selected tables are saved to the .XLSX file.

Changing Sheet Names

Any sheet name can be changed by clicking on only that table name and typing a new name in the *Sheet name* option. Each sheet name in the .XLSX file should be uniquely named. If two or more sheets have the same name, a warning message will be displayed after clicking *OK*.

OK or Cancel

Click *OK* and all of the selected tables are saved.

Edit Menu Commands

The **Edit** menu contains several standard editing options such as **Undo**, **Redo**, **Cut**, **Copy**, and **Paste**. It also contains some table specific commands, such as **Paste Special, Clear, Append Column, Insert Rows, Delete, Find, Find Next,** and **Replace**. See *Chapter 24 –Selecting and Arranging Objects* for more details on the commands that are shared with the view windows. Some of the edit commands have functions specific to the worksheet and some are available through the context menus as well as the main menus. You can right-click on selected cells to open the context menu.

Adding New Columns

To append (add) a column to a data table:

- Manually type or paste data into blank cells in an unused column.
- Click the **Edit | Append Column** command to add a column.
- Right-click in the table and choose *Append Column*.

Manually Enter Data into a Data Tab

You can add data manually to a currently blank column in a data table by either pasting information from multiple cells or typing data into blank cells individually.

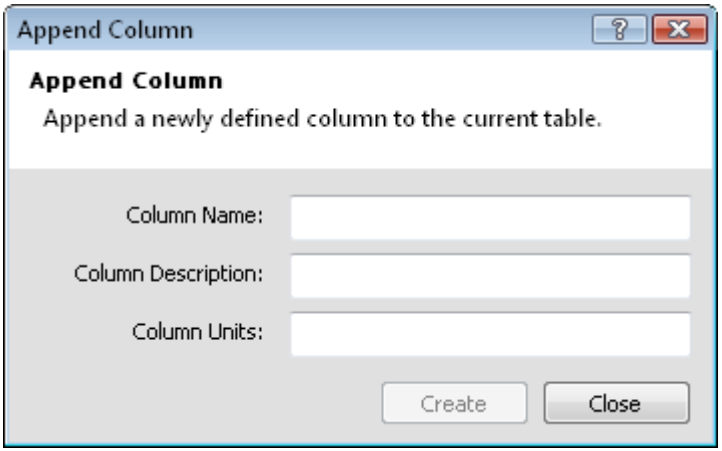
When you enter data into a cell and click off of that cell the column is automatically named *New Column*, and subsequent new columns are named *New Column 1, New Column 2*, and so on.

To rename a manually created column, click the **Table | Edit Column Properties** command.

Append Column Command

Click the **Edit | Append Column** command, right-click in a table view and select *Append Column*, or click the  button to add a column to the selected data table tab.

1. With a data tab highlighted, click the **Edit | Append Column** command. The **Append Column** dialog opens.



*Use the **Append Column** dialog to add a new column to the selected tab in a project.*

2. Enter the *Column Name*, which is the name of the column that will appear above Row 1. The new name cannot duplicate the name of an existing column in this data table.
3. Optionally enter the *Column Description*, which appears in the **Column Editor** dialog.
4. Optionally enter the *Column Units*, which appears in the **Column Editor** dialog.
5. Click *Create* to create the new column and close the dialog. The new column appears in the data table. Click *Close* to exit the dialog without creating a new column.

Insert Rows

Click the **Edit | Insert Rows** command, right-click in a table and choose *Insert Rows*, or press CTRL+R on the keyboard to add an additional row above the current row in a table.

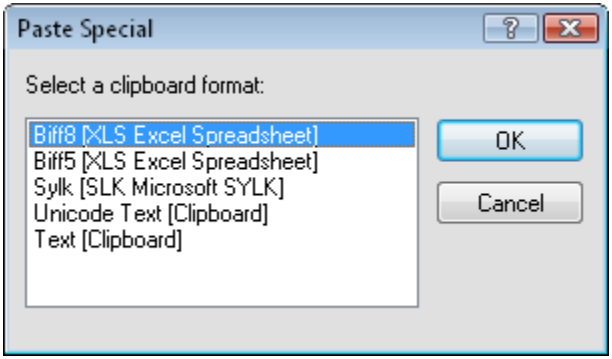
The number of inserted rows is determined by the number of highlighted rows in the data table. For example, if you highlight five rows and click the **Edit | Insert Row** command, five blank rows will be inserted above the highlighted rows.

There is no need to insert or append rows at the end of the table. These rows are already available. Scroll down to the final row in your data table and continue to scroll. Only those rows with data are considered part of the active data table.

Paste Special - Table

When data are copied to the clipboard, special formatting information is also copied. The **Paste Special** dialog determines the format in which the contents are pasted into the table view. The **Paste Special** command can also be used to remove text formatting.

The **Edit | Paste Special** command in the table opens the **Paste Special** dialog.



*Select a paste special format in the **Paste Special** dialog. This example shows options after copying worksheet data and using paste special.*

The clipboard formats displayed may vary depending the original location of the information being copied. For example, data copied from a **Strater** table may yield different options than data copied from Excel.

Biff8 [Excel Spreadsheet]

The *Biff8 [Excel Spreadsheet]* format is a Microsoft Excel Binary Interchange File Format (BIFF) version 8.

Biff5 [Excel Spreadsheet]

The *Biff5 [Excel Spreadsheet]* format is a Microsoft Excel Binary Interchange File Format (BIFF) version 5.

Biff4 [Excel Spreadsheet]

The *Biff4 [Excel Spreadsheet]* format is a Microsoft Excel Binary Interchange File Format (BIFF) version 4.

Biff3 [Excel Spreadsheet]

The *Biff3 [Excel Spreadsheet]* format is a Microsoft Excel Binary Interchange File Format (BIFF) version 3.

Biff [Excel Spreadsheet]

The *Biff [Excel Spreadsheet]* format is a Microsoft Excel Binary Interchange File Format (BIFF).

Sylk [Microsoft SYLK]

The *Sylk [Microsoft SYLK]* format is a symbolic link Microsoft file format typically used to exchange data between applications, specifically spreadsheets. The Sylk file format is composed of only displayable ANSI characters, allowing it to be easily created and processed by other applications, such as databases.

Unicode Text [Clipboard]

The *Unicode Text [Clipboard Text]* format is unformatted text from a Unicode source.

Text [Clipboard]

The *Text [Clipboard Text]* format is unformatted text.

Clear

Click the **Edit | Clear** command, click the  button, or right-click in a table view and choose *Clear* to delete the data from the selected table cells.

This differs from the **Edit | Delete** selection because **Clear** simply removes the data and leaves the blank cells intact. If you highlight several rows and use **Edit | Delete**, the rows themselves are deleted as well. For example, if you highlight row 1 and use **Clear** a blank row 1 will remain. If you highlight row 1 and use **Delete** the row itself is deleted and the data in row 2 moves up to fill row 1, the data from row 3 moves up to fill row 2, and so on.

Delete

Click the **Edit | Delete** command, click the  button, right-click on an object or in a table and select *Delete*, or press DELETE on the keyboard to remove a selected object from the borehole view, map view, or cross section view or the contents of the highlighted cells in a data table. An object can sometimes be restored by clicking the **Edit | Undo** command or by clicking the  button.

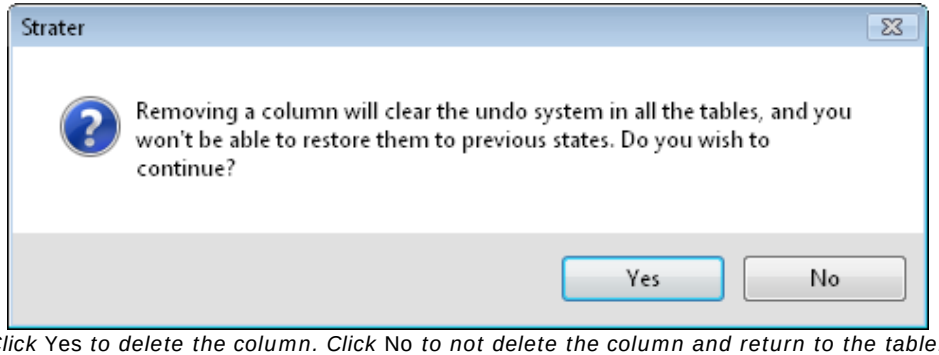
Delete Data from a Table

There are three methods for deleting data from a data table:

- **Delete data from cells:** To delete data from cells, select the cells with the data to delete. When the desired cells are selected, click the **Edit | Delete** command, right-click and select *Delete,* or press the CTRL+D keys on the keyboard **.** The data in the cells is deleted, leaving blank cells. Note: When using this method make sure to highlight only cells containing data and not the row or column headers.
- **Delete data from rows:** To delete rows from the worksheet, highlight the row number(s) at the far left you want to delete and press the DELETE key on the keyboard or click the **Edit | Clear** command. This will remove the data from the cells but leave the blank rows in place.
- **Delete rows from a data table**: To remove the information in the rows and the entire row, highlight the row number(s) to delete. Right-click and select *Delete* or click the **Edit | Delete** command. The rows AND the data are deleted, with the rows beneath the deleted rows moving up in the table.
- **Delete data from columns:** To delete columns from the worksheet, highlight the column header(s) you want to delete and press the DELETE key or select **Edit | Clear**. This will remove the data from the columns but leave the blank columns in place, even for required columns.

- **Delete columns from a data table**: To remove the information in the columns and the entire column, highlight the column header(s) to delete. Right-click and select *Delete* or click the **Edit | Delete** command**.** The columns AND the data are deleted. Required columns cannot be deleted.

In addition, if you attempt to delete a column a warning will appear:



Click Yes *to delete the column. Click* No *to not delete the column and return to the table.*

Deleting a column cannot be undone. Click *Yes* in the warning dialog to delete the column. Click *No* to not delete the column and return to the table.

Find and Replace

Click the **Edit | Find** command or click the  button to find a particular word or phrase in the table. The **Find and Replace** dialog opens to allow entry of search parameters.

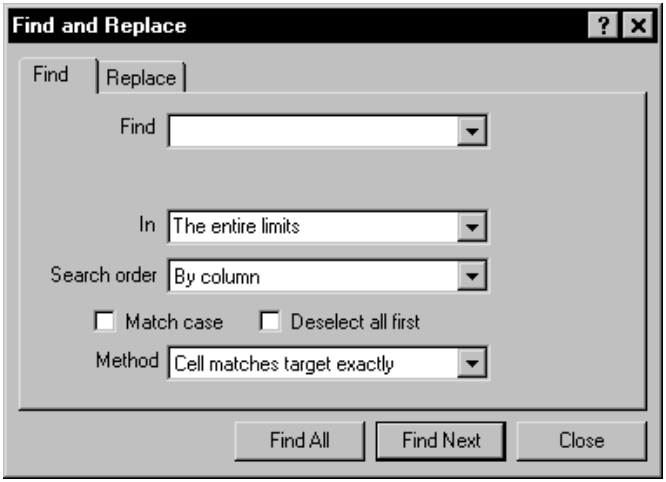
Click the **Edit | Find Next** command or the  button to find the next instance of a particular number, word, or phrase in the worksheet. Each cell matching the search parameters remains selected. If the **Edit | Find** command was not used initially, the **Find and Replace** dialog opens so that you can define your search criteria.

Click the **Edit | Replace** command or the  button to replace a word or phrase with specified text. The **Find and Replace** dialog opens to allow entry of the replacement text.

The **Find and Replace** dialog displays when the Edit | Find, Edit | Find Next, or Edit | Replace commands are chosen. The **Find and Replace** dialog is used to search for and replace specific text in the worksheet.

The Find Page

The **Edit | Find** and **Edit | Find Next** commands open the **Find** page of the **Find and Replace** dialog.



*Search for and replace specific text in the worksheet with the **Find and Replace** dialog.*

Find

To find a word or phrase, type the text you want to search for in the *Find* field. Click the arrow at the right to select from a list of the most recently used text strings. The asterisk * and question mark ? wildcards can be used in the *Find* box. Click the arrow at the right to select from a list of the most recently used criteria.

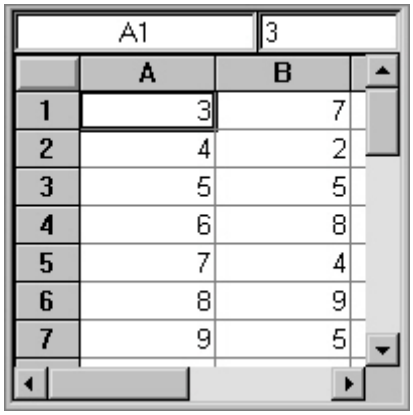
- A question mark ? finds a single character in the specified location. For example, 200? finds 2009, 2008, 200a, etc.
- An asterisk * finds any number of characters at the specified location. For example, *01 finds 601, 1201, c01, etc.

In#

Next to *In*, choose the parameters of the search from the list. Choices include *The column where active cell is, The row where active cell is,* and *The entire limits*.

- Select *The column where the active cell is* to search only the column (i.e. column B) of the active cell (i.e. cell B2) for the information listed in the *Find* field.
- Select *The row where active cell is* to search only the row (i.e. row _2) of the active cell (i.e. cell B2) for the information listed in the *Find* field.

- Select *The entire limits* to search the entire worksheet for the information listed in the *Find* field.



In this example, cell A1 is selected. If the Find *criteria is "7", and* By Column *is the* Search order*, cell A5 is found first. If* By row *is the* Search order*, cell B1 is found first.*

Search Order

The *Search order* controls the direction of the search: down through columns by selecting *By columns* or to the right across rows by selecting *By rows*.

Match Case

If you have case sensitive characters in the *Find* text string, check the *Match case* check box. Selecting *Match case* distinguishes between uppercase and lowercase characters. For example, a search for "Elevation" with the *Match case* option selected will not find entries for "elevation", but will find entries for "Elevation".

Deselect All First

Check the *Deselect all first* box to deselect all selected cells before performing the search. All previously selected cells will be deselected prior to the search when the *Deselect all first* check box is checked. If the *Deselect all first* box is deselected, the results of a previous search will remain highlighted when performing the next search.

Method

Choose the search *Method* from the list to determine how the search is performed.

This examples assume "Golden, CO" is in the *Find* field.

- Select *Cell matches target exactly* to require that the exact criteria in the *Find* box is present in a cell before it is selected. For example, only cells that have exactly "Golden, CO" will be selected.
- Select *Cell contains target phrase* to require that the phrase in the *Find* box is present in a cell before it is selected. For example, cells that have "Golden CO", "Golden Company", or "Golden Colorado" will be selected.
- Select *Cell contains all of the target words* to require that all of the *Find* words are present in a cell before it is selected. For example, cells that have "Golden" and "CO" somewhere in the cell (i.e. "Golden is the best city in Colorado" will be selected).

- Select *Cell contains any of the target words* to require that any of the *Find* criteria words are present in a cell before it is selected. For example, cells that have "Golden is a city" or "CO is a state" will be selected.

Find All Button

Click the *Find All* button to find all occurrences of the *Find* criteria in the worksheet. All of the cells that contain the *Find* criteria will be highlighted.

Find Next Button

Click the *Find Next* button to find the next occurrence of the characters specified in the *Find* box. This allows you to meet the criteria one at a time. The next instance of the *Find* criteria will be highlighted.

Close Button

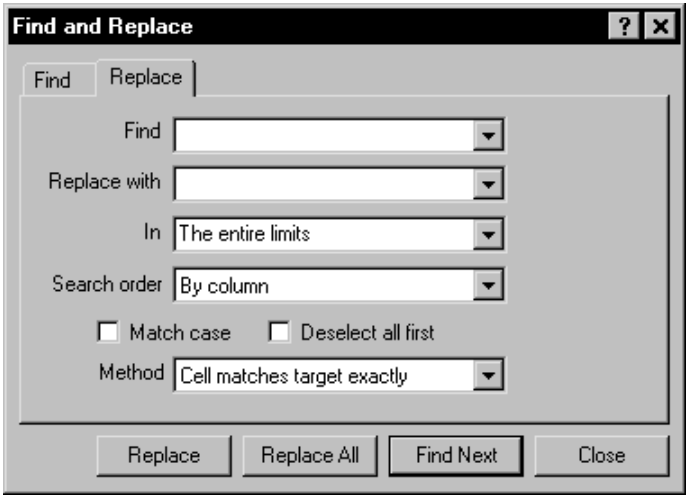
Click the *Close* button to exit the **Find and Replace** dialog.

The Replace Page

The **Edit | Replace** command opens the **Replace** page of the **Find and Replace** dialog. The **Replace** page has all of the **Find** page fields, with the addition of the *Replace with* field. The **Replace** page, *Method* field has only two options.

Replace With

Type the text you want to replace in the *Find* box. To delete the characters in the *Find* box from your worksheet, leave the *Replace with* box blank. Click the arrow at the right to select from a list of the most recently searched items.



*Replace numbers or text in the worksheet with the **Find and Replace** dialog.*

Replace Button

Click the *Replace* button to replace the selected occurrence of the criteria in the *Find* box with the criteria in the *Replace with* box, find the next occurrence of the criteria in the *Find* box,

and then stop. If you want to automatically replace all occurrences of the search criteria in the worksheet, click the *Replace All* button.

Replace All Button

Click the *Replace All* button to replace all occurrences of the *Find* criteria in your document with the *Replace with* criteria. If you want to review and selectively replace each occurrence, click the *Replace* button.

Format Menu Commands

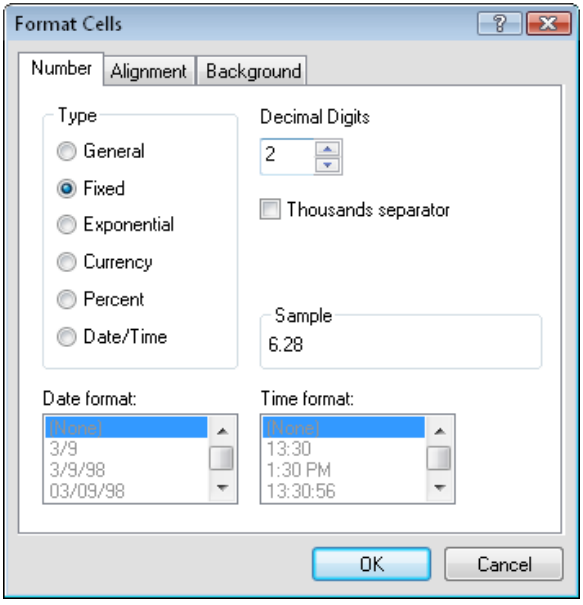
The **Format** menu is available when a data table tab is selected. The table **Format** menu controls cell formatting. This includes setting the cell numeric format, alignment, and background colors, setting the column height, and setting the row width.

Format Cells

Cell numbers, alignment, or background color can be formatted through the Cell Format dialog. To format a cell, select the cells to be formatted and click the **Format | Format Cells** command, click the  button, or right-click and select *Format Cells*. The **Format Cells** dialog opens.

Format Cells – Number Page

Cell numbers, alignment, or background color can be formatted through the **Format Cells** dialog. To format a cell, select the cells to be formatted, then select Format | Format Cells. Number formatting has no effect on a numeric text string (numbers entered as text). For example, an ASCII data file might contain the numbers "8123" (numbers surrounded by quotes) which are read as text and not as a number. The Data | Transform command can be used to perform a mathematical function, such as ATOI(X), to convert a text string to an integer value.



*Use the **Number** page to change the numeric data display in the worksheet.*

General

General displays numbers as fixed or exponential, whichever is shorter.

Fixed

Fixed displays numbers as d.ddd. The number to the left of the decimal can vary. Set the number to the right of the decimal in the *Decimal Digits* box.

Exponential

Exponential displays numbers as d.ddde+ddd. Set the number to the right of the decimal in the *Decimal Digits* box.

Currency

Currency displays fixed numbers with a currency symbol prefix ($).

Percent

Percent displays numeric values (such as 0.13) as percentages with a percent symbol suffix (13%).

Date/Time

Date/Time formats the cells as dates and/or time. Select *Date/Time* and then select the *Date format* and *Time format* of the data.

Thousands Separator

If the *Thousands separator* box is checked, a comma appears every three digits to the left of the decimal point. Do not type a comma when entering data as this causes the number to be read as text.

Sample

The *Sample* box displays the current number format.

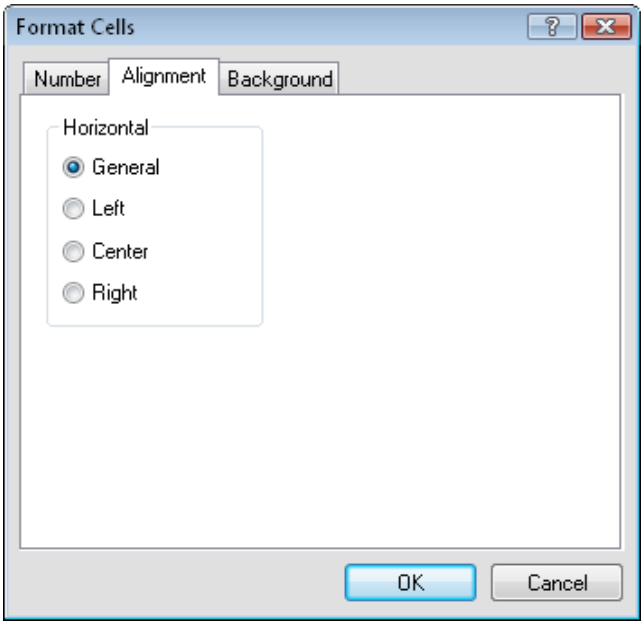
Text String

Number formatting has no effect on a numeric text string (numbers entered as text). A number with an apostrophe in front of it ('8123) is a text string. The apostrophe only shows in the active cell edit box. For example, an ASCII data file might contain the digits "8123" (digits surrounded by quotes), '8123 (digits preceded with an apostrophe), numbers with letters, or numbers with symbols (i.e. a backslash "\").

These "numbers" are read as text and not as a number. The Data | Transform command can be used to perform a mathematical function, such as *ATOI(X)*, to convert a text string to an integer value.

Format Cells – Alignment Page

The **Format | Format Cells** command in the worksheet opens the **Format Cells** dialog. Use the **Alignment** page to align the cell in one of four ways. By default, imported ASCII text files automatically align numbers to the right and text to the left.



*Use the **Alignment** page of the **Cell Format** dialog to select the Horizontal alignment of cells.*

General

General aligns text on the left side of the cell and numbers, dates, and times on the right side of the cell.

Left

Left aligns text, numbers, dates, and times on the left side of the cell.

Center

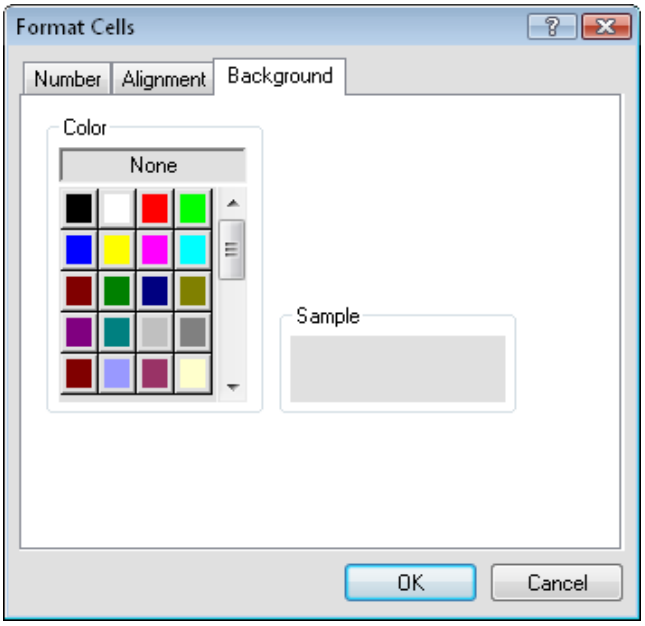
Center aligns text, numbers, dates, and time in the center of the cell.

Right

Right aligns text, numbers, dates, and time on the right side of the cell.

Format Cells – Background Page

The **Format | Format Cells** command in the worksheet opens the **Format Cells** dialog. You can set cell background color on the **Background** page. Save the worksheet in Excel format to save background color in the file.



*Select the cell background color the **Background** page of the **Format Cells** dialog.*

None

Click the *None* button to remove any previously assigned background colors.

Color Palette

Select a cell background color from the color palette.

Sample

A sample of the color is displayed in the *Sample* box.

Preserve Cell Formatting

The only formats that preserve cell formatting information are the Excel .XLS, .XLSX, or SYLK .SLK file formats. ASCII file formats (.CSV, .TXT, .DAT, .BNA, .BLN) do not preserve file format information.

Column Width

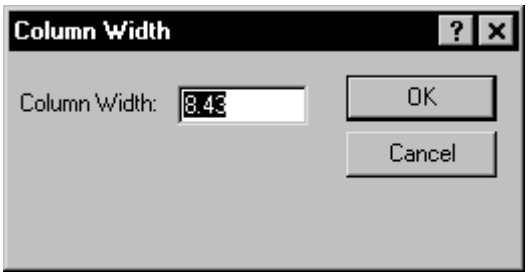
Change the column width by clicking the **Format | Column Width** command, clicking the  button, or by using the mouse to resize the column. The Excel .XLS, .XLSX, or SYLK .SLK file format must be used to save the column width in the file because ASCII file formats (.CSV, .TXT, .DAT, .BNA, .BLN) do not preserve file format information.

Column Width Dialog

To set column widths or to hide columns, highlight either the entire column or individual cells within the columns and select **Format | Column Width**. Enter the width for the selected column or cells into the *Column Width* field. Columns can range from zero to 512 characters wide. The value zero (0) hides the column. Click *OK* to make the changes.

Changing Column Widths with the Mouse

Column width can also be changed using the cursor. When the cursor is moved to the line that defines the right boundary of the column header, the cursor changes to . Press and hold the left mouse button and move the cursor to the left or right to change the width of the column.



*Change the column width by selecting columns, choosing **Format | Column Width**, and then entering a number into the **Column Width** dialog.*

Hide a Column

You can hide a column by moving the cursor to the left until the next dividing line is reached. In the **Column Width** dialog, a *Column Width* value of zero (0) hides the column.

Display Hidden Columns

To display hidden columns, press and hold the left mouse button at the right edge of the hidden column and move the cursor to the right to widen the column.

Row Height

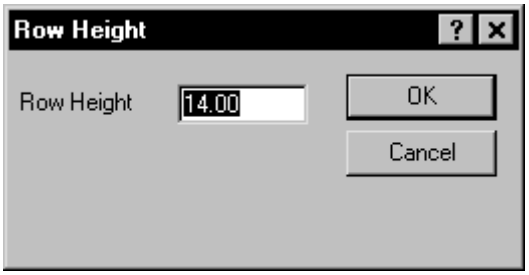
You can change row height of selected cells in a data table by clicking the **Format | Row Height** command, clicking the  button, or by using the mouse to size the row. The Excel XLS, XLSX, or SYLK SLK file format must be used to save the row height and numeric format information with the file since ASCII file formats (.CSV, .TXT, .DAT, .BNA, .BLN) do not preserve file format information.

The Row Height Dialog

To set row heights or to hide rows, select either the entire row or individual cells within the rows and select **Format | Row Height**. Enter the height, measured in pixels, for the selected row or cells in the *Row Height* field. Rows can range from zero to 512 pixels in height. A value of zero (0) hides the row.

Changing Row Heights with the Mouse

Row height can also be changed using the mouse. When the cursor is moved to the line that defines the lower boundary of the row header, the cursor changes to a line with two arrows . Press and hold the left mouse button, move the cursor up or down to change the height of the row.



*Change the row height by selecting rows, clicking the **Format | Row Height** command, and entering a number into the **Row Height** dialog.*

Hide a Row with the Mouse

You can hide a row by moving the cursor up until the next dividing line is reached. In the **Row Height** dialog, a *Row Height* value of zero (0) hides the row.

Display Hidden Rows with the Mouse

To display hidden rows, press and hold the left mouse button at the bottom of the hidden row and move the cursor down to stretch the row height.

Text to Number

The **Format | Text to Number** command allows you to change selected alphanumeric numbers in a data table back to numbers. For instance, the text 00032 can be changed to 32. In addition, the cell justification changes from left (indicating text) to right (indicating numbers).

To change text-format alphanumeric numbers to number format:

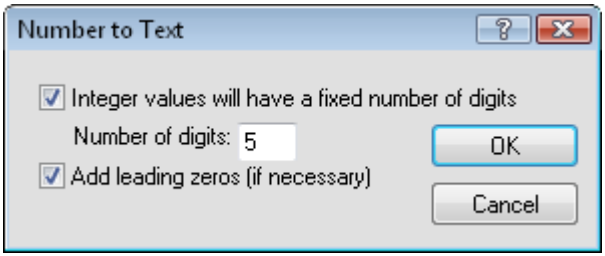
1. Highlight the data table containing the text to change.
2. Click the **Format | Text to Number** command.
3. The selected cell contents change to numbers, and their justification changes from left to right.

Number to Text

The **Format | Number to Text** command allows you to change numbers in a data table to alphanumeric text. For instance, the number 32 could be changed to 00032. In addition, the cell justification changes from right (indicating numbers) to left (indicating text).

To change numbers to alphanumeric text:

1. Highlight the numbers to change in the data table.
2. Click the **Format | Number to Text** command. The **Number to Text** dialog appears.



*Set the text format in the **Number to Text** dialog.*

3. Check the box next to the *Integer values will have a fixed number of digits* option to have all text numbers contain the same number of digits.
4. If the *Integer values will have a fixed number of digits* option is checked, enter the *Number of digits* desired.
5. If you have selected a specific number of digits, click the check box next to *Add leading zeros (if necessary)* to make all numbers have the same number of digits, even if leading zeros are necessary.
6. Click *OK* to change the numbers to text. Click *Cancel* to exit the dialog without making any changes.

Data Menu Commands

The **Data** menu is available only when a data table tab is selected. The **Data** menu commands provide methods to sort, transform or create statistics on columns in the table. In addition, the true vertical depth can be calculated and an XYZ data file can be created with the TVD information.

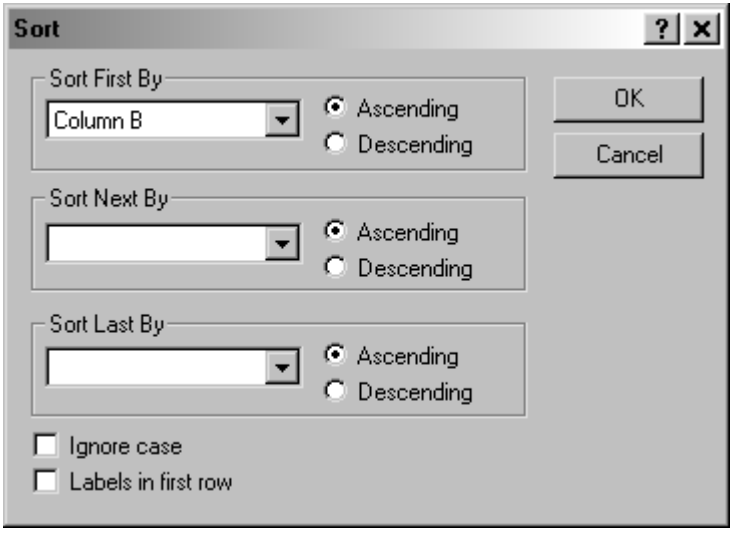
Sort Data

The **Data | Sort** command arranges data according to rank in user-specified sort columns. Sorting rank is based on numbers, ASCII text characters, and punctuation. Sort numeric data, text, or mixed columns. Sorting specifications are made in the **Sort** dialog.

Use the **Data | Sort** command, or the  button, in the worksheet to open the **Sort** dialog.

Selecting Cells to Sort

Sorting is performed only on the selected columns. If only one column is selected, only that column is sorted. To keep records (rows of data) together, select all columns containing data even if only one column is sorted. To decrease sort time, select a block of cells rather than by clicking on the row or column labels.



*Use the **Data | Sort** command to sort data on multiple columns.*

Sort Order

The *Sort First By* option defines the primary column on which the rows are sorted. The positions of the sorted rows are determined by the *Ascending* or *Descending* rank in the *Sort First By* column.

Secondary Sort

When two or more rows have identical entries in the *Sort First By* column, the *Sort Next By* column can further organize the data set. Duplicates in the *Sort First By Column* are then sorted according to the rank in the *Sort Next By* column.

Final Sort

The *Sort Last By* column can be used when the *Sort Next By* column contains duplicates.

Ascending or Descending Sort

The sort order in an *Ascending* sort is based on the ASCII table. Numeric values are placed first, followed in order by cells starting with a space character, common punctuation, numeric text (numbers entered as text), uppercase letters, less common punctuation, lower case letters, uncommon punctuation, and blank cells. *Descending* order is the opposite of ascending order although blank cells are still listed last.

0	1	2	3	4	5	6	7	8	9
space	!	"	#	$	%	&	'	(	)
*	+	,	-	.	/	"0"	"1"	"2"	"3"
"4"	"5"	"6"	"7"	"8"	"9"	:	;	<	=
>	?	@	A	B	C	D	E	F	G
H	I	J	K	L	M	N	O	P	Q
R	S	T	U	V	W	X	Y	Z	[
\	]	^	_	`	a	b	c	d	e
f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y
z	{	|	}	~	blank				

This ASCII table shows the sort order in the worksheet, by row from left-to-right.

Ignore Case

Because sorting is based on an ASCII table, upper and lowercase letters are treated differently. For example, "A" is sorted separately from "a." If the letters are to be treated as the same during the sort, check the *Ignore case* option. When this check box is activated, "A" is considered identical to "a" in the sorting rank.

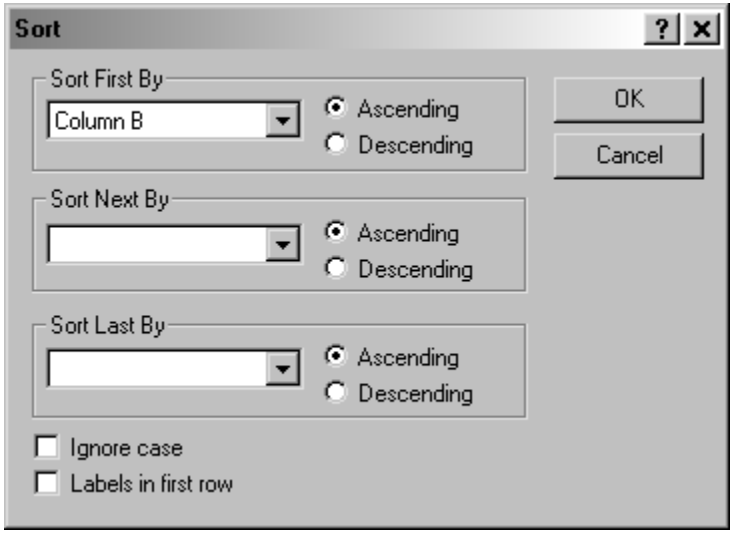
Labels in First Row

The data set may contain text identifying the data in the column (header information) in Row 1. In this case, click the *Labels in first row* option to exclude the label row from the sort process.

To Sort Data:

Select **Data | Sort** to order selected data.

1. With a data table selected, use the cursor to highlight data to order. You can highlight data in as many as three columns in the data table.
2. Click the **Data | Sort** command to open the **Sort** dialog.



*The **Sort** dialog allows you to sort in ascending or descending order up to three columns of selected data, in any column order.*

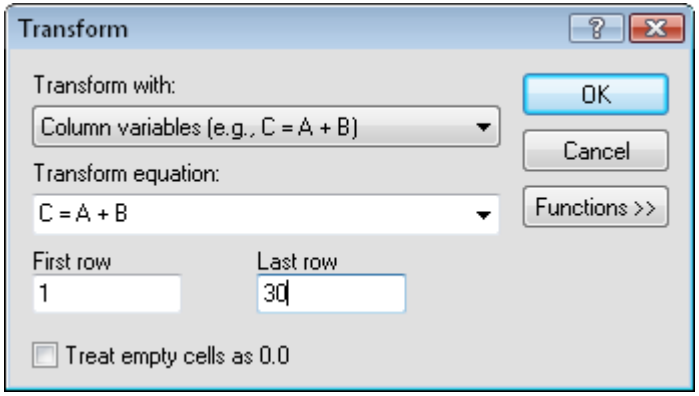
3. Click the *Sort First By* drop-down menu arrow to select the first column to order. The drop down menu is populated by up to three columns of highlighted data.
4. Select whether this column's data is sorted in *Ascending* or *Descending* order.
5. Repeat these steps for the second column (if at least two columns of data were highlighted) in the *Sort Next By* field.
6. Repeat these steps for the third column (if three columns were highlighted) in the *Sort Last By* field.
7. Click the *Ignore case* check box if you want to ignore upper and lower case in the sorted data.

8. Click the *Labels in first row* check box if the first row of sorted data includes the label (column header) for the sorted data.
9. Click **OK** to save the data sort.
10. Click **Cancel** or click the **X** in the upper right corner to close the dialog without saving.

Transform Data

Click the **Data | Transform** command to apply mathematical transformations to data. Valid math operators include addition (+), subtraction (-), multiplication (*), and division (/) as well as a large library of built-in mathematical functions. Parentheses should be used to override precedence. Parentheses can also be used for clarification.

Click the **Data | Transform** command, or the  button, in the worksheet to open the **Transform** dialog.



*The **Transform** dialog allows the user to apply mathematical transformations to data. In this image the dialog is expanded to show the Functions options.*

Transform with

Select the type of transform from the *Transform with* list. *Column variables (e.g., C = A + B)* applies the transform equation to the specified rows in the *Transform equation* column. *Row variables (i.e., _3 = _1 + _2)* applies the transform equation to the specified columns in the *Transform equation* row. *Cell variables (i.e., C3 = A1 + B2)* applies the transform equation only to the cell specified in the *Transform equation*.

Transform equation

Type the formula into the *Transform equation* box. Formulas consist of a destination column, row, or cell on the left side of the equation and a mathematical manipulation on the right side of the equation. Use the column label letters, row numbers, or cell locations on both sides of the equation. Click the down arrow to use previously entered equations. For columns, a sample equation may be C = A + B. For rows, a sample equation is _4=_1+_2. For cells, a sample equation would look like C2=A1+B1-C1.

Transform Equation Format

Formulas are entered as follows:

Type the formula into the *Transform equation* box. Formulas consist of a destination column, row, or cell on the left side of the equation and a mathematical manipulation on the right side of the equation. Use the column label letters, row numbers, or cell locations on both sides of the equation. Click the down arrow to use previously entered equations. For columns, a sample equation may be C = A + B. For rows, a sample equation is _4=_1+_2. For cells, a sample equation would look like C2=A1+B1-C1.

First and Last Rows

Enter the *First row* and the *Last row* to display results of the calculation in the specified column. Enter the *First col* and *Last col* to display results of the calculation in the specified row. These options are grayed out when a *Cell variables (e.g., C3 = A1 + B2)* transformation is performed. By default, these are set to the first row and last row (or first column and last column) with text or numbers entered into a cell for the entire worksheet.

Treat Empty Cells as 0.0

By default, if any cell is empty, the formula is not calculated for that row. If you check *Treat empty cells as 0.0*, the empty cell is replaced with 0.0 and the numeric result is placed in the destination column.

Functions

Click the *Functions* >> button to display a list of predefined mathematical functions. Click the *Functions* << button again to hide the list of predefined mathematical functions.

To use a function, place the cursor in the location to add a function, select a function from the list, click the *Insert* button, and then replace the X in the function with a column letter (A); underscore and row number (_1); or cell location (A1). Also, be sure to use proper mathematical operators (+_*/) between the function and the rest of the equation. The definition of the function is listed when the function is selected.

Insert

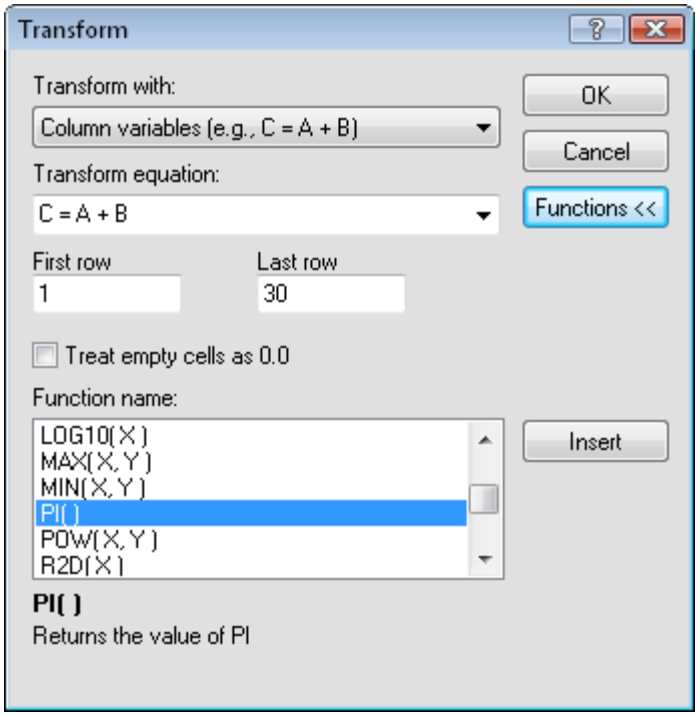
When the *Functions* are expanded, the Insert button is visible. Click the *Insert* button to add a function to the *Transform equation* box. In the *Transform equation* box, manually change the variable (i.e. X or Y) in the listed functions to a column letter, row number (_1), or cell location.

Adding Text

The + operator can be used with cells that contain characters when only characters are displayed in all cells being added. This allows multiple text cells to be combined into a single cell easily.

Examples

An example of a column formula is C = A + B. Columns A and B are added and inserted into column C with this equation. The formula adds the contents of A and B in each row and places the results in column C for that row. When all cells in the same row being added contain numbers or all cells being added contain text, the destination cell contains the combination of these cells. If a combination of text and numbers are in column A and B in the same row, the destination C column is left blank.



This example used the Functions *button to choose a predefined function from the* Function name *list. The* Insert *button was used to add the selected function to the* Transform equation *box. The values were changed to fit the desired column variables.*

An example of a row formula is _4=_1+_2. Rows 1 and 2 are added and inserted into row 4 with this equation. The formula adds the contents of the 1 and 2 in each column listed between the First col and Last col values and places the results in row 4 for that column. When all cells in the same column being added contain numbers or all cells being added contain text, the destination cell contains the combination of these cells. If a combination of text and numbers are in rows 1 and 2 in the same column, the destination row 4 is left blank.

An example of a cell formula is C2=A1+B1-C1. The value in C1 is subtracted from the sum of the values in cells A1 and B1. The result is inserted into cell C2 with this equation. Only numeric cells are used for this calculation, so the destination column is left blank if the cells used in the equation contain numbers or are blank.

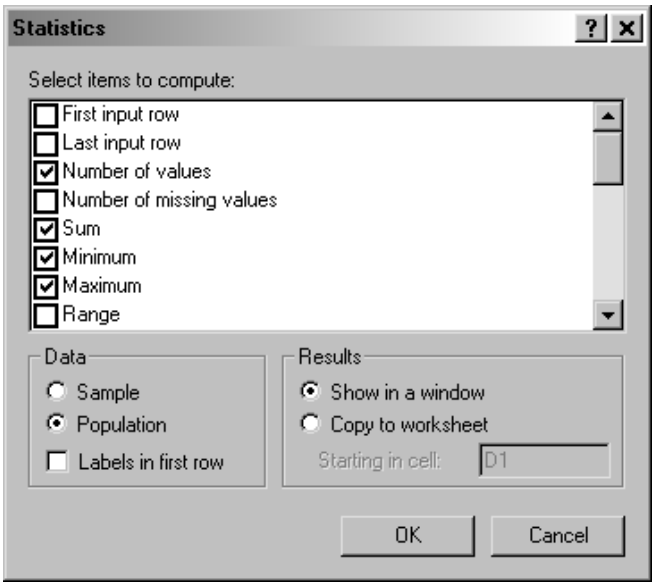
Data Statistics

Perform statistical analysis for a group of selected numerical cells in the data tables in a **Strater** project. Select an entire column or a continuous group of cells in a column to use the **Statistics** command. If a rectangular block of rows and columns are selected, the **Statistics** command calculates the statistics for each column separately. A warning message appears if a group of cells cannot be used with the **Statistics** command. Non-numeric cell entries (empty cells or text) are ignored in statistics calculations.

Click the **Data | Statistics** command or the  button in the table view to open the **Statistics** dialog.

Select Items to Compute

Click in the check boxes next to the statistics options to calculate the statistics for the selected data:



Click in the box adjacent to the statistics name to compute the statistics for the selected columns.

- *First input row* reports the first row number in the selection. If the Labels in first row option is checked, the First input row is the second row in the selection.
- *Last input row* reports the last row number containing data in the column.
- *Number of values* indicates the number of numeric cells in the column.
- *Number of missing values* indicates the number of non-numeric cells in the selection. If columns are selected by clicking the column letters, the number of missing values includes blank values up to the last used row in the worksheet, which may be different than the last used row in the selected column. If cells are selected by highlighting specific cells, then only the blank cells within the selection are counted.
- *Sum* is the sum of all numeric cells in the column.
- *Minimum* indicates the minimum value in the column.

- *Maximum* indicates the maximum value in the column.
- *Range* indicates the range of the numeric values in the column (Maximum – Minimum).
- *Mean* is the arithmetic average of the data values. It is the sum of the data values divided by the number of data values.
- *Median* is the middle value among the data values. Half of the data values are larger than the median and half are smaller than the median. When there are an even number of data values the median is the average of the two middle values.
- *First quartile (25th percentile)* is the value such that one-fourth of the data values are smaller than the quartile and three-fourths of the data values are larger than the first quartile.
- *Third quartile (75th percentile)* is the value such that three-fourths of the data values are smaller than the quartile and one-fourth of the data values are larger than the third quartile.
- Standard error of the mean
- 95% confidence interval for the mean
- 99% confidence interval for the mean
- Variance
- Average deviation
- Standard deviation
- Coefficient of variation
- Coefficient of skewness
- Coefficient of kurtosis
- Kolmogorov-Smirnov goodness of fit for normal distribution
- Critical value of K-S statistic at 90% significance level
- Critical value of K-S statistic at 95% significance level
- Critical value of K-S statistic at 99% significance level

The Data Group

The *Data* group is used to select *Sample* or *Population* statistics. The *Labels in first row* option is also specified in the *Data* group.

Sample or Population

Select *Sample* or *Population* statistics, depending on whether the data represent a statistical sample or the complete set of all possible members of a population.

Labels in First Row

Check the *Labels in first row* box if the first row of the selection contains descriptive labels. If this box is checked the label appears at the top of the statistics report for each column.

Results Group

The *Results* group is used to show the statistics report in a window or copy the results to a new location of the worksheet.

Show in Window

Select *Show in a window* to write the statistics results to a **Statistics Results** dialog. The results in this dialog can be copied to the clipboard to paste to other locations. The **Statistics Results** dialog displays the statistics results.

Copy to Worksheet

Select *Copy to worksheet* to write the statics report to a new location in the worksheet.

Starting in Cell

Use the *Starting in cell* box to specify the cell for the upper left corner of the statistics report. If the destination cells contain data, a warning is displayed that data will be overwritten.

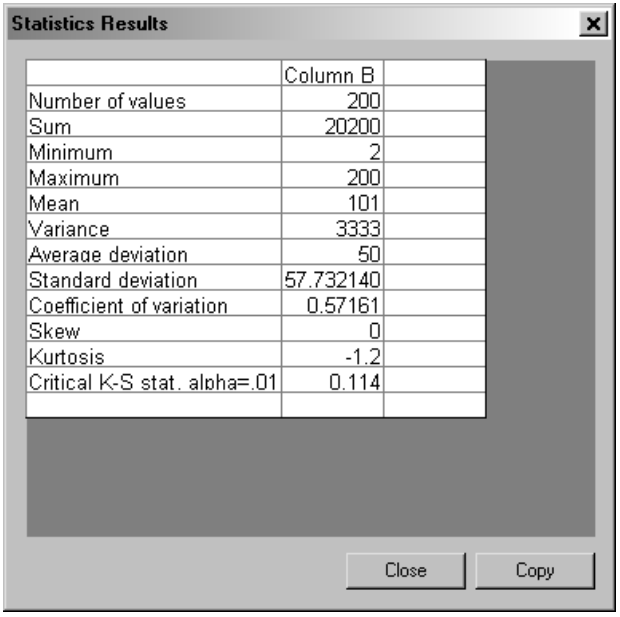
OK or Cancel

Click the *OK* button to overwrite the data, or click the *Cancel* button to set a new *Starting in Cell* location.

To Calculate Statistics:

1. Select the cells in the data table that you want to calculate the statistics on.
2. Click the **Data | Statistics** command to open the **Statistics** dialog.
3. In the *Select items to compute* section click the box next to all items you want to apply to the statistical tests. The actual tests are located at the bottom of the *Select items to compute* menu.
4. Select whether you want the *Data* to analyze as either *Sample* or *Population*.
5. If you select all data in the table, click the *Labels in first row* check box if the first row of the data table includes column labels. This will eliminate the row containing the labels from the analysis.

6. Use the *Results* section to set where the statistical analysis will appear.
   - *Show in a window* displays the results in a separate window on your desktop. Click the *OK* button to generate the statistics:
   - Click the *Copy* button to copy the contents of the window onto the clipboard. You can then paste the content into any document or data table.
   - *Copy to worksheet* copies the contents directly into the active data table. Use the *Starting in cell* field to type in the cell where you want the top left cell of data to appear.



Select Show in a Window to display the statistical results in a separate window.

7. Click *OK* to generate the statistical analysis.
8. Click *Cancel* to exit without generating any statistics.

95% and 99% Confidence Interval for the Mean

If CI is the value of the confidence interval reported by the worksheet, the range of values between the sample mean minus CI and the sample mean plus CI is expected to include the true mean of the underlying population 95% of the time (for the 95% confidence interval) or 99% of the time (for the 99% confidence interval). This formula assumes that the data set is sufficiently large for the central limit theorem to apply.

95% Confidence Interval for the Mean

$$\pm t_{(n-1),\alpha=.05}(SE)$$

99% Confidence Interval for the Mean

$$\pm t_{(n-1),\alpha=.01}(SE)$$

where

- tv,α = the value of the Student's t distribution with v degrees of freedom such that difference between the cumulative probability function evaluated at tv,α and - tv,α is equal to 1- α.
- SE = Standard Error of the Mean

Average Deviation

The average deviation is the average of the difference between the absolute values of data points and the mean.

Population Mean Deviation (MD)

$$MD = \frac{1}{N}\sum_{i=1}^{N}\left|(x_i - \mu)\right|$$

Sample Mean Deviation (MD)

$$MD = \frac{1}{n}\sum_{i=1}^{n}\left|(x_i - \bar{x})\right|$$

Where

- μ = Population Mean
- $\bar{x}$ = Sample Mean
- N = number of data values for a population
- n = number of data values for a sample
- x_1 = i^{th} data value

Coefficient of Kurtosis

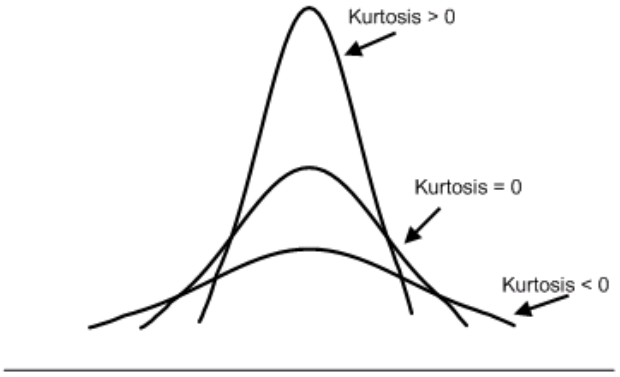
Kurtosis is a measure of how sharp the data peak is. Traditionally the value of this coefficient is compared to a value of 0.0, which is the coefficient of kurtosis for a normal distribution (i.e. the bell-shaped curve). A value greater than 0 indicates a peaked distribution and a value less than 0 indicates a flat distribution. Without a very large sample size, the use of this coefficient is of questionable value.

Population Kurtosis (γ_2)

$$\gamma_2 = \left(\frac{1}{N\sigma^4} \sum_{i=1}^{N} (x_i - \mu)^4 \right) - 3$$

Sample Kurtosis (g_2)

$$g_2 = \left(\frac{1}{ns^4} \sum_{i=1}^{n} (x_i - \bar{x})^4 \right) - 3$$



(adapted from King and Julstrom, 1982)

where

- σ = Population Standard Deviation
- S = Sample Standard Deviation
- μ = Population Mean
- $\bar{x}$ = Sample Mean
- N = number of data values for a population
- n = number of data values for a sample
- x_i = i^{th} data value

Coefficient of Skewness

The coefficient of skewness is a measure of asymmetry in the distribution. A positive skew indicates a longer tail to the right, while a negative skew indicates a longer tail to the left. A perfectly symmetric distribution, like the normal distribution, has a skew equal to zero. For small data sets this measure is unreliable.

Population Skew (γ_1)

$$\gamma_1 = \frac{1}{N\sigma^3}\sum_{i=1}^{N}(x_i - \mu)^3$$

Sample Skew (g_1)

$$g_1 = \frac{1}{ns^3}\sum_{i=1}^{n}(x_i - \bar{x})^3$$



(adapted from King and Julstrom, 1982)

where

- σ = Population Standard Deviation
- S = Sample Standard Deviation
- μ = Population Mean
- $\bar{x}$ = Sample Mean
- N = number of data values for a population
- n = number of data values for a sample
- x_i = i^{th} data value

Coefficient of Variation

The coefficient of variation is the standard deviation divided by the mean. The worksheet reports the quotient: it does not convert the value to a percentage. The coefficient of variation is a dimensionless measure of variation. This statistic is not defined for the case of a zero mean and this measure is only useful when dealing with strictly positive data.

Population Coefficient of Variation (V)

$$V = \sigma / \mu$$

Sample Coefficient of Variation (V)

$$V = s / \bar{x}$$

where

- σ = Population Standard Deviation
- S = Sample Standard Deviation
- μ = Population Mean
- $\bar{x}$ = Sample Mean

Critical Value of K-S Statistic at 90%, 95%, and 99% Significance Level

The critical value of K-S statistic at 90%, 95%, or 99% significance level are indicators of normal distributions.

For example, if a sample collected from a population has a normal frequency distribution, the K-S statistic for that sample is less than the critical value 90, 95, or 99 percent of the time. If the K-S statistic is larger than the critical value, the hypothesis that the underlying population is distributed normally with a mean of $\bar{x}$ and a standard deviation of s should be rejected.

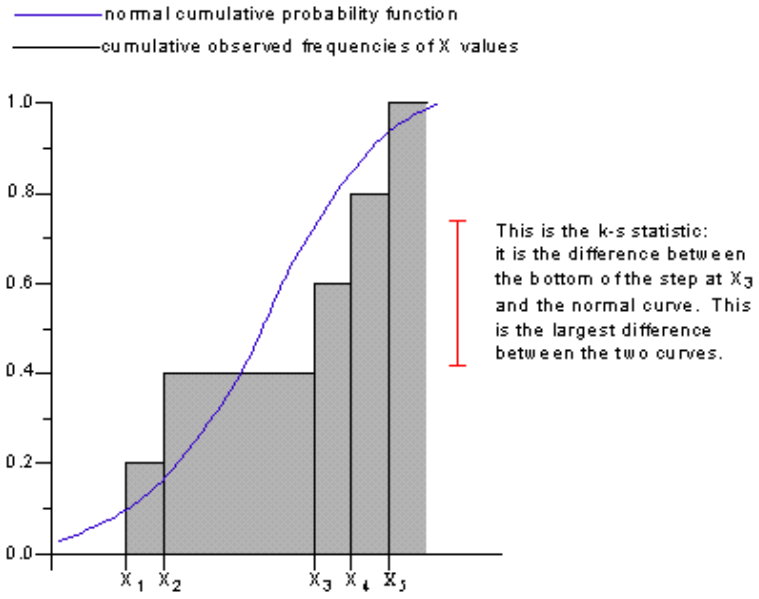
Kolmogorov-Smirnov Goodness of Fit for Normal Distribution

The Kolmogorov-Smirnov statistic is the largest difference between an expected cumulative probability distribution and an observed frequency distribution. The expected distribution used here is the normal probability distribution with mean and variance equal to the mean and variance of the sample data. The observed frequency distribution is a stepped function that increases by 1/n with each step, where n is the number of values in the data set.

For example, suppose that there are five values in a data set. The observed frequency distribution is 0 to the left of the first data point. At the first data point the observed distribution function jumps to 0.2 (since there are five data values, the size of the step

at each value is one divided by five). At each successive data value the observed frequency distribution jumps by 0.2.

The K-S statistic is calculated as the largest difference (in absolute value) between the normal cumulative probability function and the observed frequency distribution, as shown below. Note that at each step it's necessary to compute the difference between bottom of the step and the normal curve and also between the top of the step and the normal curve.



Mean

The mean is the arithmetic average of the data values. It is the sum of the data values divided by the number of data values.

Population Mean (μ)

$$\mu = \frac{1}{N}\sum_{i=1}^{N} x_i$$

Sample Mean ($\bar{x}$)

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

where

- N = number of data values (for a population)
- n = number of data values (for a sample)
- x_i = i^{th} data value

Standard Deviation

The standard deviation is the square root of the variance.

Population Standard Deviation (σ)

$$\sigma = \sqrt{\sigma^2}$$

Sample Standard Deviation (S)

$$s = \sqrt{s^2}$$

where

- σ^2 = Population Variance
- S^2 = Sample Variance

Standard Error of the Mean

The standard error of the mean is an estimate of the standard deviation of means that would be found if many samples of n items were repeatedly collected from the same population.

An alternate description: Suppose many samples of size *n* were repeatedly collected from the same population and the means of these many samples were calculated. The means of the samples would themselves form a data set. The standard error of the mean is an estimate of the standard deviation of this theoretical sample of means.

Standard Error of the Mean (SE)

$$SE = s / \sqrt{n}$$

Where

- S = Sample Standard Deviation
- n = number of data values (for a sample)

Variance

The population variance is the average of the squared deviations from the mean. The sample variance is the sum of the squared deviations from the mean divided by one less than the number of data values.

Population Variance (σ^2)

$$\sigma^2 = \frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2$$

Sample Variance (s^2)

$$s^2 = \frac{1}{(n-1)}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

where

- μ = Population Mean
- $\bar{x}$ = Sample Mean
- N = number of data values (for a population)
- n = number of data values (for a sample)
- x_i = i^{th} data value

Statistics References

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Sokal, Robert R. and F. James Rohlf. (1981) *Biometry: Principles and Practices of Statistics in Biological Research*. New York: Freeman and Co.

Spiegel, Murry R. (1961) *Schaum's Outline of Theory and Problems of Statistics*. New York: McGraw-Hill Inc.

Zar, Jerrold H. (1974) *Biostatistical Analysis*. Englewood Cliffs, New Jersey: Prentice Hall.

Transpose Data

The **Data | Transpose** command rearranges data from columns to rows or from rows to columns. To quickly switch the layout of your data, highlight the data that should be flipped. Click the **Data | Transpose** command or click the  button and the columns become rows and the rows become columns.

For example, consider the data:

	A	B	C	D	E
1	Category	Spring	Summer	Fall	Winter
2	A	12	14	15	21
3	B	13	5	23	12
4	C	51	21	12	32

Categories A, B, and C are displayed with each category in a row.

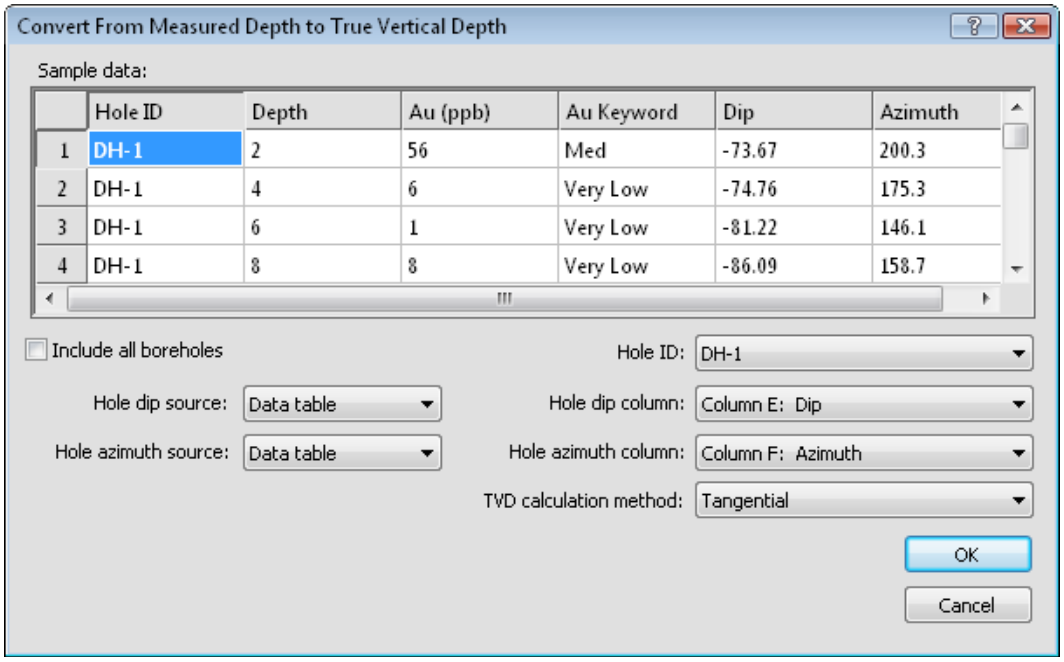
Highlight the rows 1-4. Click the **Data | Transpose** command and the data appears in columns:

	A	B	C	D
1	Category	A	B	C
2	Spring	12	13	51
3	Summer	14	5	21
4	Fall	15	23	12
5	Winter	21	12	32

Categories A, B, and C are now displayed with each category in a separate column. This makes it easier to compare the data in a graph, such as a box-whisker plot.

Create TVD

The **Data | Create TVD** command is used to convert measured depths, inclinations (or dips), and azimuths into true vertical depths. This command is available for all table types except collars tables. After clicking the **Data | Create TVD** command, the **Convert From Measured Depth to True Vertical Depth** dialog is displayed.



Set the true vertical depth calculation options in the dialog.

Sample Data

The *Sample data* section contains a portion of the table. The top line contains the header row, for ease in setting the inclination (or dip), azimuth, and hole ID columns.

Include All Boreholes

Check the box next to *Include all boreholes* to calculate the true vertical depth for all boreholes in the table. When the box is not checked, the *Hole ID* option becomes available.

Hole ID

When the *Include all boreholes* option is not checked, the *Hole ID* option becomes available. Click on the existing borehole name and select the appropriate borehole from the list. Only the selected borehole's true vertical depth is calculated.

Hole Inclination or Dip Source

The *Hole inclination source* or *Hole dip source* contains the source of the inclination or dip column. Click on the existing table name and select the desired table from the list. Available options are *None*, *Collars table, Data table,* and *Survey table*. Setting this option to *None* does not export the true vertical depth. The *Collars table* option reads all collars tables in the project and selects the appropriate inclination or dip column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate inclination or dip column for each borehole. Set the source to *Data table* to read the *Hole inclination column* or *Hole dip column* from the currently selected table. The *Hole inclination column* or *Hole dip column* option becomes available.

If either the *Hole inclination source, Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Inclination or Dip Column

When the *Hole inclination source* or *Hole dip source* is set to *Data table*, the *Hole inclination column* or *Hole dip column* option is available. Click on the existing column name and select the column that contains the inclination or dip information from the list.

Azimuth Source

The *Hole azimuth source* contains the source of the azimuth column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not result in the true vertical depth being exported. The *Collars table* option reads all collars tables in the project and selects the appropriate azimuth column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate azimuth column for each borehole. Set the source to *Data table* to read the *Hole azimuth column* from the currently selected table. The *Hole azimuth column* option becomes available.

If either the *Hole inclination source, Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Azimuth Column

When the *Hole azimuth source* is set to *Data table*, the *Hole azimuth column* option is available. Click on the existing column name and select the column that contains the azimuth information from the list.

True Vertical Depth Calculation Method

The *True vertical depth calculation method* is the method used to calculate the true vertical depth. Refer to the True Vertical Depth Calculation Methods page for information on each method.

OK or Cancel

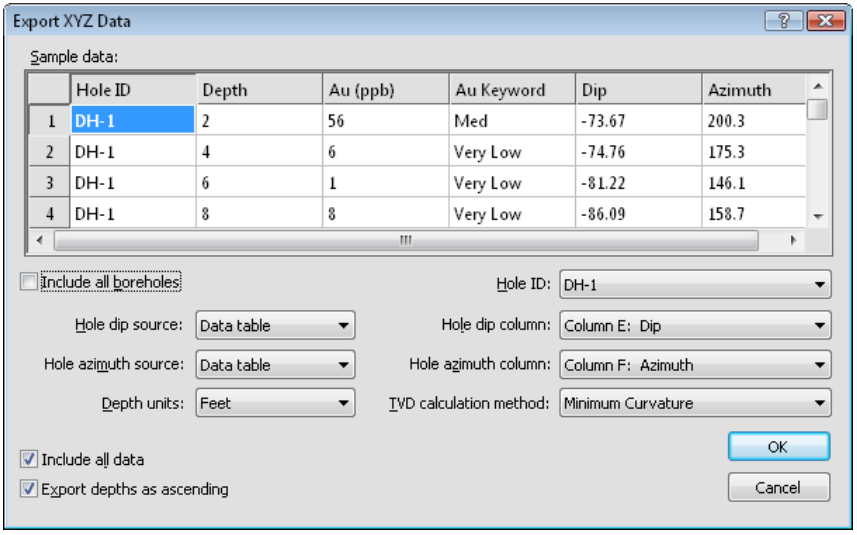
Click *OK* to calculate the true vertical depth values. A new TVD column is added to the table. Click *Cancel* to exit out of the dialog without calculating the true vertical depth.

Export XYZ Data

The **Data | Export XYZ Data** command creates a data file with the Hole ID, X, Y, and Z coordinates of the true vertical depth. This command is available for all table types except collars tables.

After clicking the **Data | Export XYZ Data** command, the **Export XYZ Data** dialog appears. Type a *File name* and click *Save*.

The **Export XYZ Data** dialog appears.



Set the inclination (or dip), azimuth, and TVD calculation method and click OK.

Sample Data

The *Sample data* section contains a portion of the table. The top line contains the header row, for ease in setting the inclination (or dip), azimuth, and hole ID columns.

Include All Boreholes

Check the box next to *Include all boreholes* to calculate the true vertical depth for all boreholes in the table. When the box is not checked, the *Hole ID* option becomes available.

Hole ID

When the *Include all boreholes* option is not checked, the *Hole ID* option becomes available. Click on the existing borehole name and select the appropriate borehole from the list. Only the selected borehole's true vertical depth is calculated.

Hole Inclination or Dip Source

The *Hole inclination source* or *Hole dip source* contains the source of the inclination or dip column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not calculate the true vertical depth. The *Collars table* option reads all collars tables in the project and selects the appropriate inclination column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate inclination or dip column for each borehole. Set the source to *Data table* to read the *Hole inclination column* or *Hole dip column* from the currently selected table. The *Hole inclination column* or *Hole dip column* option becomes available.

If either the *Hole inclination source*, *Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Inclination or Dip Column

When the *Hole inclination source* or *Hole dip source* is set to *Data table*, the *Hole inclination column* or *Hole dip column* option is available. Click on the existing column name and select the column that contains the inclination or dip information from the list.

Azimuth Source

The *Hole azimuth source* contains the source of the azimuth column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not

calculate the true vertical depth. The *Collars table* option reads all collars tables in the project and selects the appropriate azimuth column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate azimuth column for each borehole. Set the source to *Data table* to read the *Hole azimuth column* from the currently selected table. The *Hole azimuth column* option becomes available.

If either the *Hole inclination source, Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Azimuth Column

When the *Hole azimuth source* is set to *Data table*, the *Hole azimuth column* option is available. Click on the existing column name and select the column that contains the azimuth information from the list.

Depth Units

The *Depth units* option determines the units used in the exported data file. By default, the *Depth units* are set to the same units as the units on the *Depth* column. Changing the *Depth units* allows a data file to be created with a different unit, such as meters instead of feet.

TVD Calculation Method

The *TVD calculation method* is the method used to calculate the true vertical depth. Refer to the True Vertical Depth Calculation Methods page for information on each method.

Include All Data

Check the box next to *Include all data* to include all data in all columns in the existing table in the exported data file. Uncheck the box to only export the Hole ID and X, Y, and Z coordinates.

Export Depths as Ascending

When a data table contains depth values that increase down the borehole, checking the box next to *Export Depths as Ascending* will make the depth values negative, so that the values increase up. This is useful when working in other programs, such as **Voxler**, **Surfer**, or **Grapher** with the exported data. As an example, a borehole that ranges from 0 at the top of the borehole to 2400 at the bottom of the borehole will be exported as 0 to -2400 when this option is checked.

OK or Cancel

Click *OK* to calculate the true vertical depth values and create the new data file. Click *Cancel* to exit out of the dialog without creating the data file.

Data File Contents

The data file that is created contains at least four columns: *X, Y, Z,* and *Hole ID*. If the *Include all data* option is checked, other columns may exist.

X	Y	Z	Hole ID
5555	4444	0	DH-1
5555.1077	4442.6901	4.8241661	DH-1
5555.5334	4442.0566	9.7655747	DH-1
5555.6572	4441.7390	14.753937	DH-1
5555.9764	4440.9288	19.677520	DH-1
5556.0280	4439.2869	24.399976	DH-1
5555.8190	4438.4097	29.317991	DH-1

The data file created contains four columns, with XYZ location information for each point along the borehole.

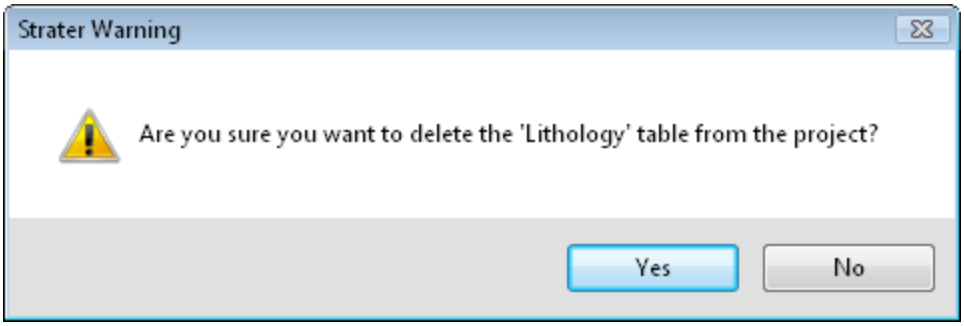
The X, Y Z columns are calculated by transforming the measured depth along the borehole with the azimuth and inclination values to create the true vertical depth.

Table Menu Commands

The **Table** menu option is visible only when a data tab or project settings tab is selected. The **Table** menu commands act on multiple rows in the selected table.

Deleting a Table

To delete the current active table click the **Table | Delete Table** command or click the  button. A **Strater** warning dialog appears.



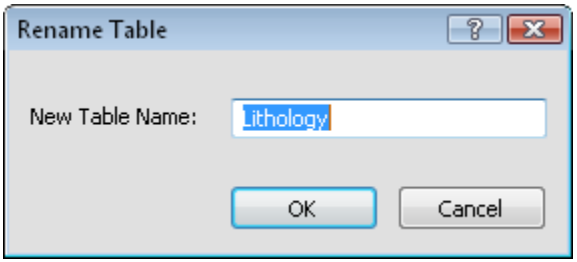
Click Yes *to delete the table and* No *to close the dialog without deleting the table.*

Click *Yes* in the dialog to remove the table and its data from the current project. Click *No* to return to the table without deleting it.

To undo the deletion, click on a borehole view or cross section view and click the Edit | Undo command.

Renaming a Table

To rename a table, click on the table to rename to make it the active sheet. Click the **Table | Rename Table** command. The current table name is displayed in the **Rename Table** dialog.



Type the new table name and click OK.

Type the new name and click *OK*. To cancel the rename process, click the *Cancel* button.

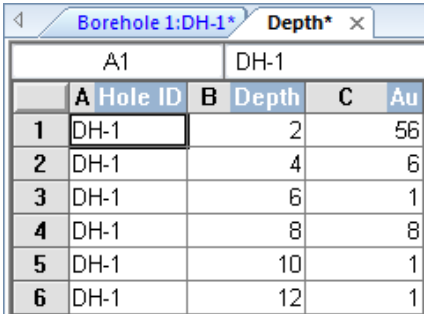
Note: The new table name cannot be the same as any other table name in the project, including the selected table. The table name cannot be empty, either. The process cannot be undone with the **Edit | Undo** command, although the table can be renamed as many times as desired.

Convert to Interval Table

With a depth table selected, click the **Table | Convert to Interval Table** command. The depth table, with a single depth column, is copied and converted to an interval table, with two depth columns: *From* and *To.*

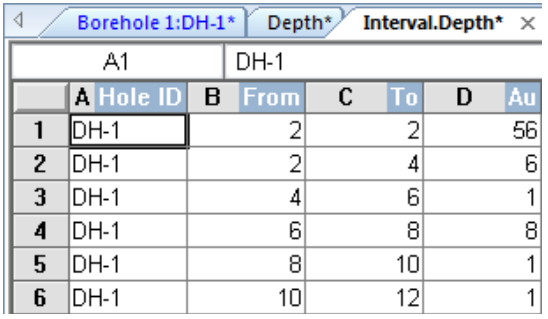
To convert a depth table to an interval table:

1. Select a tab containing a depth table.
2. Click the **Table | Convert to Interval Table** command. A new table is created, indicated by the new tab **Interval.Depth**, where **Depth** was the original table name.



	A1	DH-1	
	A Hole ID	B Depth	C Au
1	DH-1	2	56
2	DH-1	4	6
3	DH-1	6	1
4	DH-1	8	8
5	DH-1	10	1
6	DH-1	12	1

A Depth table has only one column associated with depth.



	A1	DH-1			
	A Hole ID	B From	C To	D Au	
1	DH-1	2	2	56	
2	DH-1	2	4	6	
3	DH-1	4	6	1	
4	DH-1	6	8	8	
5	DH-1	8	10	1	
6	DH-1	10	12	1	

*When a depth table is converted to an interval table **Strater** automatically changes the original* Depth *column to a* To *column, and adds a* From *column that is filled with the To values, but dropped one row.*

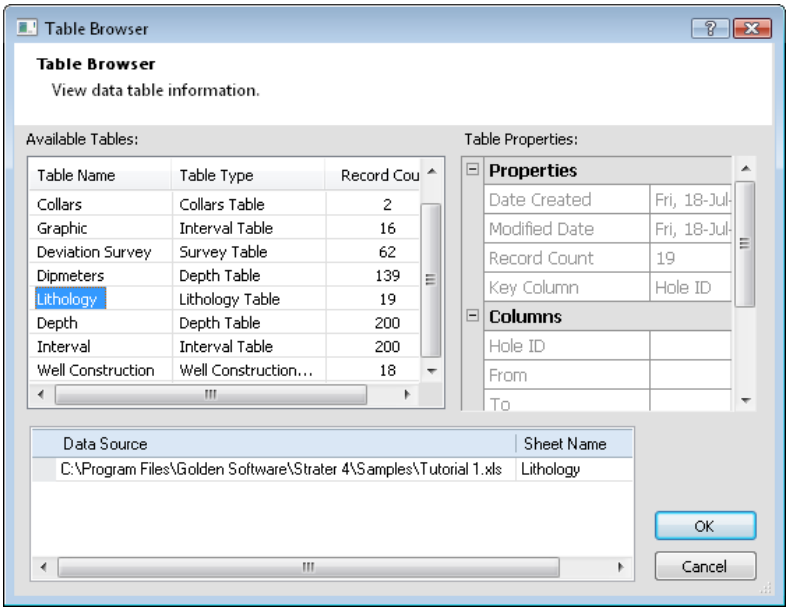
The **Convert to Interval Table** function automatically defines the interval from and to depths based upon the supplied depth values. The first depth value for the new interval table always starts with zero. Therefore, you need to manually modify the first "from" depth in the new table if the first interval does not start a zero. In the above example, change the 2 in cell B1 to a 0.

The source depth table is not deleted after using this command. You can change the name of the new column by selecting **Table | Edit Column Properties**.

Table Browser

The **Table | Table Browser** command is available only when a data table tab is selected. This is a read-only dialog that provides information about all of the tables in the current project.

To open the **Table Browser** dialog click the **Table | Table Browser** command or click the  button.



*The **Table Browser** dialog provides quick access to information about every table in the current project.*

Available Tables

Every table in the current project is listed in the *Available Tables* field. Click on a table in the *Available Tables* section to display the properties for that table.

Select a table name in the *Available Tables* field. When highlighted, its properties and columns are displayed in the *Table Properties* field, and its source data location is displayed in the *Data Sources* field.

Remove Link to External Data

To remove a data source from a table, select the table from the list of *Available Table*s, select the data source you want to remove from the *Data Source* field, and press the *Delete* key on the keyboard. When the data source is removed from a table, that data will not be reloaded when using the **File | Reload Data** or the **File | Reload All** commands. This is useful if you have changed the data in the selected table.

If you deleted the wrong data source by accident, click *Cancel* to cancel the deletion.

Changing the Link to External Data

To change the data source link for a table, select the table from the list of *Available Tables*, select the data source you want to change in the *Data Source* field, and click the  button to the right of the external data source name. In the **Data Source** dialog, select the new external data source file and click *Open*. If necessary, select the sheet name and click *OK*. When the data is changed, click *OK* and the project will update with the new data.

The new data source should have the same columns and format as the original file. If the new data source has different columns or the data is formatted differently, the best way to import the data is to use the **File | Import** command or open the data in a new table using the **File | Open** command.

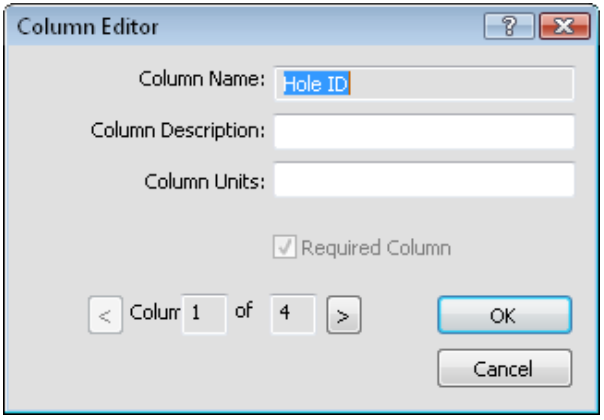
If you changed the data source incorrectly and want to return to the original source, click *Cancel* to cancel the change.

OK or Cancel

Click *OK* or *Cancel* to close the dialog and return to the table view.

Edit Column Properties

Click the **Table | Edit Column Properties** command, click the  button, or right-click in a table and select *Edit Column Properties* to open the **Column Editor** dialog. The dialog allows you to review or change the names, descriptions, or units associated with each of the columns in the current table.



*Edit column properties in the **Column Editor** dialog.*

Column Name

Column Name is the name that appears on the column header. Required columns cannot have the name changed. Optional columns can have any name.

Column Description

Column Description contains additional information about the information in the column. The *Column Description* can be used in linked text.

Column Units

Column Units contain information about the units the column contains, such as meq/l or meters/hour. This information can be used in linked text or as prefixes in the distance display for well headers in a cross section. The column units are also exported when exporting logs to an LAS file.

Required Column

The *Required Column* check box is read-only and indicates whether the current column is required.

Select Columns

When the **Edit Column Properties** dialog opens the left-most column name appears in the *Column Name* field. To navigate through the column names click the  and  buttons. The *Column [X] of [Y]* area indicates the current column name location in the table and the total number of named columns in the current data table.

OK or Cancel

To save your changes click *OK*. To exit this dialog without saving changes click *Cancel*.

Define New Hole

To add a new borehole to an active table click the **Table | Define New Hole** command, click the  button, or right-click in a table and select *Define New Hole* to open the **Define Hole** dialog.

Hole Name

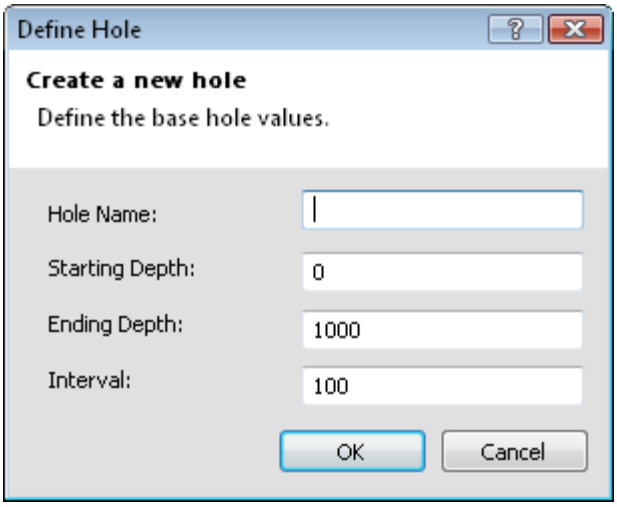
The *Hole Name* is the name of the borehole being added to the table. Type the name exactly as it should appear in the table. If the borehole name exists in another table, be sure to type the name exactly as it appears in the other table. The *Hole Name* should not be the same name of an existing borehole in the current table if the depth interval is the same.

Starting Depth

The *Starting Depth* is the initial depth value for the rows being added.

Ending Depth

The *Ending Depth* is the final depth value for the rows being added. If the difference between the *Ending Depth* and *Starting Depth* is not evenly divisible by the *Interval*, the *Ending Depth* is the maximum allowed depth value for the rows being added.



*Set the new borehole name, starting and ending depth, and interval in the **Define Hole** dialog.*

Interval

The *Interval* is the difference between row depth values. For interval table types, the *Interval* is also the difference between the *From* and *To* values for each row.

OK or Cancel

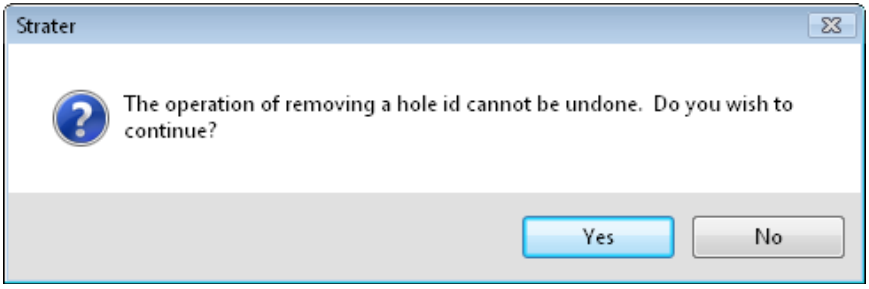
Click *OK* to add the new rows to the table. For depth tables, the *Hole ID* and *Depth* columns are created. For interval tables, the *Hole ID*, *From*, and *To* columns are created.

To Define a New Borehole:

1. Click the **Table | Define New Hole** command or click the  button. The **Define Hole** dialog appears.
2. Type a new borehole name next to the *Hole Name* option, such as MW-1.
3. Type a value in the *Starting Depth* box, such as 1000.
4. Type a value in the *Ending Depth* box, such as 5400.
5. Enter the *Interval*, which is the value between each row representing the new hole, such as 150.
6. Click *OK* to add the new rows to the data table. The rows containing the new borehole are added at the end of the currently active table. With the *Starting Depth, Ending Depth*, and *Interval*, 30 new rows are added.

Remove Hole Data

Click the **Table | Remove Hole Data** command, click the  button, or right-click in a table and select *Remove Hole Data* to remove all information for a selected Hole ID. To remove borehole data, click in one of the data table cells for the desired Hole ID and click the **Table | Remove Hole Data** command. After clicking the command or button, a warning message appears:



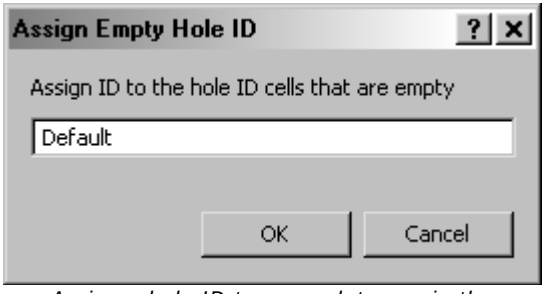
Click Yes *to remove the selected hole ID. Click* No *to cancel the delete command and return to the table.*

Click *Yes* in the dialog to remove all data for the selected hole ID from the table.

NOTE: The **Edit | Undo** command is not available after deleting data with the **Table | Remove Hole Data** command, so use caution.

Assign Empty Hole ID

The **Table | Assign Empty Hole ID** command creates a Hole ID for rows in the table that do not have a Hole ID defined, but do have data in the remaining columns. This command does not create a new Hole ID, it only gives a Hole ID to existing data.



Assign a hole ID to every data row in the selected table that does not contain a Hole ID.

Assign ID

In the dialog, highlight the word *Default* and type the Hole ID that should be assigned.

OK or Cancel

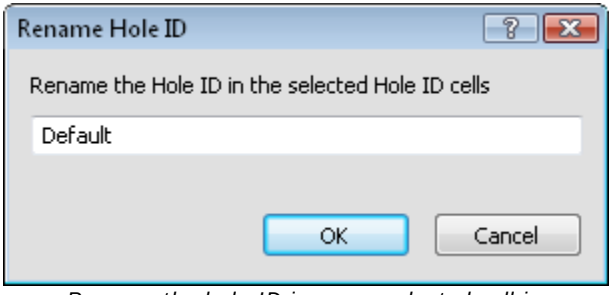
Click *OK* to update all empty Hole ID rows with the assigned Hole ID. Click *Cancel* to return to the table without making any changes.

Assigning a Hole ID to Empty Hole ID Rows

1. Click the **Table | Assign Empty Hole ID** command. The **Assign Empty Hole ID** dialog appears.
2. Enter the *Hole ID* in the *Assign ID to the empty Hole ID cells* box.
3. Click OK to assign the new ID.

Rename Hole ID

Click the **Table | Rename Hole ID** command to rename the Hole ID for all selected rows. After clicking the command, the **Rename Hole ID** dialog appears. This command is designed to rename selected cells in the hole ID column. To assign a Hole ID to all empty cells, use the **Table | Assign Empty Hole ID** command. To add new rows with a new *Hole ID*, use the **Table | Define New Hole** command.



Rename the hole ID in every selected cell in a data table that currently contains a Hole ID.

Rename Hole ID

In the dialog, highlight the word *Default* and type the Hole ID that should be assigned to all selected rows.

OK or Cancel

Click *OK* to update all selected *Hole ID* rows with the assigned *Hole ID*. Click *Cancel* to return to the table without making any changes.

Assigning a New Hole ID

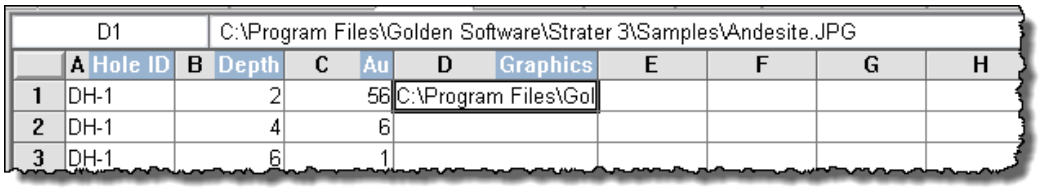
1. Highlight the cells in the *Hole ID* column whole hole IDs you wish to change.
2. Click the **Table | Rename Hole ID** command. The **Rename Hole ID** dialog opens.
3. Highlight the existing name and enter the new hole ID in the *Rename the Hole ID in the selected Hole ID cells* box.
4. Click *OK* to assign the new ID. All the selected hole IDs update to the new name.

Get Image File Name

Click the **Table | Get Image File Name** command or right-click in a table and select *Get Image File Name* to select an image and input the full path and file name of the image in the table's currently active cell. This makes using images in graphic logs easier, as it removes the chance of a typo in the table column.

To insert a file path and name into the cell:

1. In the table, click on the cell you want to insert the file name and path. In this example, click on cell D1.
2. Click the **Table | Get Image File Name** command. The **Import** dialog opens.
3. Browse to the image file and click on the file to select it. In this example, click on the *Andesite.JPG* image in the C:\Program Files\Golden Software\Strater 4\Samples directory.
4. Click *Open* and the path and file name are inserted into the selected cell.



D1	C:\Program Files\Golden Software\Strater 3\Samples\Andesite.JPG							
A Hole ID	B Depth	C Au	D Graphics	E	F	G	H	
1	DH-1	2	56	C:\Program Files\Gol				
2	DH-1	4	6					
3	DH-1	6	1					

The full path and file name of the selected image appears in the selected cell.

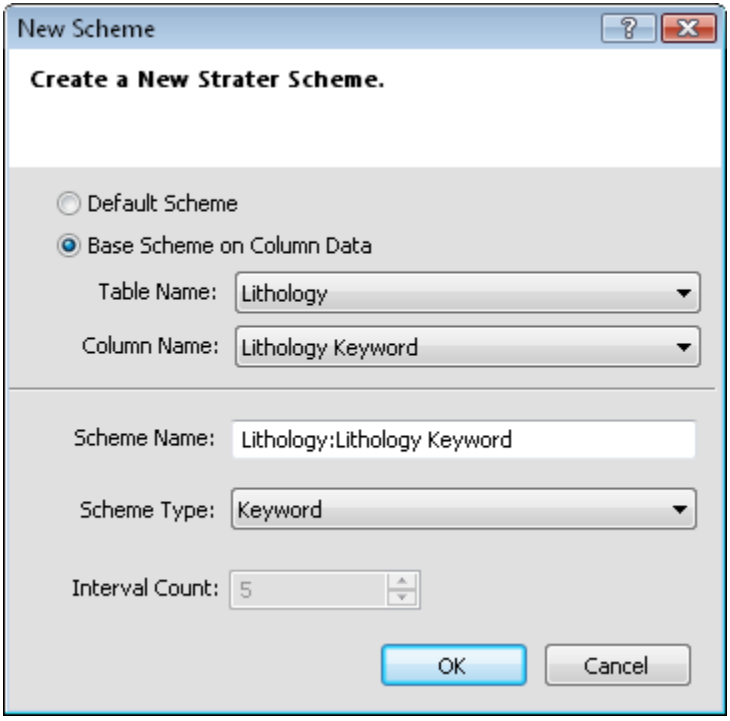
Create Scheme

Creating a scheme is a multiple-step process. Each step is simple, and the steps vary depending upon the type of scheme you want to create and whether you want to manually create the scheme or have the creation process automated.

The first step in creating a scheme is to open the **New Scheme** dialog. Data can be determined automatically from a column in a table or can be manually created.

Creating a Scheme From a Table Column

In a table view, click on any cell the column you want to use to create the scheme. Click the **Table | Create Scheme** command or right-click in the table and select *Create Scheme*. The New Scheme dialog appears, with the selected table and column name.



*The **New Scheme** dialog allows a scheme to be created automatically from a table column.*

Default Scheme

The *Default Scheme* option is selected if a scheme should be created manually. The *Table Name* and *Column Name* options are then unavailable.

Base Scheme on Column Data

If a table and column were selected, the *Base Scheme on Column Data* option is selected. The *Table Name* and *Column Name* are automatically set to the selected column. When the *Base Scheme on Column Data* option is selected, **Strater** automatically determines the number of items in the scheme based on the column contents.

Table Name

Click on the table name next to *Table Name* to select a different table. In the list, select the table in the current project that contains the column that is the basis of the scheme's contents.

Column Name

Click on the column name next to *Column Name* to select a different column. In the list, select the column that contains the keywords or values to base the scheme.

Scheme Name

The *Scheme Name* is the name for the scheme. The name must be unique and not a duplicate of an existing scheme name. When the scheme is created from a column, the column name is used for the *Scheme Name* by default.

Scheme Type

The *Scheme Type* is the type of scheme being created. Click on the existing type and select the desired scheme type from the list. If the scheme is based on column data, **Strater** automatically scans the contents of the selected column and determines an appropriate *Scheme Type*, but this can be changed. The scheme type can be Keyword, Range, Lithology Keyword, Indent Keyword, and Well Construction.

Interval Count

The *Interval Count* is the number of separate items in the scheme.

When the *Base Scheme on Column Data* option is selected, **Strater** automatically determines the number of items in the scheme based on the column contents. Except

when *Scheme Type* is set to *Range*, the *Interval Count* cannot be edited and is a read-only field when creating the scheme from a table column.

If a *Range* scheme is being created, the default *Interval Count* is 10. This can be changed by either using the up and down arrows or highlighting the 10 and typing a new number for the interval.

If the scheme is not based on a table column, the interval count can be set manually.

OK or Cancel

To create the scheme with the settings, click *OK*. To exit without creating a scheme click *Cancel*.

Information about Creating a Scheme Not Based on Current Column Data

Whenever possible it is advantageous to associate a new scheme with column data if you are planning on using the new scheme in the current project. Creating a scheme from scratch has many potential pitfalls. For example, keywords are case-sensitive and even the most minor typographical error will make the scheme not work correctly. When creating a scheme automatically, the only edits that are typically required are those to adjust the appearance (color, fill style, etc.) because auto-created schemes include these properties for all items; these auto-created properties will likely require adjusting to make the logs appear as desired.

It is common to create a scheme from scratch when working in design mode, which is when you are building a **Strater** project template you intend to use many times. In this case the time-consuming nature of creating the scheme is rewarded because the process occurs only once. Remember, even if you forget to include an item or include unnecessary items you can make these changes at any time after the scheme is completed and saved by opening the Scheme Editor.

Refresh Borehole Names

Click the **Table | Refresh Borehole Names** command after editing Hole IDs in the data tables. This command does not create new borehole IDs, it only updates the list of borehole IDs available in borehole view and cross section view windows. Click the **Table | Define New Hole** command to create a new borehole name.

To edit borehole names, select the desired Hole ID in a data table and type a new Hole ID or click the **Table | Rename Hole ID** command to edit the Hole ID for all rows for a selected borehole at once.

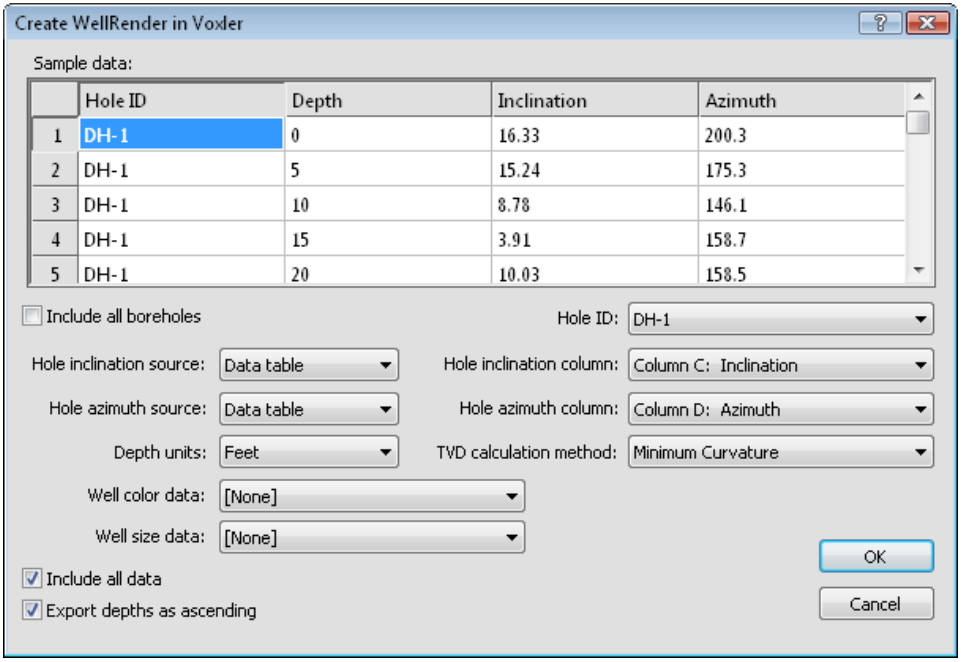
After editing all the desired borehole names click the **Table | Refresh Borehole Names** or click the  button to update the list of all borehole names in the borehole view properties.

Voxler Menu Commands

The **Voxler** menu commands control how objects are exported for display in **Voxler**. For additional information on **Voxler**, refer to the the Golden Software **Voxler** web page. The **Voxler | Export Cross Section** command is discussed in *Chapter 6 – Cross Sections and the Cross Section View*.

Create WellRender

Click the **Voxler | Create WellRender** command to create a *WellRender* object in **Voxler** (or higher). In the **Create WellRender in Voxler** dialog, set the export options and click *OK*. The data is imported into **Voxler** and a *WellRender* module is created.



Set the inclination (or dip), azimuth, units, and well color and size and click OK.

Sample Data

The *Sample data* section contains a portion of the table. The top line contains the header row, for ease in setting the inclination (or dip), azimuth, hole ID, well color, and well size columns.

Include All Boreholes

Check the box next to *Include all boreholes* to create wells in **Voxler** from all boreholes in the table. When the box is not checked, the *Hole ID* option becomes available.

Hole ID

When the *Include all boreholes* option is not checked, the *Hole ID* option becomes available. Click on the existing borehole name and select the appropriate borehole from the list. Only the selected borehole is exported and displayed in **Voxler** as a well.

Hole Inclination or Dip Source

The *Hole inclination source* or *Hole dip source* contains the source of the inclination or dip column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not calculate the true vertical depth for the wells in the *WellRender*. The *Collars table* option reads all collars tables in the project and selects the appropriate inclination column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate inclination or dip column for each borehole. Set the source to *Data table* to read the *Hole inclination column* or *Hole dip column* from the currently selected table. The *Hole inclination column* or *Hole dip column* option becomes available.

If either the *Hole inclination source*, *Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Inclination or Dip Column

When the *Hole inclination source* or *Hole dip source* is set to *Data table*, the *Hole inclination column* or *Hole dip column* option is available. Click on the existing column name and select the column that contains the inclination or dip information from the list.

Azimuth Source

The *Hole azimuth source* contains the source of the azimuth column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not calculate the true vertical depth for the wells in the *WellRender*. The *Collars table* option reads all collars tables in the project and selects the appropriate azimuth column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate azimuth column for each borehole. Set the source to

Data table to read the *Hole azimuth column* from the currently selected table. The *Hole azimuth column* option becomes available.

If either the *Hole inclination source, Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Azimuth Column

When the *Hole azimuth source* is set to *Data table*, the *Hole azimuth column* option is available. Click on the existing column name and select the column that contains the azimuth information from the list.

Depth Units

The *Depth units* option determines the units used in the exported data file. By default, the *Depth units* are set to the same units as the units on the *Depth* column. Changing the *Depth units* allows a data file to be created with a different unit, such as meters instead of feet.

TVD Calculation Method

The *TVD calculation method* is the method used to calculate the true vertical depth. Refer to the True Vertical Depth Calculation Methods page for information on each method.

Well Color Data

The *Well color data* option determines the column in the table that sets the *Color log* option on the **Path Data** tab for the *WellRender* in **Voxler**. The *WellRender* displays various colors along the length of the log, based on the values in the selected *Well color data* column. To have the entire log displayed the same color, set the *Well color data* option to *[None]*. To use different colors, set the *Well color data* option to any of the columns listed. To change the *Well color data* option, click on the existing option and select the desired option from the list. Using a *Well color data* column can increase the time it takes to create the **Voxler** *WellRender* module.

Well Size Data

The *Well size data* option determines the column in the table that sets the *Size log* option on the **Path Data** tab for the *WellRender* in **Voxler**. The *WellRender* displays various widths along the length of the log, based on the values in the selected *Well size data* column. To have the entire log displayed the same width, set the *Well size data* option to *[None]*. To use different widths, set the *Well size data* option to any of the columns listed. To change the *Well size data* option, click on the existing option

and select the desired option from the list. Using a *Well size data* column can increase the time it takes to create the **Voxler** *WellRender* module.

Include All Data

Check the box next to *Include all data* to include all data in all columns in the existing table in the exported data file. Uncheck the box to only export the Hole ID and X, Y, and Z coordinates. The *Include all data* is checked by default.

Export Depths as Ascending

When a data table contains depth values that increase down the borehole, checking the box next to *Export depths as ascending* will make the depth values negative, so that the values increase up. This is useful when working in other programs, such as **Voxler**, **Surfer**, or **Grapher** with the exported data. As an example, a borehole that ranges from 0 at the top of the borehole to 2400 at the bottom of the borehole will be exported as 0 to -2400 when this option is checked.

OK or Cancel

Click *OK* to create the *WellRender* module in **Voxler**. Click *Cancel* to exit out of the dialog without creating the *WellRender*.

Cancel Sending Data to Voxler

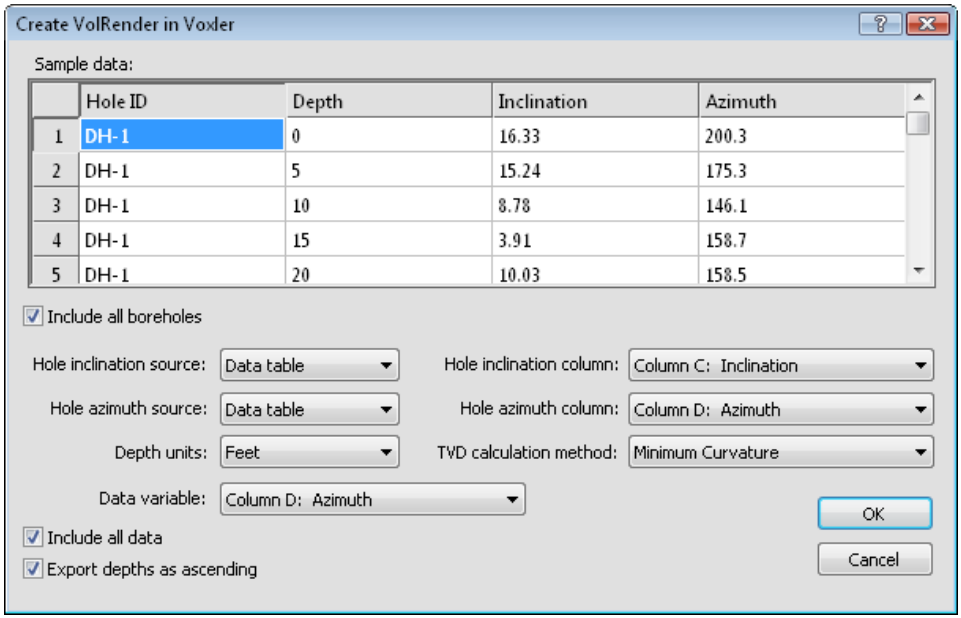
Click the *Cancel* button at the far right of the status bar to cancel the creation of the *WellRender* module in **Voxler**.

NULL Data

When the data is exported to **Voxler** to create a *WellRender*, data that contains the NULL value are not included in the well data. NULL data is ignored.

Create VolRender

Click the **Voxler | Create VolRender** command to create a *VolRender* object in **Voxler 3** (or higher). In the **Create VolRender in Voxler** dialog, set the export options and click *OK*. The data is imported into **Voxler**, gridded, and a *VolRender* module is created.



Set the inclination (or dip), azimuth, units, and well color and size and click OK.

Sample Data

The *Sample data* section contains a portion of the table. The top line contains the header row, for ease in setting the inclination (or dip), azimuth, hole ID, well color, and well size columns.

Include All Boreholes

Check the box next to *Include all boreholes* to create the *VolRender* in **Voxler** from all boreholes in the table. When the box is not checked, the *Hole ID* option becomes available.

Hole ID

When the *Include all boreholes* option is not checked, the *Hole ID* option becomes available. Click on the existing borehole name and select the appropriate borehole from the list. Only the selected borehole is exported and used for the calculations creating the *VolRender* in **Voxler**.

Hole Inclination or Dip Source

The *Hole inclination source* or *Hole dip source* contains the source of the inclination or dip column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not calculate the true vertical depth for the wells in the *VolRender*. The *Collars table* option reads all collars tables in the project and selects the appropriate inclination column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate inclination or dip column for each borehole. Set the source to *Data table* to read the *Hole inclination column* or *Hole dip column* from the currently selected table. The *Hole inclination column* or *Hole dip column* option becomes available.

If either the *Hole inclination source*, *Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Inclination or Dip Column

When the *Hole inclination source* or *Hole dip source* is set to *Data table*, the *Hole inclination column* or *Hole dip column* option is available. Click on the existing column name and select the column that contains the inclination or dip information from the list.

Azimuth Source

The *Hole azimuth source* contains the source of the azimuth column. Click on the existing table name and select the desired table from the list. Available options are *None, Collars table, Data table,* and *Survey table*. Setting the option to *None* does not calculate the true vertical depth for the wells in the *VolRender*. The *Collars table* option reads all collars tables in the project and selects the appropriate azimuth column for each borehole. The *Survey table* option reads all survey tables in the project and select the appropriate azimuth column for each borehole. Set the source to *Data table* to read the *Hole azimuth column* from the currently selected table. The *Hole azimuth column* option becomes available.

If either the *Hole inclination source, Hole dip source,* or *Hole azimuth source* is set to *Survey table*, both sources are set to *Survey table*.

Azimuth Column

When the *Hole azimuth source* is set to *Data table*, the *Hole azimuth column* option is available. Click on the existing column name and select the column that contains the azimuth information from the list.

Depth Units

The *Depth units* option determines the units used in the exported data file. By default, the *Depth units* are set to the same units as the units on the *Depth* column. Changing the *Depth units* allows a data file to be created with a different unit, such as meters instead of feet.

TVD Calculation Method

The *TVD calculation method* is the method used to calculate the true vertical depth. Refer to the True Vertical Depth Calculation Methods page for information on each method.

Data Variable

The *Data variable* option determines the column in the table that is gridded and displayed as the *VolRender* in **Voxler**. To change the *Data variable* option, click on the existing option and select the desired option from the list.

Include All Data

Check the box next to *Include all data* to include all data in all columns in the existing table in the exported data file. Uncheck the box to only export the Hole ID and X, Y, and Z coordinates. The *Include all data* is checked by default.

Export Depths as Ascending

When a data table contains depth values that increase down the borehole, checking the box next to *Export Depths as ascending* will make the depth values negative, so that the values increase up. This is useful when working in other programs, such as **Voxler**, **Surfer**, or **Grapher** with the exported data. As an example, a borehole that ranges from 0 at the top of the borehole to 2400 at the bottom of the borehole will be exported as 0 to -2400 when this option is checked.

OK or Cancel

Click *OK* to export the data and create the *VolRender*. Click *Cancel* to exit out of the dialog without creating the *VolRender* in **Voxler**.

Cancel Sending Data to Voxler

Click the *Cancel* button at the far right of the status bar to cancel the creation of the *VolRender* module in **Voxler**.

NULL Data

When the data is exported to **Voxler** to create a *VolRender*, data that contains the NULL value are included in the data created in **Voxler**. An *ExclusionFilter* is created to remove any data that contains the NULL value. The resulting gridded lattice and *VolRender* do not contain NULL information.

Chapter 4

Boreholes and the Borehole View

Borehole View

There are four different view window types available in a **Strater** workspace: borehole views, map views, cross section views, and tables. There is no limit to the number of views that can be associated with a **Strater** project.

The primary graphical component to a **Strater** document is a borehole view. A borehole view represents a collection of logs and drawing objects used to graphically display data for one or more boreholes. A borehole view may be derived from a template file or it can be created from a default view window with the necessary log items defined to create the borehole. The borehole view displays the true data for the project once data are defined in the project file.

You are presented with an empty borehole view when you first start **Strater**.

Opening a New Borehole View

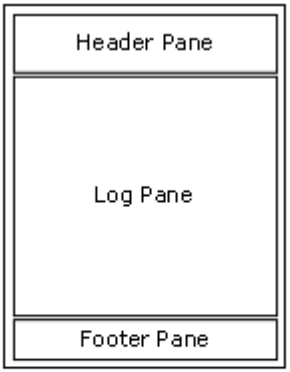
During a **Strater** session, new projects with an empty borehole view are created with the **File | New | Project** command. New borehole views in an existing project are created with the **File | New | Borehole View** command, clicking the  button, or right-clicking in the **View Manager** and selecting *New Borehole View*.

Opening an Existing Borehole View

Existing borehole views are opened by clicking the appropriate **Borehole** tab, clicking on the borehole name in the **View Manager**, or by selecting **Window | [Borehole name]**. By default, the first borehole view is named **Borehole 1** so this borehole view would be opened by choosing the **Window | Borehole 1** command. To open an existing project, use the **File | Open** command.

Panes

There are three main components of a borehole view: the log pane, header pane, and footer pane. The panes are outlined when you open a blank borehole view. The upper rectangle is the header pane, the middle rectangle is the log pane, and the bottom rectangle is the footer pane. You can change the rectangle line properties in the **View Properties**. The size of the header, log, and footer panes is defined by clicking **File | Page Setup**.



The top rectangle is the header pane, the middle rectangle is the log pane, and the bottom rectangle is the footer pane.

The header and footer panes generally contain static, unlinked information. The header and footer items are used repeatedly with minimal changes when different borehole data are applied to the view. Two objects are exceptions to the static unlinked information "rule": linked text and some scale bars. Linked text data changes as new data is applied to the view. Horizontal scale bars can be associated with some log items, a cross section, or they can be created as a stand-alone, static object. When the scale bar is linked to a log or cross section, the scale bar changes as changes are made to the linked item.

The log pane contains all the graphical log items to display the borehole data. This pane is dependent on linked tables and columns to create the graphical view. The log pane is also dependent on depth and scaling values. These values determine the size of the pane rectangle and/or the number of pages. The log pane can also contain legends, text and linked text, drawn objects, and imported images, as well.

Modes

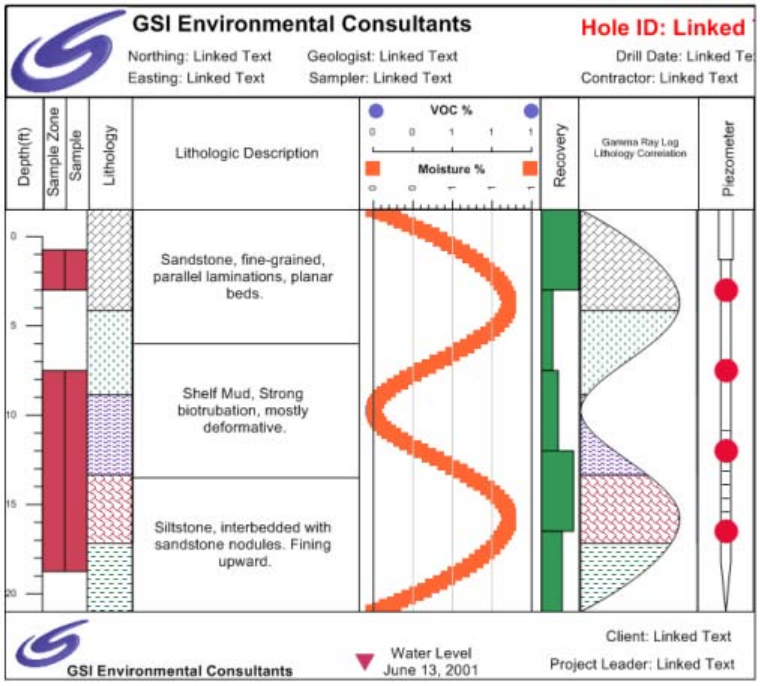
There are two "modes" in the borehole view - design mode and active mode. Design mode is used to create layouts and templates without attaching them to data. When the program is in active mode, the graphics are linked to data as they are being created.

Active Mode

An active or "live" borehole or cross section is a view window design that shows information in logs based on data in the data tables. All new boreholes created by clicking the **File | New | Project** command or clicking the  button are automatically in active mode.

Design Mode

Design mode does not automatically connect logs to associated data. This is a good option if you wish to create a borehole design, but do not have any actual data. This is also a good option if you prefer to design the borehole first and then associate data later. Instead of displaying actual data, the logs are displayed as graphical placeholders, generalized representations of the various log types. The logs displayed in design mode are fictitious and intended to give an impression of how the borehole view will look when actual data is attached. When the borehole view is switched to active mode, the logs will update with actual data.



This borehole view is displayed in design mode. The logs and linked text do not display actual data. Instead placeholders representing the logs and text appear.

Switching Between Active and Design Modes

If you open an existing borehole or cross section view and are unsure if it is active or design mode:

- Check the **Log | Design Mode** command or the toolbar button. If the button is depressed ( ) you are in design mode. To change to active mode click this command or button again.

- Look in the **Property Manager** on the **View** tab and inspect the *View Mode* option. This is a read-only option that displays either *Design mode* or *Active mode*.
- Press F4 on your keyboard to toggle between active mode and design mode.

Linking Data to the Object

When creating objects in design mode or after loading a template file, data are not associated with the objects. A borehole becomes "live" or active when data are applied.

The general steps to activate a borehole are:

1. Create objects in the borehole view.
2. Open, import, or create data.
3. To link all objects to a single borehole:
    a. Click the **View | View Properties** command.
    b. Click on the **View** tab in the **Property Manager**.
    c. Next to *Hole ID Filter*, click on the existing option and select the desired borehole name from the list.
4. To link objects to different boreholes:
    a. Click on the object in the borehole view or in the **Object Manager**.
    b. Click on the **Base** tab in the **Property Manager**.
    c. Next to the *Hole ID Filter* field, click on the existing option and select a borehole name from the list.
5. In the **Property Manager** edit the properties including data tables, data columns, and schemes.
6. Switch to active mode by clicking the **Log | Design Mode** command or the  button.

Many objects, such as drawing shapes and text boxes, are not associated with a specific borehole ID.

If all objects are properly linked to data and the borehole scaling values are correct, the place holders in the borehole view change to display your data. If the data or borehole scaling values are not correct for the log you may end up with a blank log. Check the data and borehole **View Properties** in the event of a blank log.

Objects

Objects are any individual log type, shape, or text that appears in the borehole view. All objects in a borehole view are listed in the **Object Manager** where they are categorized by the borehole view pane in which they appear.

Visible boreholes in the borehole view can consist of multiple objects, including log type, legend, scale bar, a depth log, titles, text boxes, and rectangles to hold the text. Each instance of each of these items is a separate object, and are listed separately in the **Object Manager**.

Types of Logs

Strater creates 14 different types of logs in the borehole view: bar logs, classed post logs, complex text logs, crossplot logs, depth logs, function logs, graphic logs, line/symbol logs, lithology logs, percentage logs, post logs, tadpole logs, well construction logs, and zone bar logs. Refer to chapters 8 through 21 for specific information about each log type.

Logs are graphical displays of subsurface data. Displaying logs requires a borehole design, data, and (for some log types) schemes. Logs are displayed in the log pane of a borehole view, and logs for more than one borehole can be represented in a single borehole view. You can have multiple borehole views in each project file.

Creating a Log in the Borehole View

To create log objects:

1. For logs, click the **Log | [object type]** command.
2. Click in the borehole view where you want the object to appear. Log items can be placed in the log pane only; move the  cursor to the desired location. If an object cannot be placed in the position where the cursor is located, a  cursor appears.
3. If the borehole is in active mode, a prompt appears to select data when creating a log item. You can select new data in the **Open** dialog or select the existing data from the *Use Current Table* section.
4. Click the *Open* button.

Types of Drawing Objects

Scale bars, titles, linked text, drawing objects, legends, and images can be added to the borehole view at any location. Refer to *Chapter 22 – Drawing Objects* for additional information on these object types.

Creating Drawing Objects

To create drawing objects in the borehole view:

1. Click the **Draw | [object type]** command.
2. Click on the screen where you want the object to be located. If an object cannot be placed in the position where the cursor is located, a  cursor appears.
3. If **Insert Map View** is selected and several map views exist in the project, select the desired map view and click *OK*.

Borehole View Properties

To view the general settings for a borehole view in the **Property Manager**,

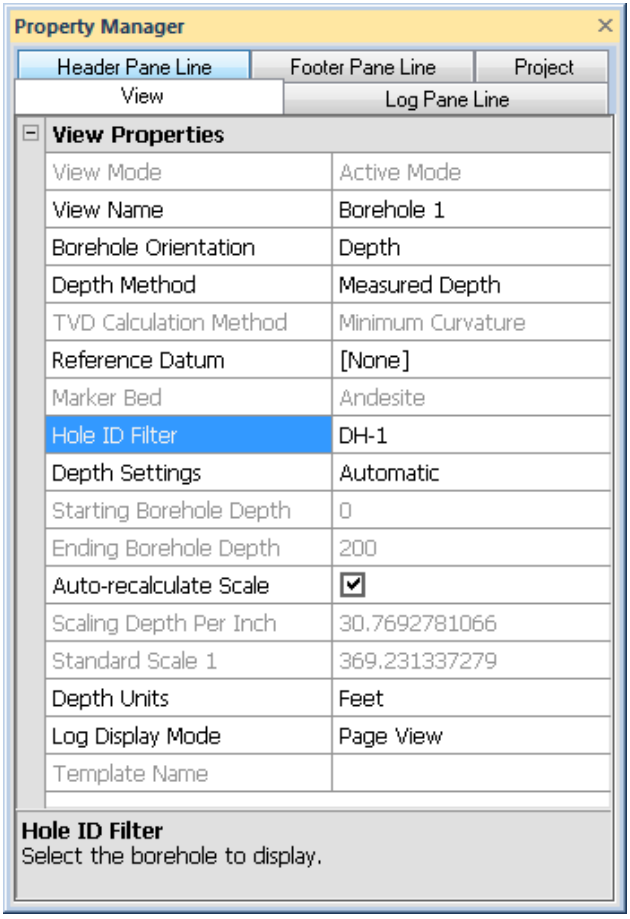
- Click the **View | View Properties** command,
- Click **Edit | Deselect All**,
- Click the  button,
- Click on the view name in the **View Manager**,
- Right-click on the view name in the **View Manager** and choose ***View Properties***, or
- Click the mouse in any white space in the borehole view that is not part of a log or object.

The borehole **View Properties** in the **Property Manager** contain the basic settings for the borehole view, including the view name, view data range, scaling, units, display mode, and the associated template name (if any). You can also define the line styles of the panes and define a project null value in the borehole **View Properties**.

The borehole **View Properties** consists of five tabs: **View**, **Log Pane Line**, **Header Pane Line**, **Footer Pane Line**, and **Project**.

View Properties

The **View** tab contains the borehole and depth options.



*Use the **View** tab to set depth options and the borehole ID.*

View Mode

This is a read-only field that displays whether the current project is in design mode or active mode. Design mode is used to create graphics without attaching them to data. Design mode is useful when designing complex logs or when designing templates. When the program is in active mode, the graphics are linked to data as they are being created.

Toggle back and forth between design mode and active mode with the **Log | Design Mode** command or by clicking the  button.

View Name

The *View Name* is the label that appears in the borehole view tab to the left of the colon. **Strater** projects can contain multiple borehole views, such as monitoring well views and sampling well views. *View Name* is a way to separate the various views from one another and to clearly identify the view. The default name of the tab is *Borehole 1: X*, in which *X* is the current *Hole ID Filter* (described below). To change the view name, highlight the existing name and type the new desired name of the view in the *View Name* field.

Borehole Orientation

The *Borehole Orientation* tells **Strater** whether values in the depth column increase down or up. To change the orientation, click on the existing option and select the desired option from the list. Set the borehole orientation to *Depth w*hen the *Starting*

Borehole Depth is less than the *Ending Borehole Depth.* Set the borehole orientation to *Elevation* when the *Starting Borehole Depth* is greater than the *Ending Borehole Depth.*

The borehole view orientation will automatically change to reflect the current *Starting Borehole Depth* and *Ending Borehole Depth.* For example, if the borehole orientation was originally set to *Elevation* and a user changed the start depth to be less than the end depth, the borehole orientation field automatically changes to *Depth*.

Depth Method

The *Depth Method* sets the display of the view to either *Measured Depth* or True Vertical Depth. The *Measured Depth* is the depth values from the tables. The *True Vertical Depth* is calculated from the depth values in the tables and the azimuth and inclination (or dip) values using the *TVD Calculation Method*. To change the *Depth Method*, click on the existing option and select the desired option from the list.

All logs except for depth logs are displayed using the specified depth method.

TVD Calculation Method

When the *Depth Method* is set to *True Vertical Depth*, the displayed depth value is calculated using the depth from the table and the azimuth and inclination (or dip). The *TVD Calculation Method* determines how the values are combined to get the true vertical depth. Available options are *Tangential, Average Tangential, Balanced Tangential, Radius of Curvature,* and *Minimum Curvature*. The default is *Minimum Curvature*, which provides a good estimate of the true vertical depth. To change the calculation method, click on the existing option and select the desired option from the list.

Reference Datum

The *Reference Datum* is the surface on the earth that defines the vertical reference for all wells in the borehole view. Changing the reference datum results in the logs in the borehole view being regenerated and "hung" on a different marker. The logs hang on an imaginary horizontal line that runs across the borehole view. The reference datum follows this horizontal line. To change the *Reference Datum*, click on the existing option and select the desired option from the list. Available options are *[None], Mean Sea Level,* and *Marker Bed*. Selecting *[None]* plots all logs at the starting depth. Elevations are not considered. *Mean Seal Level* places sea level (elevation = 0) on the horizontal line. All other locations vary based on depths and elevations from seal level. The wells in the borehole view will be placed at their respective elevations, as entered in the collars table. *Marker Bed* places the horizontal line at the top of the selected layer in the borehole view.

If you change the *Reference Datum* to either *Mean Sea Level* or *Marker Bed* and if the *Depth Settings* are set to *Collars Table* or *User Defined*, then the *Starting Borehole Depth* and *Ending Borehole Depth* values will not be updated. This may result in parts of the borehole view being created off the visible page.

Marker Bed

When the *Reference Datum* is set to *Marker Bed*, the *Marker Bed* option becomes available. This is the level in the borehole view that defines how all logs are compared. The marker bed is the bed that is at the same vertical location across the borehole view and all logs.

Hole ID Filter

The *Hole ID Filter* displays the name of the Hole ID when every log pane item in the borehole view represents a single Hole ID. If there is more than one borehole represented in the logs and you have not selected an object in the log pane, the *Hole ID Filter* displays *-Multi-.* To change the Hole ID of all objects in the log pane, click the text next to *Hole ID Filter* and select the desired Hole ID from the list. When selected, all objects in the log pane will display information based on this selected Hole ID.

When the Hole IDs for all log items in the borehole view are changed to a single Hole ID the *Hole ID Filter* field automatically changes to reflect the revised single hole ID.

Depth Settings

The *Depth Settings* option controls the starting and ending borehole depths displayed in the borehole view. There are three options: *Automatic, Collars Table,* and *User Defined.* To change the *Depth Settings*, click on the existing option and select the desired option from the list.

- By default, the *Depth Settings* option is set to *Automatic*. When the *Depth Settings* option is *Automatic*, **Strater** scans the existing data tables to determine the starting and ending borehole depths that will fit all data.

  When the *Depth Settings* option is set to *Automatic* and the *Depth Method* is set to *True Vertical Depth*, the inclination (or dip) field in the depth or interval table is used to calculate the overall true vertical depth. If the inclination (or dip) field is missing from the depth/interval table, then the inclination (or dip) field from the collars table is used. If the inclination (or dip) field is missing from the collars table, the inclination (or dip) value of 0 is used.
- When the *Depth Settings* option is set to *Collars Table*, the starting and ending borehole depths are retrieved from a collars table. You can also specify the scale

of the borehole view in a collars table. Select a borehole in the *Hole ID Filter* list to update the *Automatic* and *Collars Table* selections.

When the *Depth Settings* option is set to *Collars Table* and the *Depth Method* is set to *True Vertical Depth*, the inclination (or dip) field in the collars table is used to apply the starting and ending depths. If the inclination (or dip) field in the collars table is missing, the inclination (or dip) value of 0 is used.

- When the *Depth Settings* option is set to *User Defined*, the *Starting Borehole Depth* and *Ending Borehole Depth* are available.

When the *Depth Settings* option is set to *User Defined* and the *Depth Method* is set to *True Vertical Depth*, the inclination (or dip) field in the depth or interval table is used to calculate the overall true vertical depth. If the inclination (or dip) field is missing from the depth/interval table, then the inclination (or dip) field from the collars table is used. If the inclination (or dip) field is missing from the collars table, the inclination (or dip) value of 0 is used.

Starting Borehole Depth

If the *Depth Settings* option is set to *User Defined*, you can specify the starting borehole depth. The *Starting Borehole Depth* is the depth to begin the data display. If the *Starting Borehole Depth* is greater than zero, the *Ending Borehole Depth* must be greater than the starting value. Likewise, if the *Starting Borehole Depth* is less than zero, the *Ending Borehole Depth* must be less than the starting value. If the *Starting Borehole Depth* is zero, the *Ending Borehole Depth* can be either negative or positive.

Ending Borehole Depth

If the *Depth Settings* option is set to *User Defined*, you can specify the borehole range. The *Starting Borehole Depth* is the depth to begin the data display and the *Ending Borehole Depth* is the ending depth for data display. If the *Starting Borehole Depth* is greater than zero, the *Ending Borehole Depth* must be greater than the starting value. Likewise, if the *Starting Borehole Depth* is less than zero, the *Ending Borehole Depth* must be less than the starting value. If the *Starting Borehole Depth* is zero, the *Ending Borehole Depth* can be either negative or positive.

Auto-recalculate Scale

Uncheck the box next to the *Auto-recalculate Scale* option if you want to manually adjust the *Scaling Depth per Centimeter/Inch* and the *Standard Scale 1* fields. Check the box next to *Auto-recalculate Scale* to not edit these fields. **Strater** will automatically calculate the scale of the log display so that all data fits on a single

page. When these are automatically set by checking the *Auto-recalculate Scale* option, the entire borehole fits in a single page.

Scale Depth Per Inch/Centimeter

Use the *Scaling Depth Per Inch* (or *Centimeter*) to scale the borehole in units of measurement on the physical page. This value must be greater than zero. The page length limit is 2000 inches. To change the units between inches and centimeters use the general settings in the Options dialog.

Standard Scale 1

The *Standard Scale 1* displays the ratio between the scale depth per inch and the depth units you select. For example, if the *Scaling Depth Per Inch* is set at 2 and the depth units are *Feet* the standard scale automatically displays *24*, which is the number of inches per unit of depth (12 inches in a foot) multiplied by the scale depth per inch (2).

If you change the standard scale 1 number, the scale depth per inch automatically changes as well. For example, if you change the standard scale 1 number from 24 to 36 the scale depth per inch value changes to 3. If you change the depth unit to *meters* the standard scale value changes to 118.11, which is the number of inches in 3 meters.

Depth Units

Select the borehole unit type from the *Depth Units* list. The units selected here are the units of the data in the data table and are the base units for the depth log.

Log Display Mode

The *Log Display Mode* shows the current borehole in either *Page View* or *Full View*.

Page View separates the log into multiple pages with page breaks. The header and footer can be shown on each page, on only the first or last pages, or not at all by setting the display and size of the panes in the Page Setup dialog. If the *Log Display Mode* is set to *Page View* select View | Page or click the  buttons to move among the pages.

The *Full View* shows the header and footer but expands the log pane to show the whole length of the log with no page breaks.

Template Name

The *Template Name* shows the template name, if any, attached to this borehole view. This is a read-only field.

Log Pane Line / Header Pane Line / Footer Pane Line Properties

Use these tabs to adjust the line properties that surrounds each pane. Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

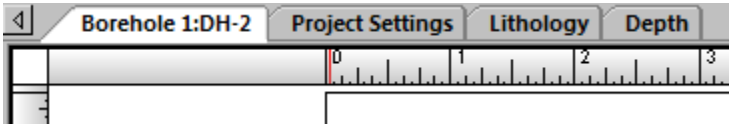
Project Properties

The **Project** tab allows you to store a null value with the **Strater** file .SDG, and this value can be different from the null value set in **Tools | Options**. This *NULL Data Value* setting overrides the null value in **Tools | Options**.

Multiple Boreholes in the Borehole View

Strater permits multiple boreholes to appear in the same borehole view. You can define multiple boreholes with a single table, distinguished by a hole ID, or you can create several tables that define different boreholes in each table. This allows you to quickly change the borehole graphics in the borehole view.

Appended to the borehole view name is the borehole ID associated with the data displayed in the view. In the following example, the Hole ID of this borehole view is **DH-2**:



Click the borehole tab at the top of the ***Strater*** *window to open a borehole view.*

If there is more than one borehole represented by the logs in a borehole view, the associated borehole view tab's name ends with *-Multi-*.



If there is more than one borehole in the borehole view, the label of the tab reads -Multi-*.*

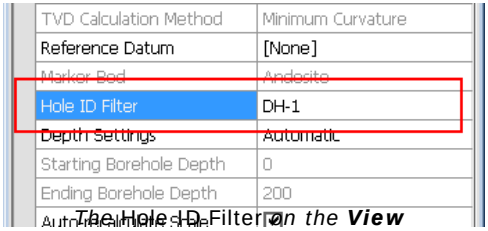
The concept and functionality is easy – users import data for multiple wells, add logs and then associate the new log with the appropriate borehole data.

A **Strater** project can include multiple boreholes with many data attributes:

- You can import data from a single data file that has data from multiple boreholes into a project.
- You can import data from multiple source data files with each data file including one or more borehole.
- If importing data from multiple files, you also have the choice to import all the data together into one data table, or you can import each file into a separate data table.
- You can import an LAS file for one borehole into one data table, and import another LAS file for a different borehole into a different data table.
- You can easily change the borehole data source for a particular log to any borehole whose data is imported into the project.

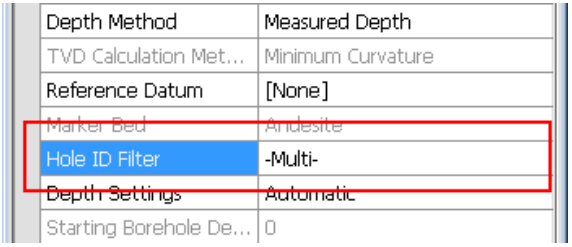
For this example we use the file *Mining Example-1.sdg*, which is found in the Samples folder in the installation folder for the **Strater** software. The default directory is C:\Program Files\Golden Software\Strater 4\Samples.

1. Click the **File | Open** command or click the  button.
2. In the **Open** dialog, select the *Mining Example-1.sdg* file and click *Open*.
3. Click on the *Interval* data tab.
4. Scroll down and note the contents of the *Hole ID* column. There are two different borehole Hole IDs in this one data table: DH-1 and DH-2. There is no limit to the number of separate boreholes that can be part of a single data table.
5. Click the *Mining: DH-1* tab.
6. Click the **View | View Properties** command to view the borehole **View Properties** in the **Property Manager**.
7. Notice the content of the *Hole ID Filter* field: *DH-1*, indicating that all logs in the view window are associated with the *DH-1* Hole ID.
8. Let's change the borehole associated with one of the logs in the log pane from DH-1 to DH-2. Select the log *Mo %* in the view window or in the **Object Manager**.
9. In the **Property Manager**, click on the **Base** tab.

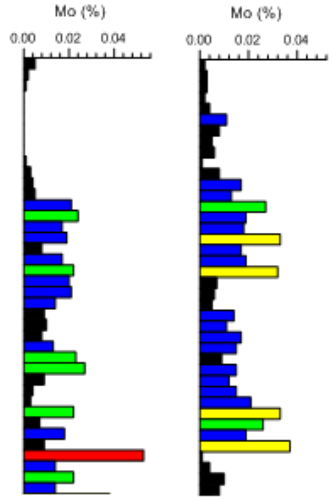


*The Hole ID Filter on the **View** tab displays the Hole ID of the borehole associated with the logs in the view window.*

10. Click on the *DH-1* text next to the *Hole ID Filter* option. A list is displayed that contains all borehole IDs found in every data table currently imported in the project. Select *DH-2* from the list.
11. Notice how the data in log *Mo %* has changed.
12. Click the **View | View Properties** command to view the borehole **View Properties** in the **Property Manager**.
13. Look in the *Hole ID Filter* field:



The Hole ID Filter field shows which borehole is associated with the currently selected object in the log pane. If no object is selected, -Multi- is displayed.



When you change the Hole ID Filter *in the* ***Property Manager*** *the log changes from the original DH-1 data (left) to DH-2 data (right).*

14. The *-Multi-* term indicates that there are multiple boreholes whose data is part of the logs in this borehole view, and that no single object in the log pane is currently selected. *-Multi-* is shown whenever there is data from more than one Hole ID in any log currently displayed in the log pane.

Adding a Log from a Different Borehole to an Existing Project

Adding a log with a different borehole ID is simple. **Strater** makes no distinction to adding data from any borehole. As an example we will add data from a third borehole to this existing project.

This example uses the data file TUTORIAL 2.XLS, which is located in the Samples folder in the installation folder for **Strater** software. The default directory path is C:\Program Files\Golden Software\Strater 4\Sample.

1. Click the **Log | Zone Bar** command or click the  command to add a zone bar log to the view.
2. Place the cursor on the right side of the log pane and click the mouse button.
3. In the **Open** dialog, select the *Tutorial 2.xls* file and click *Open*.

4. In the **Specify Worksheet Column Definitions** dialog, notice in the *Data File Preview* section that the *Hole ID* of the data is *W17.* Click *Next*.
5. In the **Specify Data Type and Column Positions** dialog, make sure the columns are specified correctly and click *Finish*.

The new zone bar log uses the data from the specified data file, which contains only one well: *W17*. The new zone bar log uses the *W17* data.

Updating Borehole Data

With a borehole view or cross section view active, click the **Edit | Update Borehole Data** command, click the  button, or press CTRL+F5 on the keyboard to force a redraw of the view window after changing the data. This is not normally necessary, as views normally update automatically.

Chapter 5

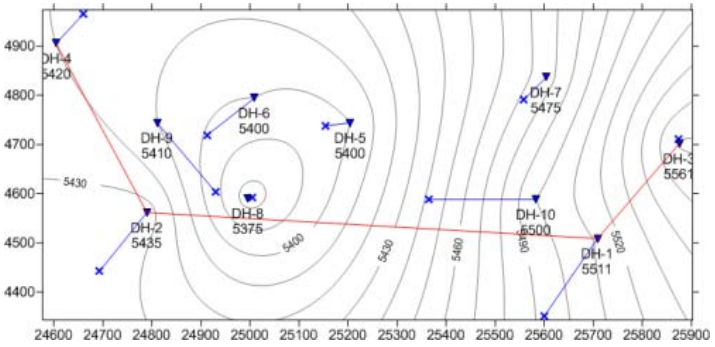
Maps and the Map View

Map View

There are four different view window types available in a **Strater** workspace: borehole views, map views, cross section views, and tables. There is no limit to the number of views that can be associated with a **Strater** project.

Map views graphically display wells or base map files on a map. Map views display any wells listed in the collars table as a symbol on the map. Each well in the collars table is displayed as a separate symbol. Wells can display deviation as a line with a symbol at the end of the well or only show the collar location of the well. Wells can be edited as a group or individually. Wells can be removed individually to customize the appearance of the map view. Map views also can display base maps, such as field outlines or exported **Surfer** maps. The map also contains a set of four axes, that can be edited individually. Drawing objects and labels can be added to a map view.

Map views can have maps from different projections and can convert the map into any supported projection. All map layers are positioned according to the map layer's coordinate system. Each layer can have a separate source coordinate system. All layers are reprojected into the *Map* target coordinate system.



This map view contains wells with names and elevations, a well selector line, and a contour map loaded as a base map.

Opening a New Map View

New map views in an existing project are created by clicking the **File | New | Map View** command, clicking the  button, pressing CTRL+M on the keyboard, or right-

clicking in the **View Manager** and selecting *New Map View*. A new blank map view is created.

Opening an Existing Map View

Existing map views are opened by clicking the appropriate **Map** tab, clicking the map view name in the **View Manager**, or by clicking **Window | [Map name]**. By default, the first map view is named **Map 1** so this map view would be opened by clicking the **Window | Map 1** command.

Creating Map Layers

Create the first map layer with the **Map | Create Well Map** or **Map | Create Base Map** command.

If creating a well map and a single collars table already has been created, the map view automatically uses that Collars table. If no Collars table exists, you are prompted for the data file. A Collars table is automatically created. If multiple Collars table exist, you are prompted to select one table.

If an existing map has already been created and the well map or base map should be added to the existing map, click the **Map | Add Well Layer** or **Map | Add Base Layer** commands. If the **Create Well Map** or **Create Base Map** command is used and a blank map view is available, the map is created in that map view, otherwise, the map is created in a new map view.

Parts of a Map

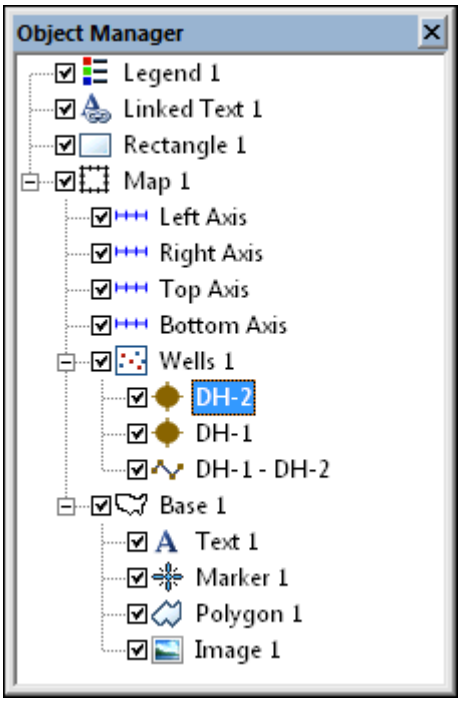
The **Object Manager** in map view window contains all of objects that are in the view. Drawn objects, such as rectangles, legends, and text appear in the **Object Manager**. When a well map or base map is created, a map object, several axis objects, and various map layers are also created.

Map Object

The *Map* object is created when a new well map or base map is created in the map view. The *Map* object controls properties for the entire map. This include the scale, limits, and target map projection for the entire map and the line, fill, symbol, and font properties for features on the map. These default properties control all of the objects in the map that have not been specifically changed.

Axes

The *Left Axis, Right Axis, Top Axis,* and *Bottom Axis* are the axes that surround the map object. Click on any axis to set the axis properties in the **Property Manager**. The ticks, title, labels, axis lines, and grid lines can be edited for each axis individually. The location of the of the cursor in axis coordinates is shown in the status bar.



*The **Object Manager** contains a list of all objects in the map view. The individual well* DH-2 *is selected in this example.*

Base Layer

The *Base* layer is created when a new base map is created or when a base map is added to an existing map. The *Base* layer controls properties for all items in the base map. To see a list of all of the items in the base layer, click the ⊞ next to *Base* in the **Object Manager**. Depending on the items in the base layer, clicking on *Base* in the **Object Manager**, there could be a **Line**, **Fill**, **Symbol**, **Font**, and **Coordinate System** tab available for the *Base* layer. Changing these properties changes the properties for all items in the base map. To change an individual item in the base layer, click on that item in the list and make the changes in the **Object Manager**. Multiple base map layers can be added to a *Map* with the **Map | Add Base Layer** command.

Wells Layer

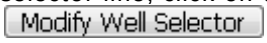
The *Wells* layer is created when a new well map is created or when a well map is added to an existing map. The *Wells* layer controls properties for all items in the wells map. To see a list of all of the items in the well layer, click the ⊞ next to *Wells* in the **Object Manager**. Depending on the items in the well layer, clicking on *Wells* in the **Object Manager**, there could will be a **Wells**, **Deviation Path**, **Symbol**, **Label**, **Line**, and **Coordinate System** tab for the *Wells* layer. Changing these properties changes the properties for all wells and well selector lines in the *Wells* map. To change an individual well or well selector line, click on that item in the list and make the changes in the **Object Manager**. Multiple well map layers can be added to a *Map* with the **Map | Add Well Layer** command.

Well Item

An individual well item can be selected from the list. The well's symbol and label properties can be set separately from all other objects in the *Wells* list. To make changes to individual well symbols, uncheck the *Use Keyword Scheme* item on the Symbol page for the *Wells* item. The label location properties for each individual well can be changed by clicking on the individual well and setting the layout options on the **Label Layout** tab. Individual wells can be removed by clicking on the well and pressing the DELETE key on the keyboard.

Occasionally, a *Wells* layer will not update properly, leaving a deviation path for the well, but removing the well symbol when changing the visibility of an individual well in the **Object Manager**. When this happens, click the **Tools | Options** command. Click on General on the left side of the dialog. On the right side, check the box next to *Reload Data When Opening Project*. Close the file and reopen it. The wells will display properly.

Well Selector Line

A well selector item is added to the *Wells* layer with the **Map | Add Well Selector** command. A *Wells* layer must be selected before this command can be used. Individual well selector line properties can be altered by clicking on the well selector line in the **Object Manager**. To add, delete, or rearrange the order of wells in the well selector line, click on the **Well Selector** tab in the **Property Manager** and click the 

button.

Map View Properties

To view the general settings for a map view in the **Property Manager**,

- Click the **View | View Properties** command,
- Click **Edit | Deselect All**,
- Click the  button,
- Click on the view name in the **View Manager**,
- Right-click on the view name in the **View Manager** and choose *View Properties*, or
- Click the mouse in any white space in the map view that is not part of a map or object.

The map view settings contain the name of the map view.

Common Map Properties

Some map properties edit the entire map view. These include the scale, limits, and coordinate system for the entire map and the symbol and line properties for features on the map. Individual symbols and lines can be changed, but these default properties control all of the objects that have not been specifically changed.

Scale

Map scale controls the size of a map on the printed page. This is accomplished by defining a correspondence between length on the map (in map units) and length on the printed page (in page units). For example, one mile on the map corresponds to one inch on the page. The map scale is set using the **Scale** tab in the **Property Manager**. The map scale for the X axis and the map scale for the Y axis can be set in unison (proportionally), or they can be set independently.

Axes are part of the map on which they are drawn. Therefore, when the scale is redefined, the axes are modified accordingly. Because **Strater** calculates reasonable tick spacing based on the map lengths and map limits, redefining the scales can result in different tick spacing along the axis.

Default Scale

By default, map scales are defined proportionally in the X and Y dimensions, with the longest side almost filling the printed page.

Resizing Maps

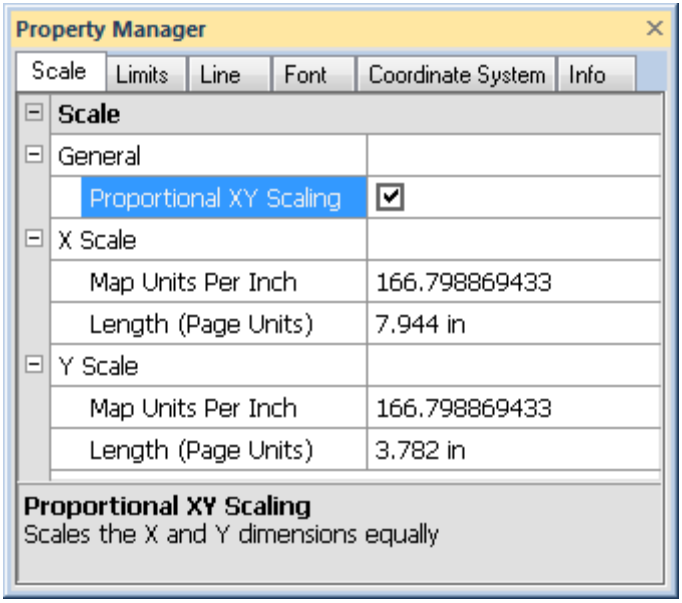
One method to resize the map is to use the **Scale** tab and set the size. These options are described below.

Another method is to click on the *Map* object. Click and drag one of the corners of the map to resize the map proportionally. To resize the map non-proportionally, click on one of the side handles when the map is selected. The map scale is automatically updated to show the new size. The *Proportional XY Scaling* box is automatically unchecked if the sides are moved.

Another method of resizing maps is to type in the size and location in the *Position/Size* toolbar. This resizes all selected items. The **Scale** tab is automatically updated to reflect the new size.

Scale Properties

The **Scale** page is located in the map properties. To set the scale, click on the *Map* object in the **Object Manager** to select it. In the **Property Manager**, click on the **Scale** tab.



*Set the X and Y scale for the map on the **Scale** tab.*

Proportional XY Scaling

The *Proportional XY Scaling* option ensures that the X and Y dimensions are scaled equally. When the box is checked, a change in either the X or Y dimension is reflected in the other dimension by a proportional amount. To scale the axes independently, uncheck the box.

X Scale and Y Scale

The *X Scale* and *Y Scale* sections specify the scale along the indicated axis.

Each axis can be scaled independently. When the *Proportional XY Scaling* box is checked, any changes made to the scale for the X or Y dimensions is automatically reflected in the other dimension.

Map Units Per Inch

The *Map Units Per Inch* or *Map Units Per Centimeter* option sets the number of map units per page unit in the associated dimension. For example, to draw a map at a scale of 1000 map units per inch, type the value 1000 into the box. The *Length (Page Units)* value is automatically updated to reflect the change. For example, if the map is 8000 units in the dimension you are setting, the map is 8 inches long in that dimension.

Length

The *Length (Page Units)* option sets the length of the map in the X or Y dimension. When the *Length (Page Units)* value is changed, the *Map Units Per Inch* or *Map Units Per Centimeter* box is automatically updated to reflect the change.

Limits

Map limits are defined as the X and Y extents of the map. When a map is first created, the map limits are set to the minimum and maximum X and Y coordinate values of the collars table used to create the map. You can accept these as the limits for the map, or you can specify custom limits using the **Limits** page. Custom limits are useful when plotting only a portion of a map.

Limits and Map Scale

When new map limits are defined for a map, the map scale is not changed. For example, if the map uses a scaling of 1 inch = 1000 meters, the new map uses this same scale. This can result in maps much smaller or larger than the original map. In this case, click on the map and set the new scale on the **Scale** page.

Limits and Changing Coordinate Systems

If the map has custom limits and an unreferenced coordinate system, changing the coordinate system will change the map limits to the default limits.

If the map has custom limits and is currently referenced, changing the coordinate system will not change the map limits to the default limits. Instead, the axis limits are converted to the new coordinate system and properly limited in the new coordinate system.

Symbols or Labels Cutoff

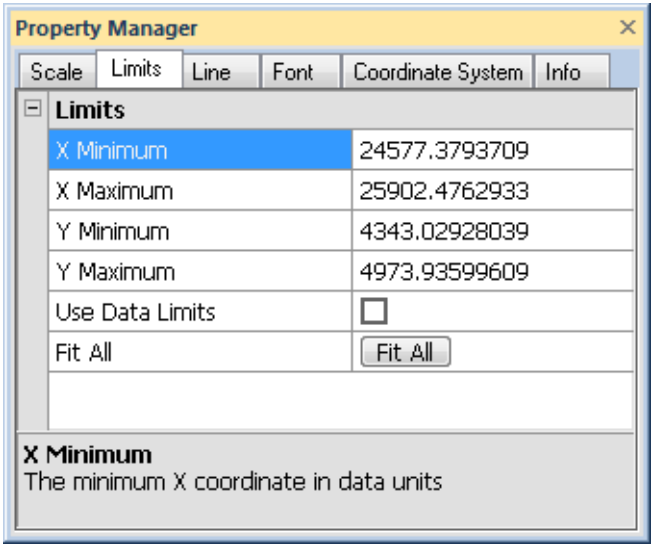
Limits can be set on maps to values that are smaller than the entire collar extents. When a well lies outside the map limits, a portion of the symbol or label may still appear on the map. The symbol and label will not extend beyond the limits. If a partial symbol or label is visible, the limits may need to be altered.

Limits, Scale, and Visible Layers

When a new base map or Wells map layer is added to an existing map, the map limits automatically adjust to use all of the data limits from all layers. If the locations change in the Collars table so that no items are visible, the map limits automatically adjust to show all of the objects.

Limits Properties

The **Limits** page is located in the map properties.



*Specify the map limits in the **Property Manager** on the **Limits** page.*

X Minimum

Set a custom *X Minimum* value by highlighting the existing value and typing a new value. The value is in X data units (easting, longitude, etc). The minimum value must be less than the maximum value.

X Maximum

Set a custom *X Maximum* value by highlighting the existing value and typing a new value. The value is in X data units (easting, longitude, etc). The maximum value must be greater than the minimum value.

Y Minimum

Set a custom *Y Minimum* value by highlighting the existing value and typing a new value. The value is in Y data units (northing, latitude, etc). The minimum value must be less than the maximum value.

Y Maximum

Set a custom *Y Maximum* value by highlighting the existing value and typing a new value. The value is in Y data units (northing, latitude, etc). The maximum value must be greater than the minimum value.

Use Data Limits

Check the box next to the *Use Data Limits* option to reset the map limits to the limits of all base map and Wells layers. The scale of the map does not change automatically, so a change may be necessary on the Scale tab.

Fit All

Click the Fit All button to adjust the map limits to fit all of the objects into the view. This extends the minimum and maximum values so that all labels and symbols are fully visible.

Coordinate System

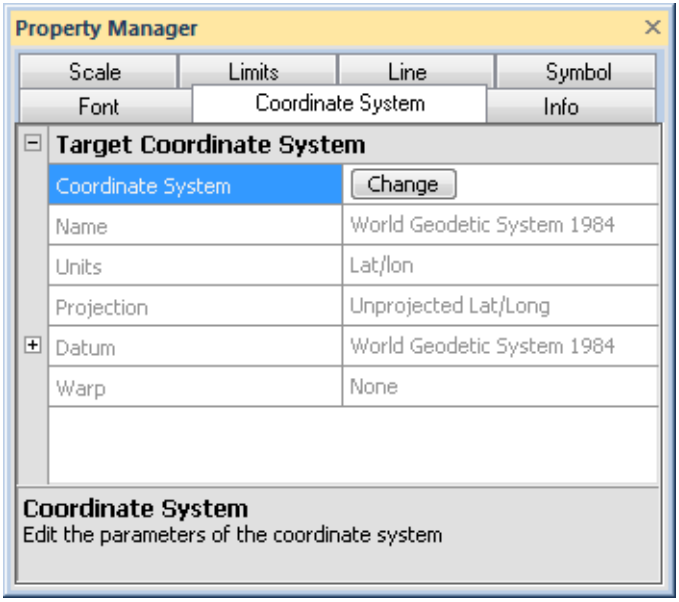
Maps can be displayed in any coordinate system. The map is displayed in the coordinate system defined as the *Target Coordinate System* for the map. A coordinate system has a defined projection and datum. If some map layers are using a different coordinate system than the map's target coordinate system, the layer is converted to the map's *Target Coordinate System*. The map's *Target Coordinate System* is the new coordinate system that you want to use to project your X, Y coordinate data.

The **Coordinate System** page is located in the **Property Manager** when a *Map* object is selected.

Coordinate System

Click the *Change* button next to *Coordinate System* to open the **Assign Coordinate System** dialog. This dialog lets you set the desired target coordinate system. This is the coordinate system in which you want the map to be displayed.

The coordinate systems and projections are discussed in *Chapter 27 – Coordinate Systems and Map Projections*.



*Specify the map coordinate system on the **Coordinate System** page.*

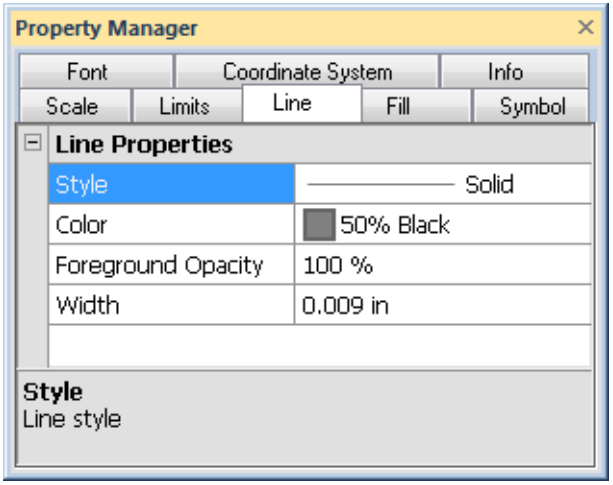
Map Limits and Changing Coordinate Systems

If the map has custom limits and an unreferenced coordinate system, changing the coordinate system will change the map limits to the default limits.

If the map has custom limits and is currently referenced, changing the coordinate system will not change the map limits to the default limits. Instead, the axis limits are converted to the new coordinate system and properly limited in the new coordinate system.

Line Properties

The **Line** page in the map properties lets you define the line properties for all items in the *Map*. Changing this option overwrites any custom line properties and changes all objects in the *Map* to use the new line properties. All well selectors, base maps, and axes will use the new line properties.



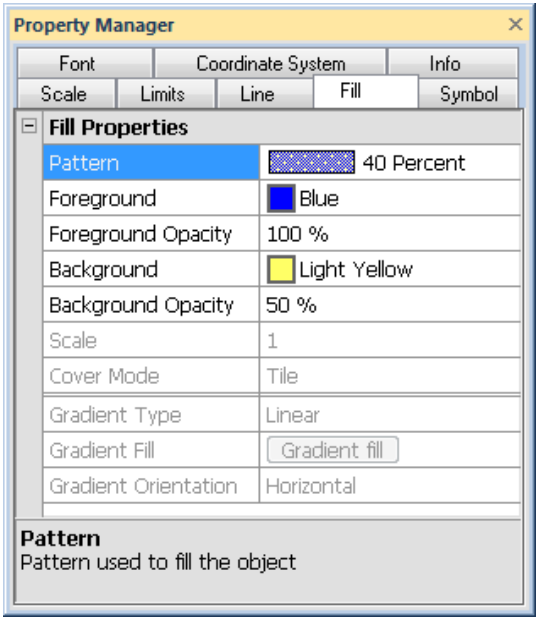
Set the line properties for all items in the Map *by changing the options on the* ***Line*** *tab in the* ***Property Manager*** *when the* Map *is selected.*

To change an object's line properties separately, click on either the map layer (*Base*, *Wells,* or *Axis*) and change the line properties for that item individually.

Refer to *Chapter 22 – Drawing Objects* for information about the line properties.

Fill Properties

The **Fill** page in the map properties lets you define the fill properties for all items in the *Map*. Changing this option overwrites any custom fill properties and changes all polygons to use the new fill properties.



Set the fill properties for all items in the Map *by changing the options on the* ***Fill*** *tab in the* ***Property Manager*** *when the* Map *is selected.*

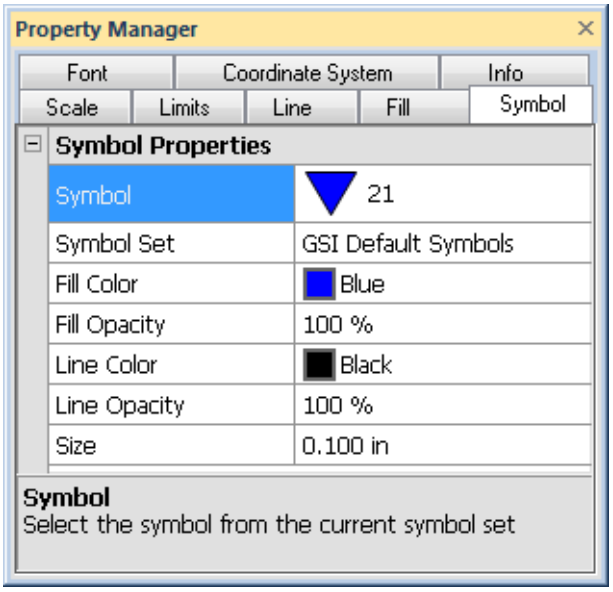
To change an object's fill properties separately, click on either the map layer (*Base*, *Wells,* or individual polygon) and change the fill properties for that item individually.

Refer to *Chapter 22 – Drawing Objects* for information about the fill properties.

Symbol Properties

The **Symbol** page in the map properties lets you define the symbol properties for all items in the *Map*. Changing this option overwrites any custom symbol properties, including symbols defined with a keyword scheme. The symbol properties control the default look of all wells in the map.

To change an object's symbol properties separately, click on either the map layer (*Base*, *Wells,* or individual *Symbol*) and change the symbol properties for that item individually.



Set the symbol properties for all items in the Map *by changing the options on the* ***Symbol*** *tab in the* ***Property Manager*** *when the* Map *is selected.*

If the *Map* symbol properties or well symbol properties are not available, a keyword scheme may be in use by the *Wells* layer. To turn off the display of the keyword scheme, click on the *Wells* layer to select it. Click on the **Wells** tab. Uncheck the box next to *Use Keyword Scheme for Symbols* option and the wells can be set to the symbol from the *Map* or individual wells edited separately.

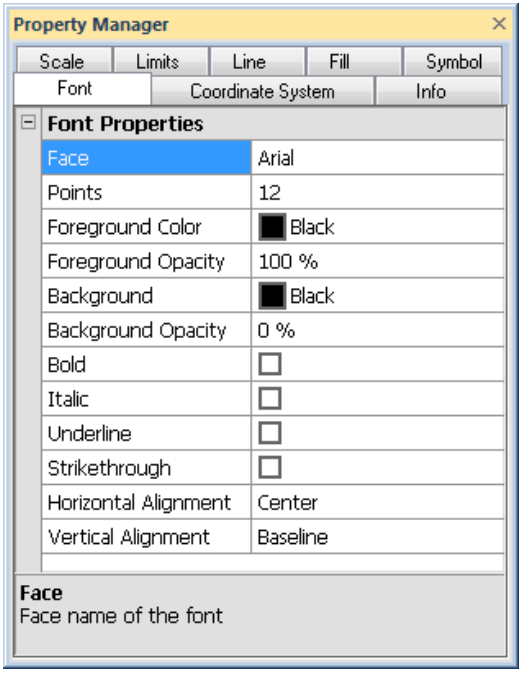
Refer to *Chapter 22 – Drawing Objects* for information about the symbol properties.

Font Properties

The **Font** page in the map properties lets you define the font properties for all items in the *Map*. Changing this option overwrites any custom text properties. The font properties control the default text for all labels and text in the map.

To change an object's font properties separately, click on either the map layer (*Base* or *Axis*) or the individual item and change the font properties for that item individually.

Refer to *Chapter 22 – Drawing Objects* for information about the font properties.



The Font *section displays the options for setting the font properties.*

Info

The **Info** tab contains the name of the source file and the number of any objects in the group.

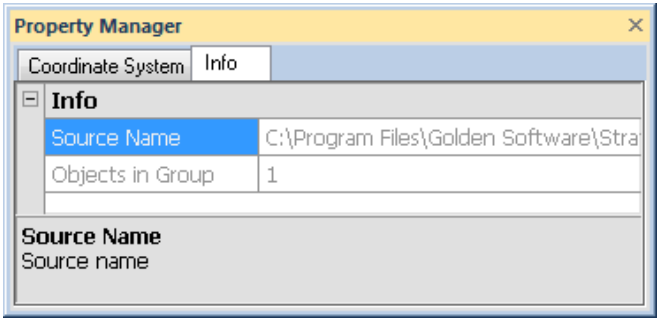
The **Info** page for the *Map* or map layer contains information about the entire map or the selected layer.

Source Name

The *Source Name* is the name of the file used to create the layer. The *Source Name* is not listed for a *Map* object.

Objects in Group

The *Objects in Group* option displays the number of *Base*, *Wells*, and *Axes* that are in the current *Map* or the number of individual items that are in the selected map layer.



The ***Info*** *tab contains information about the* Base *layer.*

Using Different Scaling in the X and Y Directions

Under some conditions, different map units are used for the X and Y directions.

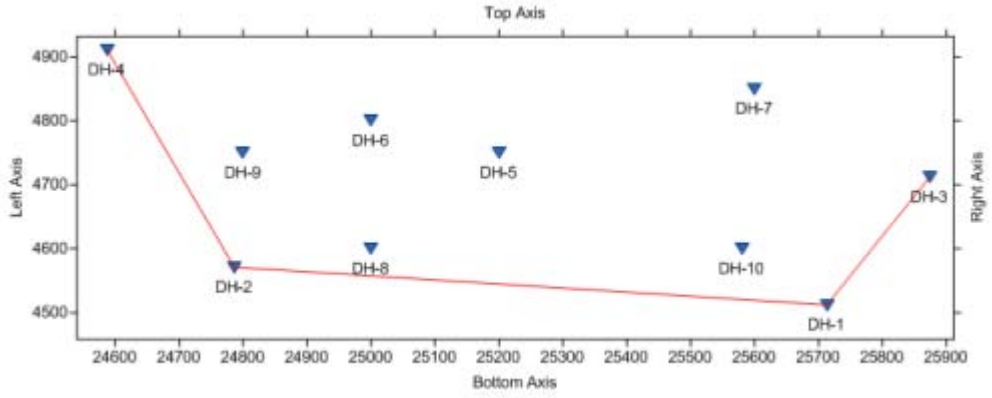
Example

Consider a map of the state of Montana. When you plot the map on a one to one scale, the map appears stretched in the east-west direction. To understand this problem, consider that for Montana the latitude ranges from 44.36° to 49°. The latitude for the center of the map is determined from this to be 46.68°. The cosine of 46.68° is 0.686. The distance covered by one degree of longitude at this latitude is only 0.686 times the distance covered by one degree of latitude. To reduce the distortion on this map, you must correct for this difference.

You uncheck the *Proportional XY scaling* box on the **Scale** page and then set the map scaling so 1 unit in the X direction is not equal to 1 unit in the Y direction. The map is then plotted with different scales in the X and Y directions.

Map Axes

Four axes are automatically created for each map in **Strater**. Axes are named by their relative positions on the map and are called the *Left Axis*, *Right Axis*, *Top Axis*, and *Bottom Axis*. The *Left Axis* and *Right Axis* are Y axes and display northing or latitude values. The *Top Axis* and *Bottom Axis* are X axes and display easting or longitude values.



The map axes are automatically created with default values that fit the wells.

By default, axis limits match the X, Y limits of all of the wells in the collars table used to create the map. When a map is first created, the *Left Axis* and *Bottom Axis* display

major ticks and tick labels. The *Top Axis* and *Right Axis* display only major ticks. The tick spacing is automatically scaled so a reasonable number of ticks are drawn along each axis. Tick scaling and label format parameters can be independently specified for the axes on the map.

Selecting an Axis

Click an axis in the **Object Manager** or in the map view to select it. When selecting in the map view, place the pointer on the tick marks or tick labels when clicking. Cyan circles appear at each end of the selected axis. Because the axes are part of the map on which they are drawn, the eight solid green square handles appear around the entire map. The axis is also highlighted in the **Object Manager**. The properties for the axis are shown in the **Property Manager**.

Editing an Axis

To edit an axis, click on the axis to select it. The axis properties are listed in the **Property Manager** on the **Ticks**, **Title**, **Label**, **Axis Line**, and **Grid Lines** tabs.

Axis Visibility

When the map is created, the axes are displayed automatically. You can turn off the display of any or all of the axes on the map by enabling the visibility of the axis with the **Object Manager**. Check the box adjacent to the axis name to turn on or off the axis.

Axis Position

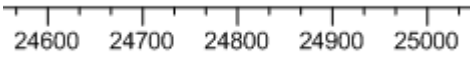
Individual axes cannot be moved with the mouse. Open the axis properties by clicking on the axis name in the **Object Manager**. To change the axis limits, click on the *Map* object and change the **Limits**.

Other Axis Features

Other axis features are axis titles and grid lines. Axis titles can be placed on any of the axes and are drawn in relation to the associated axis. Grid lines are drawn at the same position as the axis tick marks.

Ticks Properties

Map axes can display both major and minor ticks. When a map is created, the display of major ticks is on by default. Major ticks can display tick labels. Minor ticks are displayed at regular intervals between major ticks, and do not have associated tick labels. Minor ticks are not displayed, by default. When tick labels are displayed, all major ticks along the axis are represented with a label. Minor ticks are defined as the number of minor ticks to be drawn between adjacent major ticks.The display and spacing of tick marks is controlled from the **Ticks** page in the axis properties.



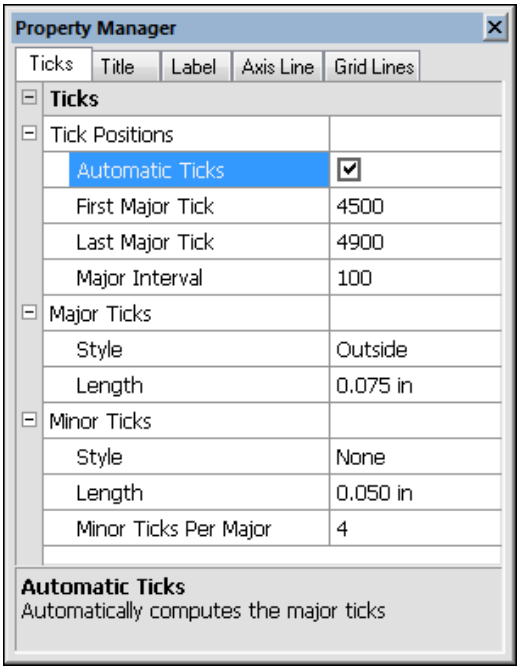
On this axis, two minor ticks are displayed between major ticks.

Tick Positions

Axes are a part of the map on which they are placed. Axes are drawn at the edge of the map, covering the entire limits of the map. To set the tick positions to custom values, click the ⊞ next to *Tick Positions* to open the *Tick Positions* section.

Automatic Tick Marks

The *Automatic Ticks* option uses the limits of the map as the limits for the axes and uses a reasonable tick mark spacing along the axis. When any parameters in the *Tick Positions* section are changed, the *Automatic Ticks* check box is automatically unchecked. After making any changes, you can return to the automatic settings by checking the *Automatic Ticks* box.



*Specify the axis tick properties in the **Property Manager** on the **Ticks** page.*

First Major Tick

The *First Major Tick* option controls the major tick mark minimum value. This value is expressed in data units. The *First Major Tick* does not need to be the same as the map minimum value, but it cannot be less than the minimum value. To set the tick value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Last Major Tick

The *Last Major Tick* box controls the major tick mark maximum value. This value is expressed in data units. The *Last Major Tick* does not need to be the same as the map maximum value but it cannot be greater than the maximum value. To set the tick value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Major Interval

The *Major Interval* option controls the spacing, in data units, between major ticks along the selected axis. The major tick marks occur at values

$$Tick = First\ major\ tick + n * Major\ interval \qquad n = 0, 1, \ldots, N$$

where *N* is the largest integer such that *Tick* ≤ *Last Major Tick*. Thus, a tick mark is placed at the value of the *Last Major Tick* only if the interval (*Last Major Tick - First Major Tick*) is evenly divisible by *Major Interval*. To change the interval, highlight the existing value and type a new value.

Major Ticks

The *Major Ticks* section controls the display of the major tick marks. Click the ⊞ next to *Major Ticks* to open the *Major Ticks* section.

Style

Click the *Style* option to display a list of available styles for the tick marks. In the list, select the desired tick mark location. Options include *None, Outside, Inside,* and *Cross*. If you do not want to display ticks, select *None* from the list. *Outside* places the ticks on the outside of the axis. *Inside* places ticks on the inside of the axis (in the map area). *Cross* places ticks on both the outside and inside of the axis.

Length

The *Length* option controls the length of the major tick marks. The tick lengths are in page units. To change the length, highlight the existing value and type a new value or click the  to increase or decrease the value.

Minor Ticks

The *Minor Ticks* section controls the display of the minor tick marks. Click the ⊞ next to *Minor Ticks* to open the *Minor Ticks* section.

Style

Click the *Style* option to display a list of available styles for the tick marks. In the list, select the desired tick mark location. Options include *None, Outside, Inside,* and *Cross*. If you do not want to display ticks, select *None* from the list. *Outside* places the ticks on the outside of the axis. *Inside* places ticks on the inside of the axis (in the map area). *Cross* places ticks on both the outside and inside of the axis.

Length

The *Length* box controls the length of the minor tick marks. The tick lengths are in page units. To change the length, highlight the existing value and type a new value or click the  to increase or decrease the value.

Minor Ticks Per Major

To specify the number of minor ticks to draw between adjacent major ticks, enter the number into the *Minor Ticks Per Major* box. This should be one less than the number of minor divisions you want to appear between adjacent major ticks. Specify a value between 1 and 20.

For example, if you want the minor ticks to indicate 2 divisions, the *Minor Ticks Per Major* value should be set to 1.

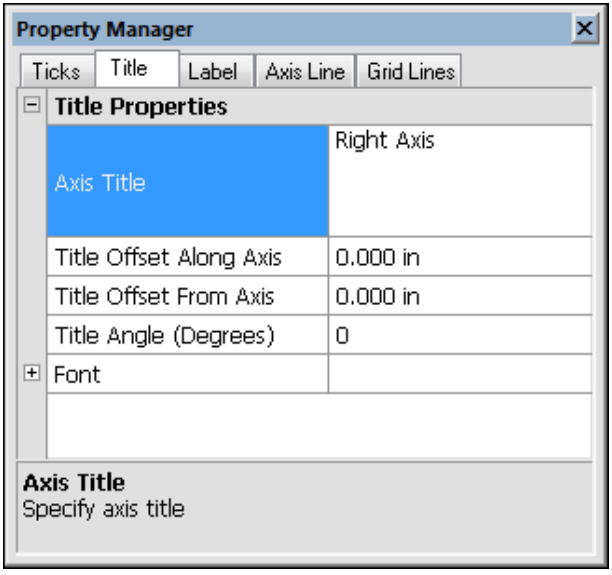
Title Properties

Axes can display any text as a title for the axis. Axis titles can use any text properties, including math text formatting instructions.

The **Title** page controls the display, location, and font properties of the axis title.

Title

Axis titles can use any text properties including math text formatting instructions. Click in the empty box next to *Axis Title* to type the axis title. To add a new line of text, press the ENTER key on the keyboard. When



*Specify the axis title properties in the **Property Manager** on the **Title** page.*

finished, click off the *Axis Title* input section to see the change on the map.

Offset Along Axis

The *Title Offset Along Axis* controls the placement of the title along the axis. Positive offset values move the axis title in the positive direction along the axis. The offset values are set in page units. To change the offset, highlight the existing value and type a new value or click the  to increase or decrease the offset value.

Offset From Axis

The *Title Offset From Axis* controls the placement of the title towards or away from the axis. Positive offset values move the axis title away from the axis. The offset values are set in page units. To change the offset, highlight the existing value and type a new value or click the  to increase or decrease the offset value.

Title Angle

The *Title Angle (Degrees)* controls the angle at which the title is drawn. Positive angles rotate the title in a counterclockwise direction. Values must be between 0 and 359 degrees. To change the *Title Angle (Degrees)*, highlight the existing value and type a new number or click the  to increase or decrease the angle value.

Font Properties

Click the ⊞ next to *Font* to specify the font properties for the axis title.

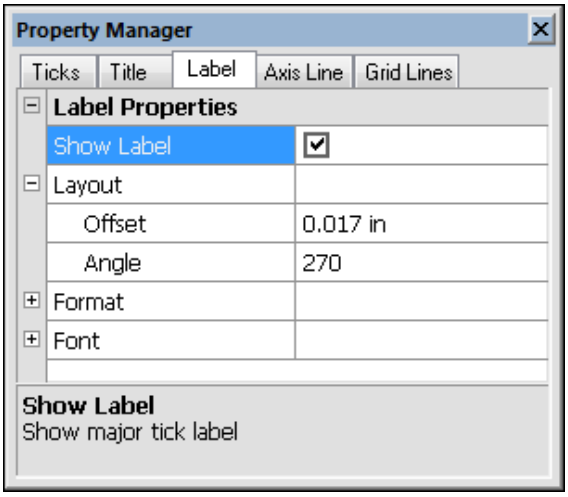
Label Properties

Axes can display labels at each major tick marks. Axis labels can use any text properties.

The **Label** page controls the display, layout, format, and font properties of the axis tick labels.

Show Label

Tick labels are the numbers or text that appear at major tick mark locations. Tick labels indicate the axis values in data units. Check the box next to the *Show Label* option to display labels at all major tick marks for the selected axis.



Check the Show Label *box to display labels at the major tick marks for an axis.*

Layout

Click the ⊞ next to *Layout* to control the offset from the axis and the angle for the tick mark labels.

Offset

The *Offset* option controls how far away the tick labels are drawn from the tick marks. Positive offset values move the tick mark label away from the axis. The offset values are set in page units. To change the offset, highlight the existing value and type a new value or click the ▲▼ to increase or decrease the offset spacing.

Angle

The *Angle* option specifies the angle at which the tick labels are drawn. Positive angles rotate each axis tick label in a counterclockwise direction. Values must be between 0 and 359 degrees. To change the *Angle,* highlight the existing value and type a new number or click the ▲▼ to increase or decrease the angle.

Format

Click the ⊞ next to *Format* to specify the numeric format properties for the axis labels.

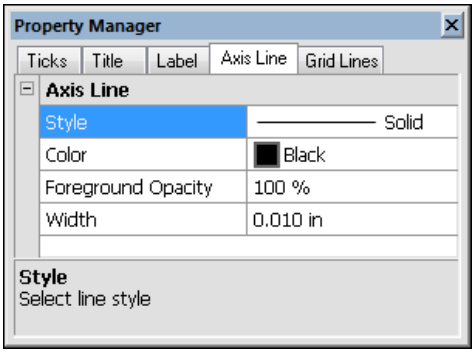
Font Properties

Click the ⊞ next to *Font* to specify the font properties for the axis labels.

Axis Line Properties

The **Axis Line** page for a selected axis controls the line properties for the axis. The line style, color, foreground opacity, and width can be set. The change only affects the selected axis.

Refer to *Chapter 22 – Drawing Objects* for information about the line properties.

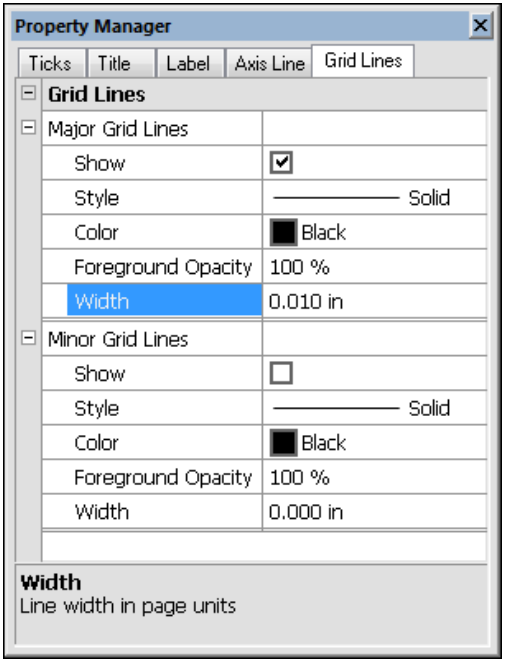


The Axis Line *page controls the line properties for the selected axis.*

Grid Lines Properties

The **Grid Lines** page for a selected axis controls the grid line properties for the axis. Grid lines are a mesh over the top of the map. Along an axis, grid lines can originate from the major ticks, minor ticks, or both. The major and minor grid lines can use different line properties. Grid lines are drawn over the extent of the map. For example, if you draw grid lines for an X axis (the *Bottom Axis*), the grid lines are drawn parallel to the Y axis (*Left Axis*) over the entire map.

Refer to *Chapter 22 – Drawing Objects* for information about the line properties.



The axis Grid Lines *page controls the grid line properties for the selected axis*

Major Grid Lines

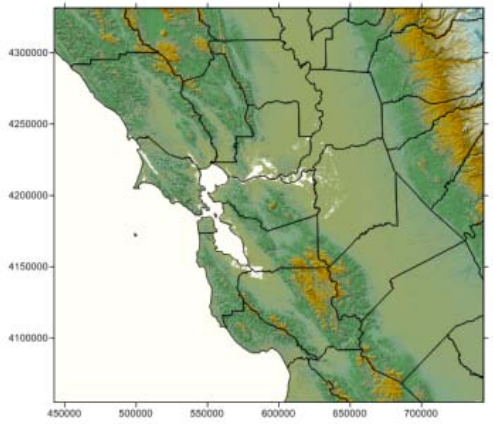
If you want grid lines to extend from the major ticks, check the box next to the *Show* option in the *Major Grid Lines* section.

Minor Grid Lines

If you want grid lines to extend from the minor ticks, check the box next to the *Show* option in the *Minor Grid Lines* section.

Base Maps

Base maps display geographic and political information such as roads, streams, lakes, or state and county boundaries. Base map files draw objects at precise X, Y locations on a map and can contain points, polygons, polylines, text, and images. Base maps can be created from many common map formats, including DXF, SHP, PDF and a variety of image formats.



This base map contains polygons and a background image.

Base map files can be georeferenced with a georeferenced format, such as .GSR2 or .TFW, or by referencing the base map after it is created as a base map on the **Coordinate System** tab. Images in base maps can be georeferenced by clicking on the *Image* in the **Object Manager** and setting the **Image Properties** in the **Property Manager**.

Creating a New Base Layer

Click the **Map | Create Base Map** command or click the  button to create a new base map. If a blank map view is available, the map is created in that map view, otherwise, the map is created in a new map view. In the **Import** dialog, select the base map file to import and click *Open*. The base map is created.

Adding a Base Layer to an Existing Map

To add a base map to an existing map, click the **Map | Add Base Layer** command, click the  button, or right-click on an existing map and choose *Add* | *Base Layer.* In the **Import** dialog, select the base layer file to import and click *Open*. The base layer is added to the map.

Editing a Base Layer

If the properties of the base map should be the same as the other objects in the *Map*, the base map properties can be edited by clicking on the *Map* in the **Object Manager** and editing the properties in the **Property Manager**. This changes the properties for all layers in the map.

If the properties of the base map should be different than other objects in the *Map*, the *Base* map layer should be selected. When the properties are edited while the *Base* layer is selected, all of the objects in the base layer are changed to reflect the new properties.

Some base maps consist of multiple objects (i.e. polygons, polylines, text, etc.). The sub-objects can be selected individually in the **Object Manager** and edited in the **Property Manager**.

Base Layer Properties

Base layers have different properties available, depending on the type of objects in the base layer. The possible properties listed in the **Property Manager** are: **Line**, **Fill**, **Symbol**, **Font**, **Coordinate System**, and **Info**. Images in a base map have an **Image Properties** page, where extents for the image can be set.

Line Properties

The **Line** page for a base map layer controls the line properties for all of the objects in the *Base* object. The line style, color, foreground opacity, and width can be set. The change only affects the selected axis.

Refer to *Chapter 22 – Drawing Objects* for information about the line properties.

Fill Properties

The **Fill** page for a base map layer lets you define the fill properties for all items in the *Base* object. Changing this option overwrites any custom fill properties and changes all polygons to use the new fill properties.

Refer to *Chapter 22 – Drawing Objects* for information about the fill properties.

Symbol Properties

The **Symbol** page for a base map layer lets you define the symbol properties for all items in the *Base*. Changing this option overwrites any custom symbol properties.

Refer to *Chapter 22 – Drawing Objects* for information about the symbol properties.

Font Properties

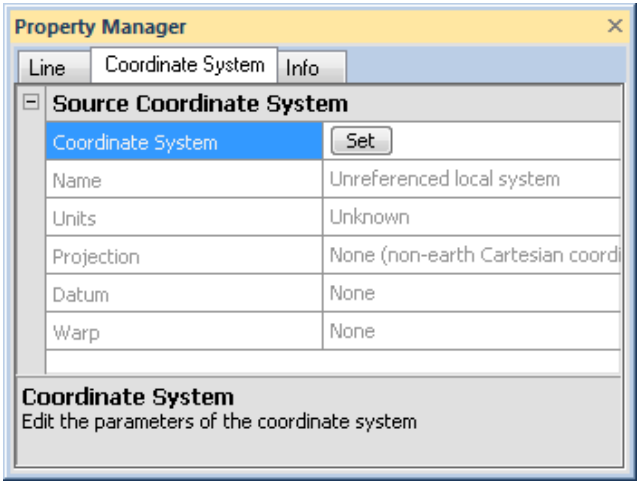
The **Font** page for a base map layer lets you define the font properties for all items in the *Base* object. Changing this option overwrites any custom text properties. The font properties control the default text for all text in the base map.

Refer to *Chapter 22 – Drawing Objects* for information about the font properties.

Source Coordinate System - Map Layer

Maps can be created from data loaded in a table view or base map files in any coordinate system. The *Source Coordinate System* is the coordinate system for the collars table data or base map used to create a map layer. A coordinate system normally has a defined projection and datum. If some map layers are using a different source coordinate system than what you want the map to display, the map layer is converted to the map's *Target Coordinate System*.

The **Coordinate System** page is located in the **Property Manager** when a base or well layer object is selected.



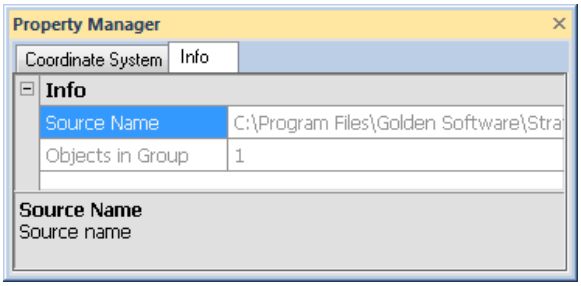
*Specify the map layer coordinate system on the **Coordinate System** page.*

Coordinate System

Click the *Set* button next to *Coordinate System* to open the Assign Coordinate System dialog. This dialog lets you set the source coordinate system. This is the coordinate system for the original data or base map.

Info Page

The **Info** page for the base map layer contains information about the selected layer.



*The **Info** tab contains information about the* Base *laver.*

Source Name

The *Source Name* is the name of the file used to create the layer.

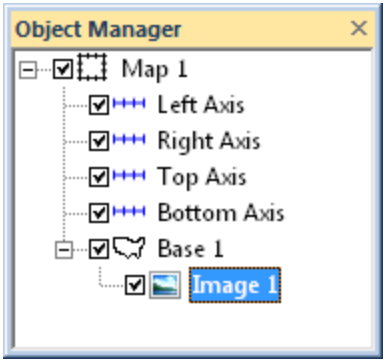
Objects in Group

The *Objects in Group* option displays the number of individual items that are in the selected map layer.

Assigning Coordinates to an Image Base Map

If your image is already georeferenced, when you import the image as a base map, the image will be referenced accordingly. If your image is not georeferenced, you can assign coordinates to the image. To create the base map, click the **Map | Create Base Map** command. Select the image file and click *Open*.

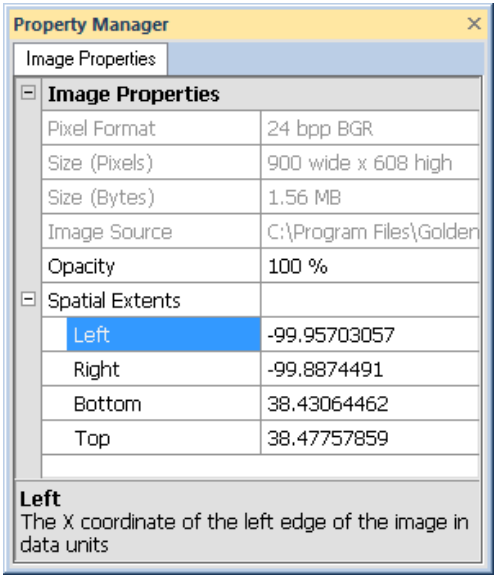
To redefine the image coordinates click on the *Image* object in the *Base* layer in the **Object Manager**. By default, image files that are not georeferenced are assigned a coordinate system that corresponds to the rows and columns of the raster image. For .TIF files, if the .TIF contains an image size in the .TIF file, the size is used for the object coordinates. Under most circumstances the pixel coordinates or page coordinates do not match the coordinate systems used on other types of maps. In order to include this base layer with other base layers or well layers, you will need to redefine the coordinates for the image. After the image coordinates are redefined, the image base layers will overlay with other types of maps correctly.



*Click on the Image 1 object to open the base map properties in the **Property Manager**.*

To change the base map image coordinates:

1. Click the **Map | Create Base Map** command. The **Import** dialog opens.
2. Select the image to create the base map. For example, click on *NAIP_Image.tif* located in the Samples folder.
3. Click *Open*.
4. In the **Object Manager**, click on the *Image 1* object to open the image properties in the **Property Manager**.
5. On the **Image Properties** page in the **Property Manager**, you can change the *Spatial Extents*.
6. In the *Spatial Extents* section, type the *Left, Right, Top,* and *Bottom* values to apply to the image.



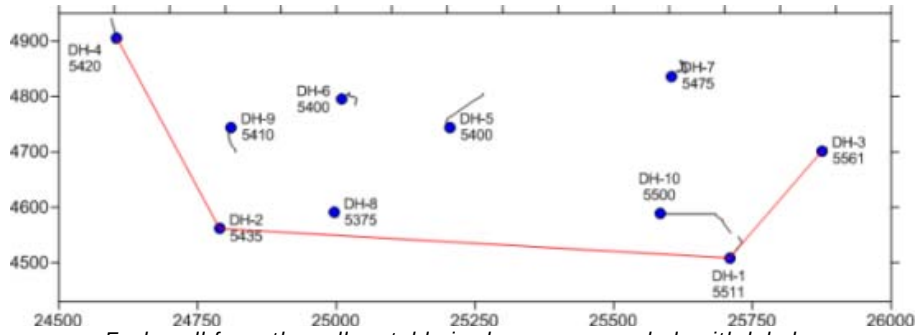
The image is updated using the new coordinates. After setting the *Spatial Extents*, you will need to reset the map's **Limits** and **Scale**. To change the base map extents and set the coordinate system:

1. In the **Object Manager**, click on the *Base 1* object to open the base map properties in the **Property Manager**.
2. Click on the **Coordinate System** tab.
3. Click the *Set* button.
4. Set the coordinate system for the image and click *OK*.
5. Click on the *Map* object in the **Object Manager**.
6. Click on the **Limits** tab.
7. Check the *Fit All* button.
8. Click on the **Scale** tab.
9. Change the scale properties, if necessary.

Use the Spatial Extents *section on the* ***Image Properties*** *page to change the coordinates of the base map image.*

Well Maps

A *Wells* map layer contains the wells and well selector lines in the map. The wells that appear are in the same collars table.



Each well from the collars table is shown as a symbol, with labels. The map also shows a well selector as a red line.

Creating a New Well Layer

Click the **Map | Create Well Map** command or click the  button to create a new well map.

- If a single collars table already has been created, the well map automatically uses that collars table. If a blank map view is available, the map is created in that map view, otherwise, the map is created in a new map view.
- If no collars table exists, you are prompted for the data file. Select the collars data file and click *Open.* Step through the importing process. A collars table is automatically created from the selected data file. If a blank map view is available, the map is created in that map view, otherwise, the map is created in a new map view.
- If multiple collars table exist, you are prompted to select one table. In the Look For Well Locations dialog, select the appropriate collars table and click *OK*. If a blank map view is available, the map is created in that map view, otherwise, the map is created in a new map view.

A *Wells* map layer contains the wells and well selector lines in the map. The wells that appear are in the same collars table.

Adding a Well Layer to an Existing Map

New *Wells* map layers are created with the **Map | Create Well Map** command. Additional *Wells* layers can be added to the existing map with the Map | Add Well Layer command. Click the **Map | Add Well Layer** command, click the  button, or right-click on an existing map and choose *Add* | *Well Layer* to add a new *Well Locations* map layer to an existing map. Creating multiple *Wells* maps allows wells from different collars files to be displayed on the same map. It also allows different schemes to apply to different types of wells.

Editing a Wells Layer

If the properties of the *Wells* layer should be the same as the other objects in the *Map*, the wells properties can be edited by clicking on the *Map* in the **Object Manager** and editing the properties in the **Property Manager**. This changes the properties for all layers in the map.

If the properties of the *Wells* layer should be different than other objects in the *Map*, the *Wells* map layer should be selected. When the properties are edited while the *Wells* layer is selected, all of the objects in the wells layer are changed to reflect the new properties.

The sub-object well selector line and wells can be selected individually in the **Object Manager** and edited in the **Property Manager**.

Updating Well Data

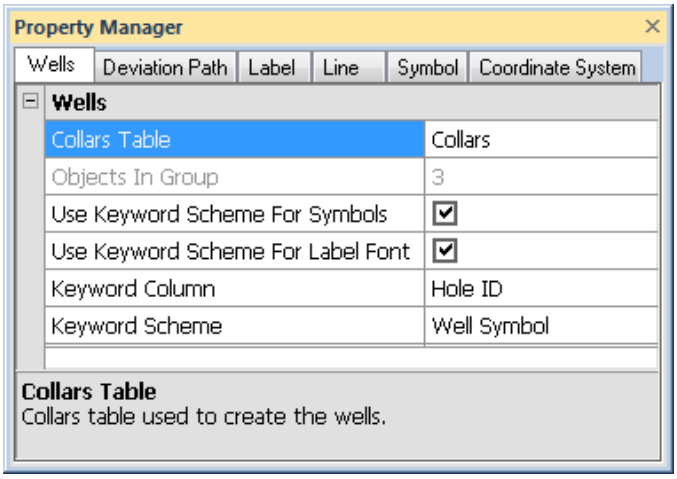
Occasionally, a *Wells* layer will not update properly, leaving a deviation path for the well, but removing the well symbol when changing the visibility of an individual well in the **Object Manager**. When this happens, click the **Tools | Options** command. Click on General on the left side of the dialog. On the right side, check the box next to *Reload Data When Opening Project*. Close the file and reopen it. The wells will display properly.

Wells Layer Properties

Wells layers have different properties available. The possible properties listed in the **Property Manager** are: **Wells**, **Deviation Path**, **Label**, **Line**, **Symbol** , and **Coordinate System**.

Wells Properties

The **Wells** tab controls the collars table and scheme used to display the wells layer.



*The **Wells** page controls the collars table and scheme used to display the wells layer.*

Collars Table

The *Collars Table* displays the name of the collars table. To change the collars table, click on the existing collar table name and select the desired collars table from the list. All collars tables in the project will be included in the list.

Objects in Group

The *Objects in Group* option lists the number of objects in the currently selected *Wells* layer. This includes all wells and all well selector lines. This option is not editable.

Use Keyword Scheme For Symbols

Check the box next to *Use Keyword Scheme For Symbols* to use a keyword scheme to assign symbols to the wells. When this box is checked, the options on the **Symbol** tab are not available and the symbols vary, as determined by the selected *Keyword Column* and *Keyword Scheme*. When this box is unchecked, all symbols are the same and are determined by the symbol properties set on the **Symbol** page.

The keyword scheme is used by default and is based on the type, keyword, or symbol column found in the collars table. If these columns are not found, the default symbol properties are used for all symbols in the well map.

Use Keyword Scheme For Label Font

Check the box next to *Use Keyword Scheme For Label Font* to use a keyword scheme for the font label properties for the wells. When this box is checked, the *Font* options on the **Label** tab are not available and the font properties vary, as determined by the selected *Keyword Column* and *Keyword Scheme*. When this box is unchecked, all label font properties are the same and are determined by the font properties set on the **Label** page.

Keyword Column

The *Keyword Column* is the column in the collars table that is used to determine the symbol and font label properties. Any column can be used. To change the column, click on the existing option and select the desired column from the list. If no keyword column is desired, uncheck the box next to *Use Keyword Scheme For Symbols* or *Use Keyword Scheme For Label Font* options.

Keyword Scheme

The *Keyword Scheme* is the scheme currently used to determine the symbol or font label properties for all of the wells in the *Wells* layer. To change the scheme, click on the existing scheme. In the list, select the desired scheme and the wells automatically update to the new scheme name. Alternatively, click on the scheme name. Click the ... to open the **Scheme Editor**.

Deviation Path Properties

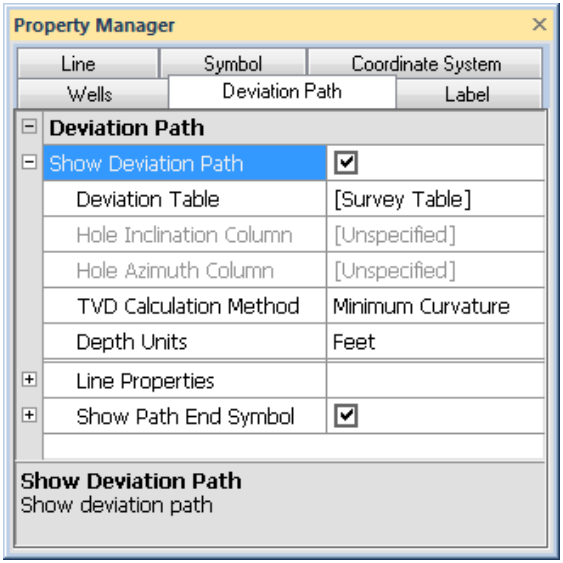
The **Deviation Path** page controls whether the deviated wells are displayed on the map.

Show Deviation Path

Check the box next to *Show Deviation Path* to turn on the display of deviation lines on the map. Uncheck the box to turn off the deviation lines on the map, showing only the top of the well location.

Deviation Table

The *Deviation Table* is the table from which the *Hole Inclination Column* (or *Hole Dip Column*), and *Hole Azimuth*



*Turn on the display of well deviation lines and set the line and end point properties on the **Deviation Path** page.*

Column are read. Available options are *[Collars Table], [Survey Table],* and any other depth or interval tables that have already been loaded into the project. *[Collars Table]* loads the collars table used to create the well location map. The collars table is specified on the Wells tab when a well location map is selected. *[Survey Table]* loads the information from all survey tables in the project. A well should only be included in a single survey table. Selecting any of the other tables activates the *Hole Inclination Column* (or *Hole Dip Column*) and the *Hole Azimuth Column*. To change the *Deviation Table,* click on the existing option and select the desired option from the list. If no table should be used, uncheck the box next to *Show Deviation Path*.

When recorded in a collars table, the inclination (or dip) and azimuth apply to the entire well length. When recorded in a survey table, the inclination (or dip) and azimuth apply from the depth to the next recorded depth. When set to one of the depth or interval tables, each well is updated independently from each other well using the information in the specific tables.

Hole Inclination, Hole Dip and Hole Azimuth Columns

The *Hole Inclination Column* or *Hole Dip Column* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified]* and data columns in the existing *Deviation Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the

calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

The *Hole Inclination Column* (or *Hole Dip Column*) and *Hole Azimuth Column* are only available if the *Deviation Table* is not a Collars or Survey table. When the *Deviation Table* is a Collars table, the options are disabled and the inclination (or dip) and azimuth from the Collars table are applied from the starting depth to the ending depth from the Collars table for the entire length of the borehole. When the *Deviation Table* is a Survey table, the options are disabled and the inclination (or dip) and azimuth from the Survey table are applied from the depth recorded in the Survey table to the next depth from the Survey table.

TVD Calculation Method

When the *Show Deviation path* is checked, the displayed depth value is calculated using the depth from the table and the azimuth and inclination. The *TVD Calculation Method* determines how the values are combined to get the true vertical depth. Available options are *Tangential, Average Tangential, Balanced Tangential, Radius of Curvature,* and *Minimum Curvature*. The default is *Minimum Curvature*, which provides a good estimate of the true vertical depth. To change the calculation method, click on the existing option and select the desired option from the list.

Depth Units

Select the depth unit type from the *Depth Units* list. The units selected here should match the units of the depth data in the *Deviation Table*. To change the *Depth Units*, click on the existing option and selected the desired measurement from the list.

Line Properties

Click the ⊞ next to *Line Properties* to set the deviation path line *Style, Color, Foreground Opacity,* and Width.

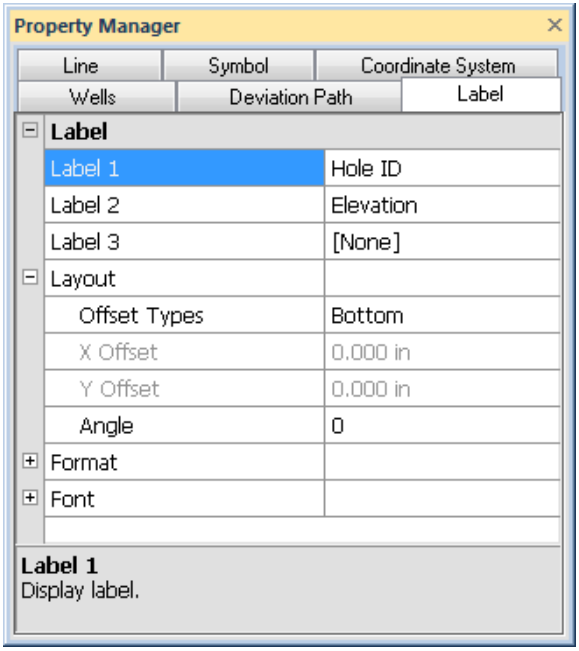
Show Path End Symbol

Check the box next to *Show Path End Symbol* to place a symbol at the bottom of each well's deviation path. Click the ⊞ next to *Show Path End Symbol* to set the end symbol properties, including the symbol size and color.

Label Properties

To edit the labels displayed on the *Wells* layer, click on the *Wells* map layer in the **Object Manager**. The *Wells* properties are listed in the **Property Manager**. Click on the **Label** tab to display labels for all wells and change the label properties.

To move the label for an individual well, click on that well name in the **Object Manager**. Then, set the **Label Layout** in the **Property Manager**.



Display well ID labels, coordinate labels, or any column from the collars table as labels on the Wells map layer.

Label 1, Label 2, Label 3

Each well can have up to three different labels. To display a label, click on the existing option and select the desired label from the list. Available options are *[None], Coordinates, Hole ID,* and all columns listed in the collars table on the Wells tab for the well location map. If no labels are desired, set *Label 1, Label 2,* and *Label 3* to *[None].* Select *Coordinates* to display the X and Y coordinates for all wells on the *Wells* layer. The coordinates are shown as (X,Y) for each well. Select *Hole ID* to show the well name for each well. Select any of the other columns to display labels from that column for each well.

Layout

Click the ⊞ next to *Layout* to open the *Layout* section. This section positions the labels around the wells.

Offset Types

The *Offset Types* lists the locations around the wells where the labels are positioned. Available options are *Center, Left, Top, Right, Bottom,* or *User Defined*. To change the position, click on the existing option and select the desired location from the list.

Custom Offset Amount

The *X Offset* and *Y Offset* control how far away the labels are drawn from the well location when the *Offset Types* is set to *User Defined*. Changing the *X Offset* moves the labels horizontally. Changing the *Y Offset* moves the labels vertically. Positive values move the labels right and up on the page. The offset amount is in page units and refers to the location away from the well location where the center of the labels will be located. To change the value, highlight the existing value and type a new value or click the  to increase or decrease the distance from the well. Values are between -2 and 2 inches.

Angle

The *Angle* option specifies the angle at which the labels are drawn. Positive angles rotate label in a counterclockwise direction. Values must be between 0 and 360 degrees. To change the *Angle*, highlight the existing value and type a new number or click the  to increase or decrease the angle.

Format

Click the ⊞ next to *Format* to open the numeric format properties section. The format properties apply to all of the well labels in the *Wells* map layer.

Font

Click the ⊞ next to *Font* to open the font properties section. The font properties apply to all of the well labels in the *Wells* map layer. The size, color, text properties and horizontal alignment of the multiple lines of labels can be set. If the options in the font properties section are not available, click on the **Wells** tab and uncheck the box next to the *Use Keyword Scheme For Label Font* option.

Line Properties

The **Line** page for the *Wells* object lets you define the line properties for all items in the *Wells*. Changing this option overwrites any custom line properties and changes all objects in the *Wells* object to use the new line properties.

To change an object's line properties separately, click on that item individually and set the **Line** properties.

Refer to *Chapter 22 – Drawing Objects* for information about the line properties.

Symbol Properties

There are four ways to edit the symbols displayed on the *Wells* layer: editing the symbols for the *Map* object, for the *Wells* layer, individually, or through a scheme.

If the symbol properties should be the same as the other objects in the *Map*, the symbol properties can be edited by clicking on the *Map* in the **Object Manager** and editing the symbol properties in the **Property Manager**. This changes the symbol properties for all layers in the map.

If the symbol properties for the *Wells* layer should be different than other objects in the *Map*, but all wells in the current wells map should be edited together, the *Wells* map layer should be selected. When the symbol properties are edited while the *Wells* layer is selected, all of the symbols in the wells layer are changed to reflect the new properties. To edit all of the symbols in a single wells layer, click on the *Wells* map layer in the **Object Manager**. The *Wells* properties are listed in the **Property Manager**. Click on the **Symbol** tab to display symbols for all wells and change the symbol properties. If a scheme should be used, click on the **Wells** tab and check the *Use Keyword Scheme For Symbols* option. Uncheck this box to set the symbol properties on the **Symbol** tab.

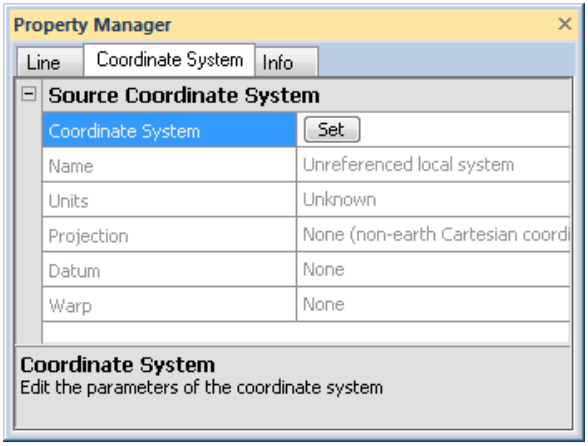
The individual wells can have different symbol properties. To edit individual wells, click on the well name in the **Object Manager** and edit the symbol properties in the **Property Manager**. If the options on the **Symbol** tab are not available, uncheck the *Use Keyword Scheme For Symbols* option on the **Wells** tab.

If changing the *Map* symbols, *Wells* symbols, or the individual well symbols shows no change on the wells in the map, a keyword scheme may be in use by the *Wells* layer. To turn off the display of the keyword scheme, click on the *Wells* layer to select it. Click on the **Wells** tab. Uncheck the box next to *Use Keyword Scheme For Symbols* and the wells can be set to the symbol from the *Map* or *Wells*, or individual wells edited separately.

Refer to *Chapter 22 – Drawing Objects* for information about the symbol properties.

Source Coordinate System

Maps can be created from data loaded in a table view or base map files in any coordinate system. The *Source Coordinate System* is the coordinate system for the collars table data or base map used to create a map layer. A coordinate system normally has a defined projection and datum. If some map layers are using a different source coordinate system than what you want the map to display, the map layer is converted to the map's *Target Coordinate System*.



*Specify the map layer coordinate system on the **Coordinate System** page.*

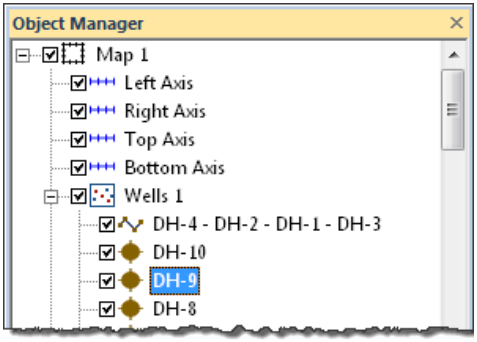
The **Coordinate System** page is located in the **Property Manager** when a base or well layer object is selected.

Coordinate System

Click the *Set* button next to *Coordinate System* to open the Assign Coordinate System dialog. This dialog lets you set the source coordinate system. This is the coordinate system for the original data or base map.

Individual Wells

To edit individual wells on a map, click on the well in the **Object Manager**.



Click on the individual well, such as DH-9, to edit only that well's symbol properties.

Symbol Properties

The symbol properties for the selected well are located in the **Property Manager** on the **Symbol** tab. Editing individual wells allows each well to have separate symbol properties.

The individual wells can have different symbol properties. To edit individual wells, click on the well name in the **Object Manager** and edit the symbol properties in the **Property Manager**. If the options on the **Symbol** tab are not available, uncheck the *Use Keyword Scheme For Symbols* option on the **Wells** tab.

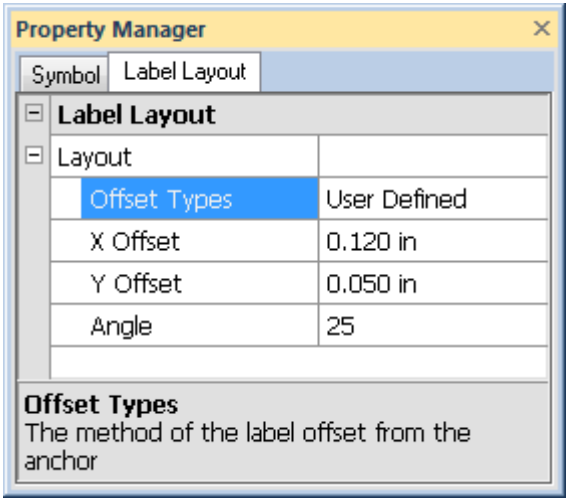
Refer to *Chapter 22 – Drawing Objects* for information about the symbol properties.

Label Layout Properties

To move the label for an individual well, click on that well name in the **Object Manager**. Then, set the **Label Layout** properties in the **Property Manager**.

Layout

Click the ⊞ next to *Layout* to open the *Layout* section. This section positions the labels around the wells.



*Set the position for individual wells on the **Label Layout** tab.*

Offset Types

The *Offset Types* lists the locations around the wells where the labels are positioned. Available options are *Center, Left, Top, Right, Bottom,* or *User Defined*. To change the position, click on the existing option and select the desired location from the list.

Custom Offset Amount

The *X Offset* and *Y Offset* control how far away the labels are drawn from the well location when the *Offset Types* is set to *User Defined*. Changing the *X Offset* moves the labels horizontally. Changing the *Y Offset* moves the labels vertically. Positive values move the labels right and up on the page. The offset amount is in page units and refers to the location away from the well location where the center of the labels will be located. To change the value, highlight the existing value and type a new value or click the  to increase or decrease the distance from the well. Values are between -2 and 2 inches.

Angle

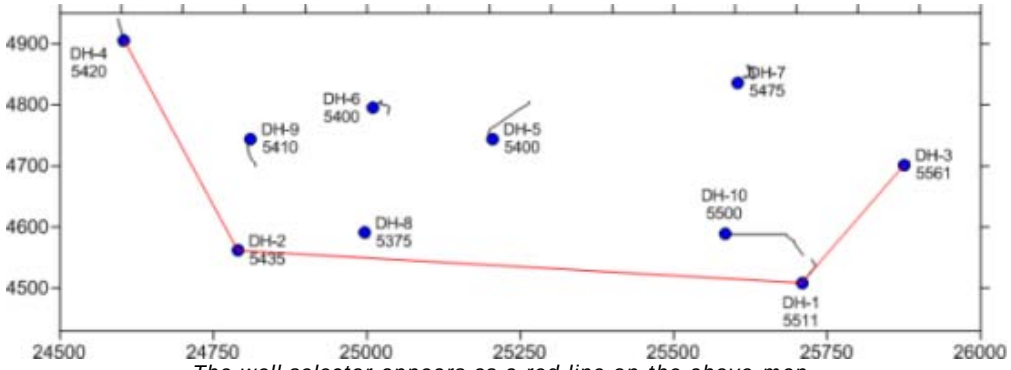
The *Angle* option specifies the angle at which the labels are drawn. Positive angles rotate label in a counterclockwise direction. Values must be between 0 and 360 degrees. To change the *Angle*, highlight the existing value and type a new number or click the  to increase or decrease the angle.

Moving All Well Labels at Once

To edit the labels displayed on the *Wells* layer, click on the *Wells* map layer in the **Object Manager**. The *Wells* properties are listed in the **Property Manager**. Click on the Label tab to display labels for all wells and change the label properties.

Well Selectors

Once a map view exists, wells can be connected for creation of a cross section. Wells are selected in the order that they should appear in the cross section with the furthest left well selected first.



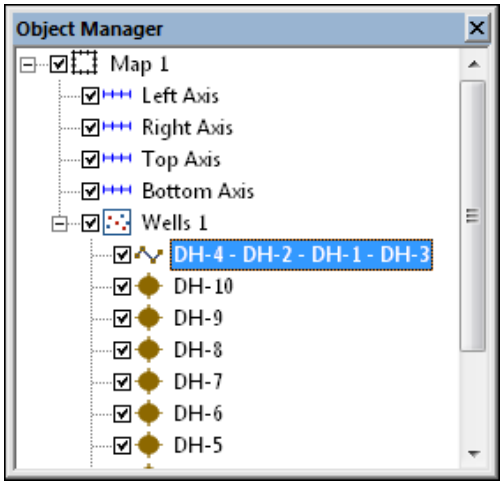
The well selector appears as a red line on the above map.

Creating a Well Selector

To connect wells with a well selector line,

1. Click the *Wells* map layer.
2. Click the **Map | Add Well Selector** command, click the  button, or right-click on an existing map and choose *Add* | *Well Selector*.
3. The cursor changes to . As the cursor approaches a well, the well name appears in a floating box. This makes selecting the right well easier. Click on the first well to select it. In the map above, this would be well DH-4.
4. Click on each additional well. The order the wells are selected is the order that the logs will appear in the cross section. The order the wells were selected above would be DH-2, DH-1, and finally DH-3.
5. After the last well is selected, press the ENTER key on the keyboard or double-click on the last well to end the current well selector line.
6. Press ESC on the keyboard or the  button to end selector mode.

The well selector is displayed on the map as a line and in the **Object Manager** as a line with the names of the selected wells. The wells are listed in the name of the line in the order the wells are selected.



*The well selector object is shown in the **Object Manager** as a line with the name displaying the order of the selected wells .*

Creating Multiple Well Selectors

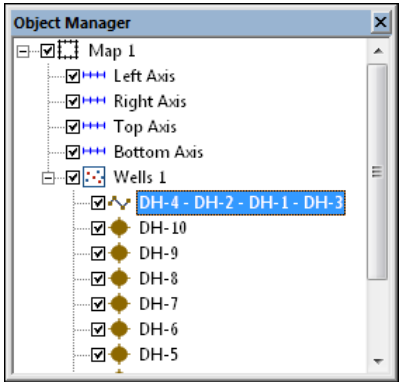
Each well selector can be used to create a new cross section, so multiple well selector lines can be added to the same map view. To add the next well selector, follow the steps above again. **Strater** allows an unlimited number of well selector lines to be in a single map view.

Creating the Cross Section

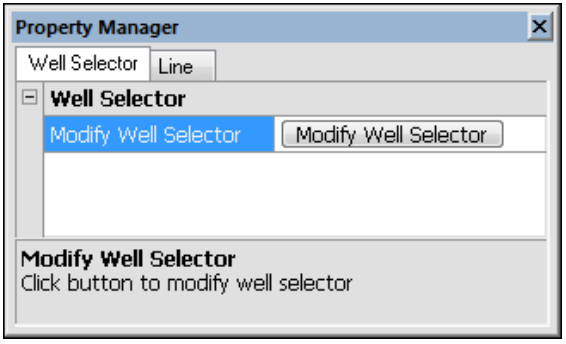
To create a cross section, click on the well selector in the **Object Manager**. Click the **Cross Section | Create Cross Section** command, click the  button, or right-click on the well selector line and choose *Create | Cross Section*. The cross section view is created from the wells in the well selector.

Editing the Well Selector

To edit the well selector, click on the well selector object in the **Object Manager**. The line properties for the well selector are located in the **Property Manager**. The wells displayed on the line can also be edited.



*Click on the well selector object in the **Object Manager**.*



*The properties for the well selector are displayed in the **Property Manager**.*

Edit Wells in the Well Selector

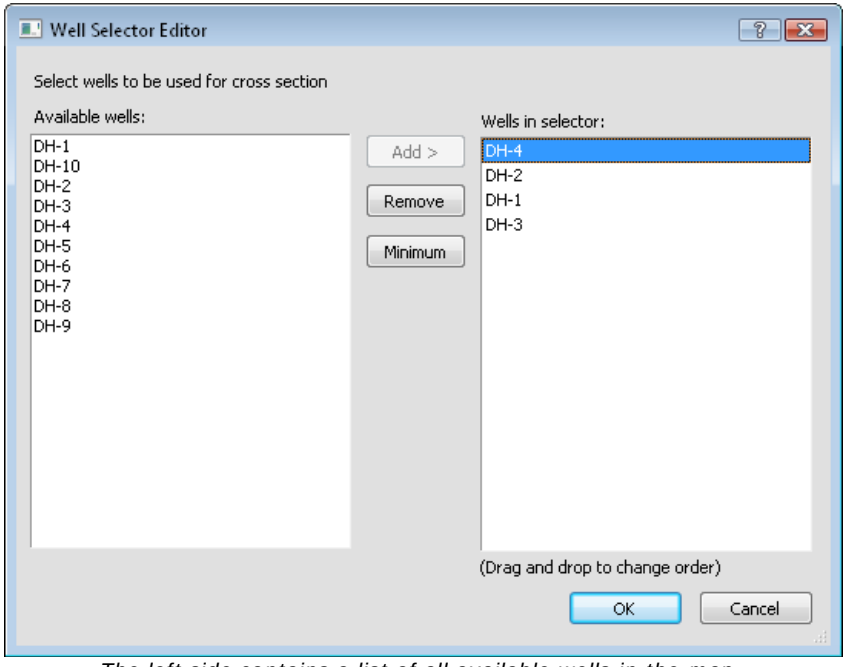
To add wells to the well selector, click the on the well selector line in the **Object Manager** to select it. In the **Property Manager**, click on the **Well Selector** tab. To modify the wells, click the Modify Well Selector button. The **Well Selector Editor** dialog appears. Wells can be added, deleted, or rearranged in the dialog.

Line Properties

To modify the appearance of the well selector line on the map, click on the well selector in the **Object Manager**. In the **Property Manager**, click on the **Line** tab. Change any line properties and the well selector line immediately updates to show the changes.

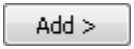
Well Selector Dialog

In the **Create Well Selector** dialog or **Well Selector Editor** dialog, wells can be rearranged, added, and deleted from the well selector line. The **Create Well Selector** dialog appears when creating a cross section. The **Well Selector Editor** dialog appears when editing a well selector line from a map view.



The left side contains a list of all available wells in the map.
The right side contains a list of wells in the current well selector.

Adding Wells

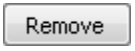
To add wells, open the **Well Selector Editor** dialog. Click on the well name that should be added in the *Available* wells list. To select multiple wells that are not located above or below other wells in the list, press and hold the CTRL key on the keyboard. Click and select each well to add multiple wells. To select multiple wells that are located above or below other wells, click the first well, press and hold the SHIFT key on the keyboard, and press the last well. All wells between the first and last are selected. Once all wells are selected, click the 

button. The selected wells are added to the bottom of the list of *Wells in selector* list. Click *OK* when all of the wells are in the *Wells in selector* list and the well selector line updates.

Modifying Well Order

To modify the order the wells in the well selector are connected, open the **Well Selector Editor** dialog. On the right side of the dialog in the *Wells in selector* list, change the wells so that the wells are in the order they should appear in the cross section. To move wells, click on the well to move, hold down the left mouse button, and drag the well to the desired location. A ➔ indicates a location where the well can be moved. a  appears in a location where the selected well cannot be moved. Click *OK* when all of the wells are in the proper order and the well selector line updates.

Deleting Wells

To delete wells from the well selector, open the **Well Selector Editor** dialog. Click on the well to be removed in the *Wells in selector* list. Click the 

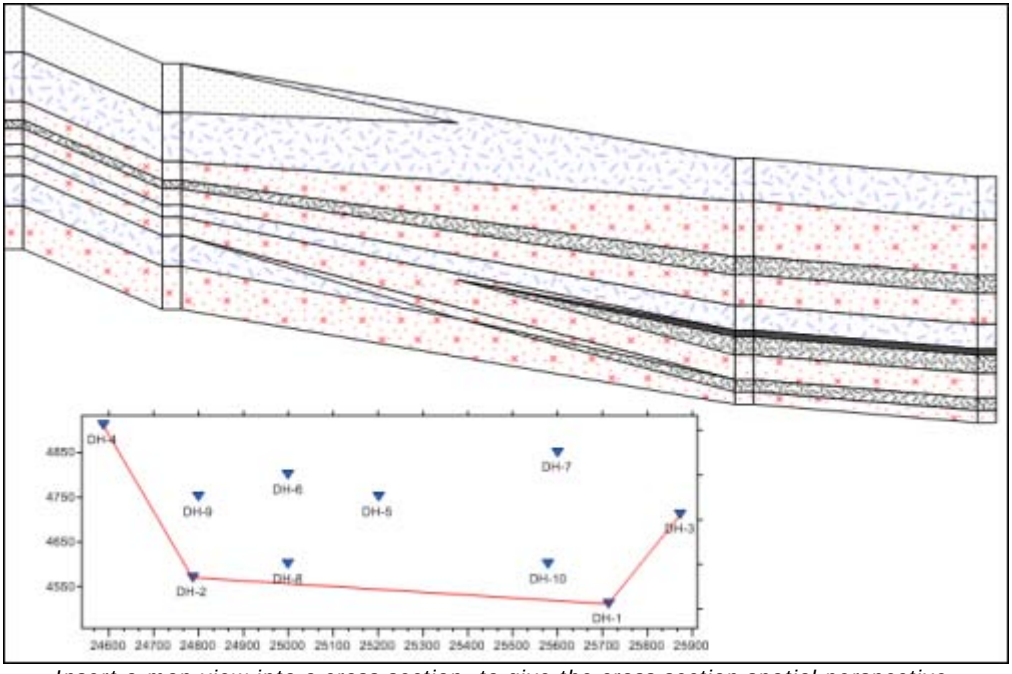
button and the selected well is removed from the list. Click *OK* and the well selector line is updated to not include the deleted wells.

To remove all wells but the top two, click the 

button. After clicking the *Minimum* button, all wells except for the top two are removed from the *Wells in selector* list. This is a quick way to recreate the well selector line or delete multiple wells at once.

Inserting a Map View

An inserted map view provides location information for the boreholes displayed in a borehole view or cross section view. To insert a map view into a borehole view or cross section view, click the **Draw | Insert Map View** command. If only one map view exists, the map is immediately displayed. If multiple map views exist, select the desired map view from the dialog and click *OK*. The map is added to the borehole view or the cross section view in the center of the selected pane.



Insert a map view into a cross section, to give the cross section spatial perspective.

Changing the Inserted Map

To change the map that is displayed in the inserted map, click on the *Map View* object in the **Object Manager**. In the **Property Manager**, click on the name next to *Map View Name*. In the list, select the desired map view to display. The inserted map automatically updates. Click *[None]* if no map view should be displayed.

Editing the Inserted Map

The inserted map displays exactly as it appears in the linked map view. To make any changes to the inserted map, select the map view in the **View Manager**. Make any changes to the appearance of the map and the inserted map automatically updates.

Insert Map View Unavailable

If no map view has been created in the project, the **Draw | Insert Map View** command is not available. Create a map view by clicking the **File | New | Map View** command. In the map view, create a base map or well location map. Then insert the map in the borehole view or cross section view using the **Draw | Insert Map View** command.

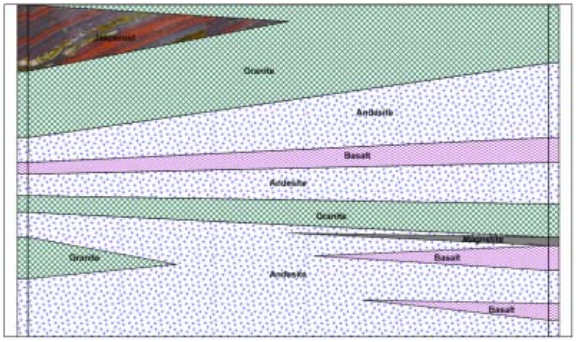
Chapter 6

Cross Sections and the Cross Section View

Cross Section View

There are four different view window types available in a **Strater** workspace: borehole views, map views, cross section views, and tables. There is no limit to the number of views that can be associated with a **Strater** project.

Cross section views display multiple wells on a page. Cross sections can be created from zone bar, lithology, or line/symbol log types. Each well can have a variety of curves, similar to a borehole view but these logs are not included in the automatic cross section connections.



This cross section displays two wells and the layers between.

Wells are connected to display layers, zones, or lithologies across the page, connecting information from the wells. Automatic connections between wells can be made. The wells can also be displayed without connections or with manual connections, connecting the wells where you select, as well.

Well spacing and elevation hanging can be altered to give you the look you need to display your data. Wells can be displayed vertically or with deviations calculated from *Inclination* (or *Dip*) and *Azimuth* columns from a table.

The cross section view also allows data to be exported to a data file for use in **Surfer** or exported to a **Voxler** 3D display to create fence diagrams. Drawing objects and labels can be added to a cross section view.

Opening a New Cross Section View

New cross section views are created in an existing project by clicking the **File | New | Cross Section View** command, clicking the  button, or right-clicking in the **View**

Manager and choosing *New Cross Section View* to add a new blank cross section view to the existing project.

A new cross section window can also be created with the **Cross Section | Create Cross Section** command.

Opening an Existing Cross Section View

Existing cross section views are opened by clicking the appropriate **Cross Section** tab, clicking the cross section view name in the **View Manager**, or by clicking **Window | [Cross Section name]**. By default, the first cross section view is named **Cross Section 1** so this cross section view would be opened by clicking the **Window | Cross Section 1** command.

Panes

There are two main components of a cross section view: the cross section pane and the header pane. There is also a footer pane, but it is usually not visible. The panes are outlined when you open a blank cross section view. The upper rectangle is the header pane, the lower rectangle is the cross section pane. You can change the rectangle line properties in the **View Properties**. The size of the header, log, and footer panes is defined by clicking **File | Page Setup**.

The header and footer panes generally contain well header, cross section identifiers, text, scale bars, and other inoformation. Horizontal scale bars can be associated with a cross section. When the scale bar is linked to a cross section, the scale bar changes as changes are made to the cross section.

The cross section pane contains all the graphical log and layer items to display the cross section. This pane is dependent on linked tables and columns to create the graphical view. The cross section pane is also dependent on depth and scaling values. These values determine the size of the pane rectangle and/or the number of pages. The cross section pane can also contain legends, text and linked text, drawn objects, and imported images, as well.

Modes

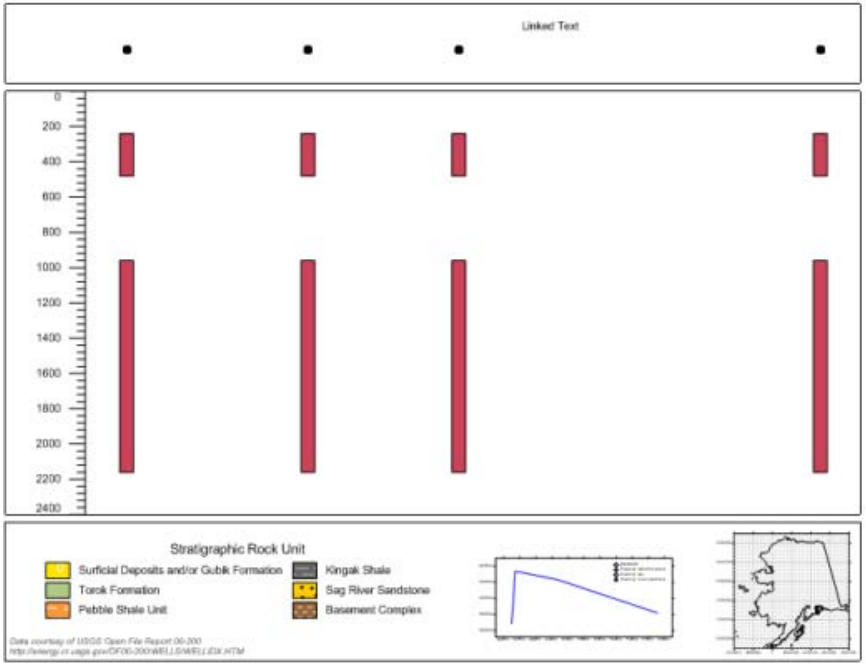
There are two "modes" in the cross section view - design mode and active mode. Design mode is used to create layouts and templates without attaching them to data. When the program is in active mode, the graphics are linked to data as they are being created.

Active Mode

An active or "live" borehole or cross section is a view window design that shows information in logs based on data in the data tables. All new boreholes created by clicking the **File | New | Project** command or clicking the  button are automatically in active mode.

Design Mode

If you prefer to design the cross section first and then associate data later, you can use design mode. This is a good option if you wish to create a cross section design, but do not have any actual data. When designing a cross section view in design mode the screen shows generalized representations of the logs. The logs displayed in design mode are fictitious and intended to give an impression of how the cross section view will look when actual data is attached. No layers are displayed between wells.



This cross section view is displayed in design mode. Zone bars are displayed in design mode, but the layers between wells are not displayed.

Switching Between Active and Design Modes

If you open an existing borehole or cross section view and are unsure if it is active or design mode:

- Check the **Log | Design Mode** command or the  toolbar button. If the button is depressed () you are in design mode. To change to active mode click this command or button again.
- Look in the **Property Manager** on the **View** tab and inspect the *View Mode* option. This is a read-only option that displays either *Design mode* or *Active mode*.
- Press F4 on your keyboard to toggle between active mode and design mode.

Linking Data to the Object

When creating objects in design mode or after loading a template file, data are not associated with the objects. A cross section becomes "live" or active when data are applied.

The general steps to activate a borehole are:

1. Create objects in the cross section view.
2. Open, import, or create data.
3. To link each log to a different well:
   a. Click on the object in the cross section view or in the **Object Manager**.
   b. Click on the **Base** tab in the **Property Manager**.
   c. Next to the *Hole ID Filter* field, click on the existing option and select a borehole name from the list.
4. In the **Property Manager** edit the properties including data tables, data columns, and schemes.
5. Switch to active mode by clicking the **Log | Design Mode** command or the  button.

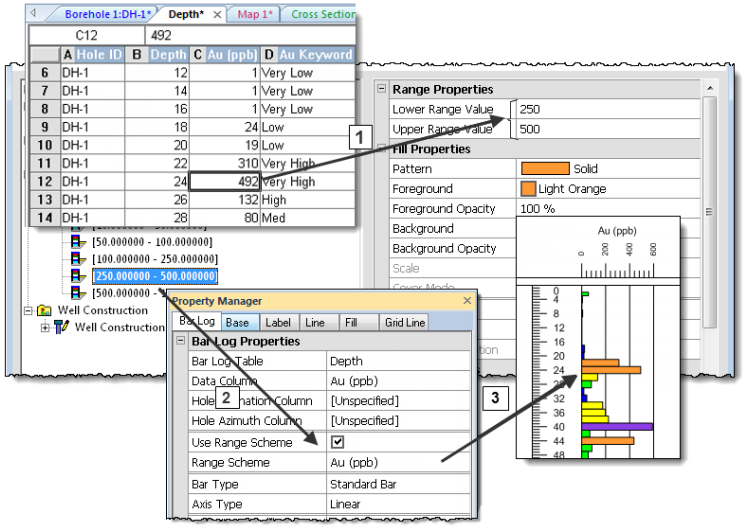
If all objects are properly linked to data and the depth scaling values are correct, the place holders in the borehole view change to display your data. If the information is not correct for the data you have selected, you may end up with a blank cross section. Check the data and borehole **View Properties** in the event of a blank cross section.

Data, Schemes, and Log Properties

The data, scheme, and log, map, or cross section properties are all related in the process of creating a log in a borehole view or cross section view, creating a map Wells layer, or creating layers in a cross section. The data contains depth information (either single depth or from-to interval depth), borehole names, and the data to be displayed on the log. Schemes contain line, symbol, label, and fill property information that links the data to the log. When scheme information (keywords or numeric ranges) is found in the data, the logs in the borehole or cross section displays the properties of the scheme. The **Property Manager** determines which data table and column are used to create the log, the scheme to use (if any), and properties such as the log width. Each log item can use a different data table, column, scheme, and properties.

Project data, schemes, and log properties are all related in the process of creating a borehole log.

1. The data in each row is linked to a scheme item. This scheme links the *Au (ppb)* values from column C. In this case, the data in row 12 has a value of 492 and appears at a depth of 24. The data in row 12 falls within the range scheme item of 250 to 500. Note the fill is a solid light orange.
2. A bar log is created displaying the *Au (ppb)* data column. The *Au Concentration* scheme is selected.
3. The bar log is displayed. The *Au Concentration* scheme determines the appearance of the log. The color at the depth 24 is light orange, as indicated by the scheme.



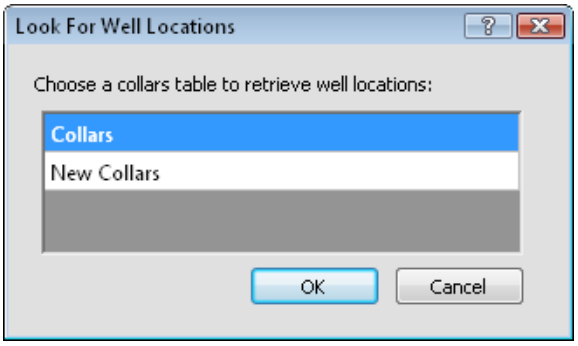
This diagram shows the connection between a value in the table column, the scheme, and the log being displayed.

Creating a Zone Bar or Lithology Log Cross Section

To create a cross section, click the **Cross Section | Create Cross Section** command or click the  button. The program will step you through the process of importing data and selecting the wells to display in the cross section.

Strater requires that a lithology or interval table be created for lithology/zone bar log cross sections. To create a zone bar or lithology log cross section in **Strater**:

1. Click the **Cross Section | Create Cross Section** command.
2. Select the collars table:
   a. If a single collars table exists, it is automatically selected.
   b. If multiple collars tables exist, select the appropriate collars table in the **Look for Well Locations** dialog and click *OK*.
   c. If no collars table exists, select the file that contains the collars information in the **Open Collars File** dialog and click *Open*. For example, select *Example Data.xls* from the Samples folder and click *Open*.



Select the appropriate collars table and click OK.

   d. In the **XLS Import Options** dialog, select the *Collars* sheet and click *OK*.
   e. In the **Specify Worksheet Column Definitions** dialog, make sure that *Specify Column Header Row* is checked and that the row number is set to 1. Click *Next*.
   f. In the **Specify Data Type and Column Positions** dialog, make sure that all columns are listed correctly. Click *Finish*.
3. At this point, a map view is created with the wells in the collars table. In the **Create Well Selector** dialog,
   a. Set the order the wells are displayed in the list on the right side of the dialog. The first well listed is on the far left side of the cross section. The last well listed is on the far right side of the cross section. Wells are displayed in the cross section in the order listed on the right side of the dialog. To rearrange the order, click on a well on the right side of the dialog and drag it to the desired location in the list.
   b. To add wells to the cross section, click on the well name on the left side of the dialog in the *Available wells* list. Click the *Add* button to add the well to the right side of the dialog.

c. To remove wells from the cross section, click on the well name on the right side of the dialog in the *Wells in selector* list. Click *Remove* to remove the selected well.

d. When all the wells are in the proper order, click *OK*. The wells should be listed as DH-1 first and then DH-2 for this example. After clicking *OK*, the well selector line is created in the map view.

4. In the **Import Or Select Data To Create Cross Section Logs** dialog,

   a. Set the *Type of cross section logs to be created* to *Lithology/Zone bar log*.

   b. Click the *Import Data* button for *DH-1*.

   c. In the **Import Data** dialog, select the *Example Data.xls* file and click *Open*.

   d. In the **Multisheet Selection** dialog, select the *Lithology* sheet and click *OK*.

   e. In the **Specify Worksheet Column Definitions** dialog, make sure that *Specify Column Header Row* is checked and that the row number is set to 1. Click *Next*.

   f. In the **Specify Data Type and Column Positions** dialog, make sure that all columns are listed correctly. Click *Finish*.

   g. Since both logs now have a *Table* and *Data Column* defined, click *OK*.

The default cross section is created. Because the cross section was created from *Lithology/Zone bar log*, the logs are displayed showing the wells that were selected and the connected layers between the wells are also displayed.

Creating a Line/Symbol Cross Section

Strater requires that a depth, interval, or lithology table be created for line/symbol log cross sections. To create a line/symbol log cross section in **Strater**:

1. Click the **Cross Section | Create Cross Section** command.
2. Select the collars table:

   a. If a single collars table exists, it is automatically selected.

   b. If multiple collars tables exist, select the appropriate collars table in the **Look for Well Locations** dialog and click *OK*.

   c. If no collars table exists, select the file that contains the collars information in the **Open Collars File** dialog and click *Open*. For example, select *Example Data.xls* from the Samples folder and click *Open*.

   d. In the **XLS Import Options** dialog, select the *Collars* sheet and click *OK*.

   e. In the **Specify Worksheet Column Definitions** dialog, make sure that *Specify Column Header Row* is checked and that the row number is set to 1. Click *Next*.

f. In the **Specify Data Type and Column Positions** dialog, make sure that all columns are listed correctly. Click *Finish*.

3. At this point, a map view is created with the wells in the collars table. In the **Create Well Selector** dialog,
   a. Set the order the wells are displayed in the list on the right side of the dialog. The first well listed is on the far left side of the cross section. The last well listed is on the far right side of the cross section. Wells are displayed in the cross section in the order listed on the right side of the dialog. To rearrange the order, click on a well on the right side of the dialog and drag it to the desired location in the list.
   b. To add wells to the cross section, click on the well name on the left side of the dialog in the *Available wells* list. Click the *Add* button to add the well to the right side of the dialog.
   c. To remove wells from the cross section, click on the well name on the right side of the dialog in the *Wells in selector* list. Click *Remove* to remove the selected well.
   d. When all the wells are in the proper order, click *OK*. The wells should be listed as DH-1 first and then DH-2 for this example. After clicking *OK*, the well selector line is created in the map view.
4. In the **Import Or Select Data To Create Cross Section Logs** dialog,
   a. Set the *Type of cross section logs to be created* to *Line/Symbol log*.
   b. Click the *Import Data* button for *DH-1*.
   c. In the **Import Data** dialog, select the *Example Data.xls* file and click *Open*.
   d. In the **Multisheet Selection** dialog, select the *Depth* sheet and click *OK*.
   e. In the **Specify Worksheet Column Definitions** dialog, make sure that *Specify Column Header Row* is checked and that the row number is set to 1. Click *Next*.
   f. In the **Specify Data Type and Column Positions** dialog, make sure that all columns are listed correctly. Click *Finish*.
   g. Since both logs now have a *Table* and *Data Column* defined, click *OK*.

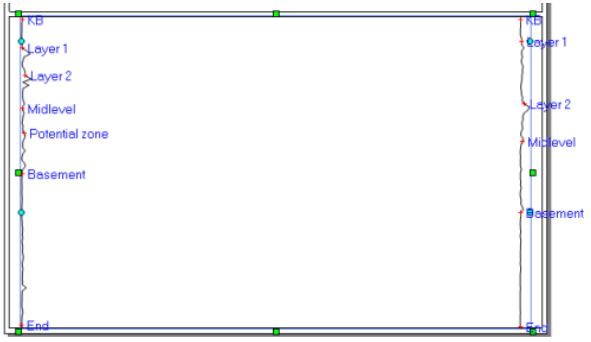
The default cross section is created. Because the cross section was created from *Line/Symbol log*, the logs are displayed showing only the line/symbol logs and no layers are created.

Manually Connecting Wells on a Cross Section

With line/symbol log cross sections, wells are manually connected by using layer marks. Layer marks can be created in another program, such as Excel and imported into the cross section. Or layer marks can be selected directly on the line/symbol logs displayed on the cross section.

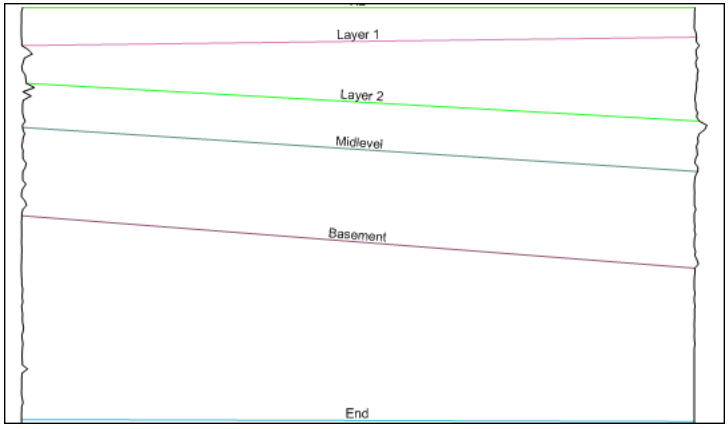
To manually click each layer mark:

1. Click on the *Cross Section* object in the **Object Manager**.
2. Click the **Cross Section | Layer Marks | Create/Edit** command to start picking locations on each log where a layer should be located. The cursor changes to .
3. Click on either log in any locations to make a layer mark. Generally, the top or bottom of the layers should be clicked to create a data file of tops. As the mouse hovers over a log, the log name and depth appear in a large box beside the log. This makes it easier to select the precise location of each layer mark.
4. After clicking on the log, the **Name The Layer** dialog appears. Type a name for the location where you clicked, such as *Layer 1*, or the actual name of the layer. Click *OK* in the dialog after naming the location.
5. Continue clicking on each log in the cross section to assign the layer top or bottom locations. Not all layers need to be assigned for each well, but in order for the wells to be connected some of the same layer names should be assigned to each log in the cross section.
6. If the area from the top of the well to the first layer should be filled, be sure to click on the top of each well and assign a layer name, such as *Top, Overburden,* or *KB*.
7. If the area below the last layer should be filled, be sure to click on the bottom of each well and assign a layer name, such as *End*.
8. If a location is selected incorrectly, right-click on the same location to remove the layer mark.



After clicking a few layer marks on each log, your cross section may look something like this.

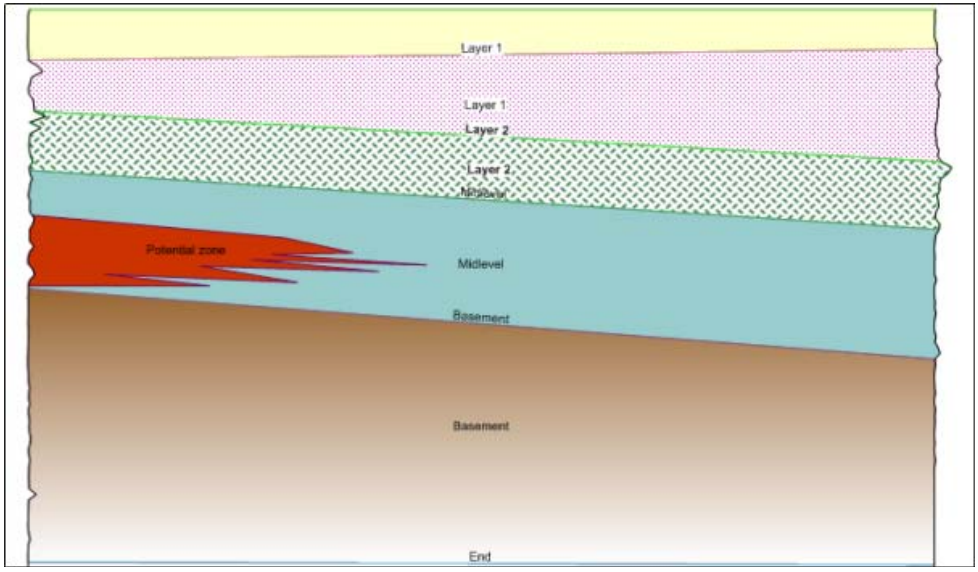
9. After selecting all layer marks, press ENTER on the keyboard to end layer mark creation/editing mode.
10. In the **Save Layer Marks To Table** dialog, check the *Save layer marks to table* option to save the marks to a table. You can select any of the existing tables, or type a new table name next to *Table name*. Click *OK* and the layer marks are saved to the table.
11. Click *Yes* in the warning message which indicates that the cross section will be redrawn. The layer marks are now connected across the logs.



The layer marks are now connected across the logs.
Layer labels have been added by checking the Show Layer Labels *option in the* ***Property Manager****.*

12. Notice that the *Potential zone* layer mark on DH-1 does not have a layer. This is because the same mark does not exist on DH-2. A new layer can be created named *Potential zone*. With the *Cross Section* object selected, click the **Cross Section | Connect Logs with Layers** command.
13. In the **Select Or Enter Layer Name** dialog, click on the existing name and select *Potential zone* from the list. Click *OK*.
14. Click on the DH-1 log near where the *Potential zone* layer mark was created.
15. Hold down the SHIFT key and click on locations between the two logs to make a pinchout layer.
16. Click on the DH-1 log above the *Basement* layer line.
17. Press ENTER on the keyboard or double click the last point to end the layer creation mode. A *Potential zone* layer is created and automatically filled.
18. To fill the rest of the layers, make sure that the *Layers* object is selected in the **Object Manager**. In the **Property Manager**, click on the Layers tab and check the box next to *Fill between Layer Lines*.

19. Since the *Potential zone* layer was created before filling the layers, it is now at the bottom of the list of layers in the **Object Manager**. Click on the *Potential zone* layer and click **Arrange | Order Objects | Move to Front**.
20. To change the colors of the layers, the scheme can be edited. Click the **Draw | Scheme Editor** command.
21. Open the *Cross Section Scheme* by clicking on the ⊞ next to *Cross Section Scheme*.
22. Click on the first item in the scheme. Assign fill colors and properties.
23. Repeat steps 21 and 22 for each additional item in the scheme. When the scheme colors are set appropriately, click *OK* to close the **Scheme Editor**.
24. When all edits have been made, the layer lines can be unchecked in the **Object Manager**. This leaves only a single label in the center of each layer. The cross section may look like the following.



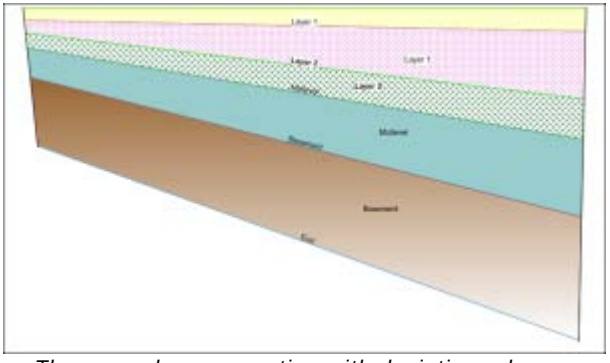
After editing the layer colors and label properties, the final cross section may look like this.

Displaying Deviated Logs on a Cross Section

To display deviated logs on a cross section, you will need inclination (or dip) and azimuth data for each log that should be displayed as deviated.

To display a cross section as deviated:

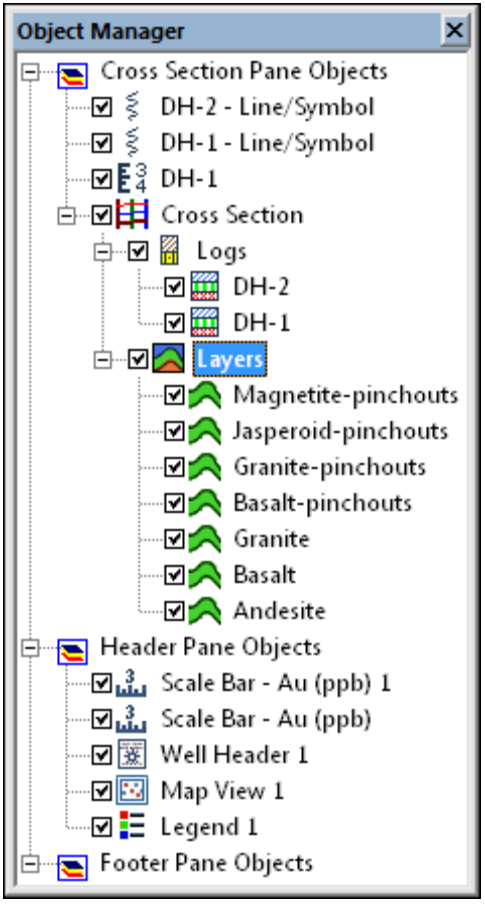
1. Create the lithology,or zone bar, or line/symbol cross section as normal. Use the steps in the previous section for a good example.
2. Click on the *Logs* item in the **Object Manager**.
3. In the **Property Manager**, click on the **Logs** tab.
4. Set the *Hole Inclination Column* or *Hole Dip Column* to the table that contains the deviation information.
5. Set the *Hole Azimuth Column* to the table that contains the deviation information.
6. Click on the *Cross Section* object in the **Object Manager**.
7. On the **Cross Section** tab, check the box next to the *Display Logs As Deviated* option.
8. If desired, click *Yes* in the dialog so that the *Depth Method* is automatically set to *True Vertical Depth*. Alternatively, click *No* and set the *Depth Method* manually.
9. Click the **View | View Properties** command.
10. Click on the **View** tab in the **Property Manager**.
11. Set the *Depth Method* to *True Vertical Depth*.



The example cross section with deviations shown. When a line/symbol log is displayed, the log is displayed as a straight line.

Parts of a Cross Section

The **Object Manager** in a cross section view window contains all of objects that are in the view. The **Object Manager** is split into three sections: *Cross Section Pane Objects, Header Pane Objects*, and *Footer Pane Objects.* Drawn objects, such as rectangles, legends, and text can appear in the **Object Manager** in any of the three panes. When a cross section is created, a *Cross Section* object is added to the *Cross Section Pane Objects.* The *Cross Section* object contains a *Logs* object and a *Layers* object. The *Logs* object contains all of the logs that are part of the cross section. The *Layers* object contains all of the layers that are part of the cross section. When logs are added to the cross section by clicking the **Log** menu commands, the logs are added to the *Cross Section Pane Objects*, but are not part of the *Cross Section* object.



*The **Object Manager** contains a list of all objects in the cross section view. The* Layers *object is selected in this example.*

Cross Section Object

The *Cross Section* object is created when a new cross section is created with the **Cross Section | Create Cross Section** command. The *Cross Section* object controls properties for the entire cross section. This include the spacing for the cross section, the ability to recreate the cross section, and whether the logs are deviated or vertical on the cross section.

Logs Object

The *Logs* object is created when the cross section is created and contains all of the lithology, zone bar, or line/symbol logs that are a part of the cross section. These are the logs defined when the cross section is created, either by the selected well selector line in the map view or by the logs selected in the **Create Well Selector** dialog.

Some shared log properties of all logs in the cross section can be set by clicking on the Logs object. To see a list of all of the

individual logs in the cross section, click the ⊞ next to *Logs* in the **Object Manager**. The individual logs can be edited by clicking on the individual log object and making the changes in the **Property Manager**.

To change the order of the logs in the cross section, click on an individual log in the **Object Manager** and drag it to the desired position. The bottom log in the **Object Manager** is located on the left side of the cross section. The top log in the **Object Manager** is located on the right side of the cross section. Click *Yes* in the warning dialog to automatically recreate the layers.

Log Item

An individual log item can be selected from the *Logs* list in the **Object Manager**. The log's properties can be set separately from all other objects. See the lithology, zone bar, or line/symbol log properties for information on individual log properties. Individual logs can be removed from the cross section by clicking on the log name and pressing the DELETE key on the keyboard.

To change the order of the logs in the cross section, click on an individual log in the **Object Manager** and drag it to the desired position. The bottom log in the **Object Manager** is located on the left side of the cross section. The top log in the **Object Manager** is located on the right side of the cross section. Click *Yes* in the dialog to automatically recreate the layers.

Layers Object

The *Layers* object is created when the cross section is created and contains all of the layers that are defined by the intervals in the lithology or zone bar logs in the cross section. The layers can be controlled with a keyword scheme on the **Layers** tab in the **Property Manager**. The line, fill, and label properties for all layers can also be controlled by clicking on the *Layers* object if a scheme is not used. The **Info** tab contains the number of layers in the cross section. To see a list of all the layers in the cross section, click the ⊞ next to *Layers* in the **Object Manager**. The individual layers can be edited by clicking on the individual layer name and making the changes in the **Property Manager**.

Layer Item

An individual layer item can be selected from the *Layers* list in the **Object Manager**. The layer's line and fill properties can be set as part of the scheme on the *Layers* object, or individually. To set the layer properties individually, be sure to first uncheck the *Use Scheme For Line/Fill* box on the Layers tab of the *Layers* object.

To change the order of the layers in the cross section, click on an individual layer and drag it to the desired position. It is recommended that the pinchout layers stay above the non-pinchout layers so that the cross section is drawn correctly. If the layer order is changed and results in a cross section that is not appropriate, click on the *Cross Section* object and click the Recreate button in the **Property Manager**.

When wells are displayed as deviated, additional layers are displayed in the **Object Manager**. Each layer is broken into multiple pieces, so that the areas between wells can be individually edited.

If automatic layers are not desired, manual layers can be created using the **Connect Logs with Layers**, and layer mark **Import** and **Create/Edit** commands. When using layer marks, the layer lines and layer fill objects are listed in the *Layers* list in the **Object Manager**.

Well Header

The *Well Header* object is added by clicking the **Cross Section | Add Well Headers** command. The well header properties control the items that are displayed in the well header, including the distance between wells, well symbol symbol, and the text that is displayed in the header for each well.

Drawn Logs

Any log type can be added to the cross section by clicking the appropriate command under the **Log** menu. These logs are not used in the automatic interpolation of the cross section layers. But, they can be used when picking layer marks. To position these logs in the appropriate spot on the cross section, make sure the appropriate Hole ID is selected for the *Hole ID Filter* on the **Base** tab for the log. Then, click the **Log | Overlay Logs** command to move all of the logs for each borehole directly on top of each other or the **Log | Adjoin Logs** to move all of the logs for each borehole directly beside each other. When the *Reference Datum* changes in the Cross Section **View Properties**, these logs also move, if layers can be found for each log.

Cross Section View Properties

The depth method, reference datum, and depth settings for the entire cross section are controlled on the Cross Section View Properties. To edit the view properties, click the **View | View Properties** command or click the  button.

Cross Section View Properties

The depth method, reference datum, and depth settings for the entire cross section are controlled on the cross section **View** properties. To edit the view properties, click the **View | View Properties** command or click the  button.

To view the general settings for a cross section view in the **Property Manager,**

- Click the **View | View Properties** command,
- Click **Edit | Deselect All**,
- Click the  button,
- Click on the view name in the **View Manager**,
- Right-click on the view name in the **View Manager** and choose *View Properties*, or
- Click the mouse in any white space in the cross section view that is not part of a cross section or object.

The cross section view settings contain the name of the basic settings for the cross section, including the cross section name, depth range, scaling, units, display mode, the reference datum, and any vertical exaggeration that may exist in the cross section. You can also manage the cross section items and recreate the cross section.

View Properties

The **View** tab contains the borehole and depth options.

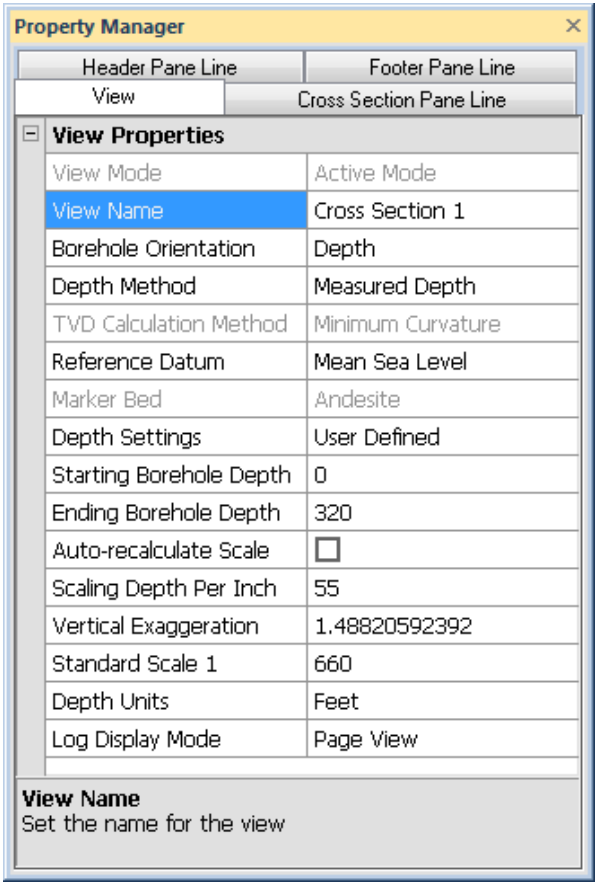
View Mode

This is a read-only field that displays whether the current project is in design mode or active mode. Design mode is used to create graphics without attaching them to data. Design mode is useful when designing complex logs or when designing templates. When the program is in active mode, the graphics are linked to data as they are being created.

Toggle back and forth between design mode and active mode with the **Log | Design Mode** command or by clicking the  button.

View Name

The *View Name* is the label that appears in the cross section view tab. **Strater** projects can contain multiple cross section views. *View Name* is a way to separate the various views from one another and to clearly identify the view. The default name of the tab is *Cross Section 1*. To change the view name, highlight the existing name and type the new desired name of the view in the *View Name* field.



*Use the **View** tab to set depth options and the borehole ID.*

Borehole Orientation

The *Borehole Orientation* tells **Strater** whether values in the depth column increase down or up. To change the orientation, click on the existing option and select the desired option from the list. Set the borehole orientation to *Depth w*hen the *Starting Borehole Depth* is less than the *Ending Borehole Depth.* Set the borehole orientation to *Elevation* when the *Starting Borehole Depth* is greater than the *Ending Borehole Depth.*

The borehole orientation will automatically change to reflect the current *Starting Borehole Depth* and *Ending Borehole Depth.* For example, if the borehole orientation was originally set to *Elevation* and a user changed the start depth to be less than the end depth, the borehole orientation field automatically changes to *Depth*.

Depth Method

The *Depth Method* sets the display of the view to either measured depth or true vertical depth. The *Measured Depth* is the depth values from the tables. The *True Vertical Depth* is calculated from the depth values in the tables and the azimuth and inclination (or dip) values using the *TVD Calculation Method*. To change the depth method, click on the existing option and select the desired option from the list.

All logs except for depth logs are displayed using the specified depth method.

TVD Calculation Method

When the *Depth Method* is set to *True Vertical Depth*, the displayed depth value is calculated using the depth from the table and the azimuth and inclination (or dip). The *TVD Calculation Method* determines how the values are combined to get the true vertical depth. Available options are *Tangential, Average Tangential, Balanced Tangential, Radius of Curvature,* and *Minimum Curvature*. The default is *Minimum Curvature*, which provides a good estimate of the true vertical depth. To change the calculation method, click on the existing option and select the desired option from the list.

Reference Datum

The *Reference Datum* is the surface on the earth that defines the vertical reference for all wells in the cross section. Changing the reference datum results in the cross section being regenerated and "hung" on a different marker. A cross section hangs on an imaginary horizontal line that runs across the cross section. The reference datum follows this horizontal line. To change the *Reference Datum*, click on the existing option and select the desired option from the list. Available options are *[None], Mean Sea Level,* and *Marker Bed*. Selecting *[None]* plots all boreholes at the starting depth. Elevations are not considered. *Mean Seal Level* places sea level (elevation = 0) on the horizontal line. All other locations vary based on depths and elevations from seal level. The wells in the cross section will be placed at their respective elevations, as entered in the collars table. *Marker Bed* places the horizontal line at the top of the selected layer in the cross section.

If you change the *Reference Datum* to either *Mean Sea Level* or *Marker Bed* and if the *Depth Settings* are set to *Collars Table* or *User Defined*, then the *Starting Borehole Depth* and *Ending Borehole Depth* values will not be updated. This may result in parts of the cross section, or the entire cross section, being created off the visible page.

Marker Bed

When the *Reference Datum* is set to *Marker Bed*, the *Marker Bed* option becomes available. This is the level in the cross section that defines how all wells are compared. The marker bed is the bed that is at the same vertical location across the cross section and all wells.

Depth Settings

The *Depth Settings* option controls the starting and ending borehole depths. There are three options: *Automatic, Collars Table,* and *User Defined.* To change the *Depth Settings*, click on the existing option and select the desired option from the list.

- By default, the *Depth Settings* option is set to *Automatic*. When the *Depth Settings* option is *Automatic*, **Strater** scans the existing data tables to determine the starting and ending borehole depths that will fit all data.

  When the *Depth Settings* option is set to *Automatic* and the *Depth Method* is set to *True Vertical Depth*, the deviation field in the depth or interval table is used to calculate the overall true vertical depth. If the deviation field is missing from the depth/interval table, then the deviation field from the collars table is used. If the deviation field is missing from the collars table, the deviation value of 0 is used.

- When the *Depth Settings* option is set to *Collars Table*, the starting and ending borehole depths are retrieved from a collars table. You can also specify the scale of the borehole view in a collars table. Select a borehole in the *Hole ID Filter* list to update the *Automatic* and *Collars Table* selections.

  When the *Depth Settings* option is set to *Collars Table* and the *Depth Method* is set to *True Vertical Depth*, the deviation field in the collars table is used to apply the starting and ending depths. If the deviation field in the collars table is missing, the deviation value of 0 is used.

  If *Reference Datum* is set to *Mean Sea Level* or *Marker Bed* and the *Depth Settings* is set to *Collars Table*, the *Starting Borehole Depth* and *Ending Borehole Depth* values will not be updated. This may result in parts of the cross section, or the entire cross section, being created off the visible page.

- When the *Depth Settings* option is set to *User Defined*, the *Starting Borehole Depth* and *Ending Borehole Depth* are available.

  When the *Depth Settings* option is set to *User Defined* and the *Depth Method* is set to *True Vertical Depth*, the deviation field in the depth or interval table is used to calculate the overall true vertical depth. If the deviation field is missing from the depth/interval table, then the deviation field from the collars table is used. If the deviation field is missing from the collars table, the deviation value of 0 is used.

  If *Reference Datum* is set to *Mean Sea Level* or *Marker Bed* and the *Depth Settings* is set to *User Defined*, the *Starting Borehole Depth* and *Ending Borehole Depth* values will not be updated. This may result in parts of the cross section, or the entire cross section, being created off the visible page.

Starting Borehole Depth

If the *Depth Settings* option is set to *User Defined*, you can specify the starting borehole depth. The *Starting Borehole Depth* is the depth to begin the data display. If the *Starting Borehole Depth* is greater than zero, the *Ending Borehole Depth* must be greater than the starting value. Likewise, if the *Starting Borehole Depth* is less than zero, the *Ending Borehole Depth* must be less than the starting value. If the *Starting Borehole Depth* is zero, the *Ending Borehole Depth* can be either negative or positive.

Ending Borehole Depth

If the *Depth Settings* option is set to *User Defined*, you can specify the borehole range. The *Starting Borehole Depth* is the depth to begin the data display and the *Ending Borehole Depth* is the ending depth for data display. If the *Starting Borehole Depth* is greater than zero, the *Ending Borehole Depth* must be greater than the starting value. Likewise, if the *Starting Borehole Depth* is less than zero, the *Ending Borehole Depth* must be less than the starting value. If the *Starting Borehole Depth* is zero, the *Ending Borehole Depth* can be either negative or positive.

Auto-recalculate Scale

Uncheck the box next to the *Auto-recalculate Scale* option if you want to manually adjust the *Scaling Depth per [Centimeter/Inch], Vertical Exaggeration,* and the *Standard Scale 1* fields. Check the box next to *Auto-recalculate Scale* to not edit these fields. **Strater** will automatically calculate the scale of the cross section display so that all data fits on a single page.

Scale Depth Per Inch/Centimeter

Use the *Scaling Depth Per Inch* (or *Centimeter*) to scale the borehole in units of measurement on the physical page. This value must be greater than zero. The page length limit is 2000 inches. To change the units between inches and centimeters use the general settings in the **Options** dialog.

Vertical Exaggeration

The *Vertical Exaggeration* sets the ratio of the X scale (distance between wells) over the Y scale (depth down the hole). To change the *Vertical Exaggeration*, highlight the existing value and type the desired value. Press ENTER on the keyboard to make the change.

The Y scale is displayed by the *Scaling Depth Per Inch* and *Depth Units* options. The X scale is defined as the distance between the farthest left and farthest right wells in map units divided by the physical distance between the centers of the farthest left and farthest right wells in page units. The map units are determined by the *Map* coordinate

system for the map from which the cross section was created or by the collars table Easting and Northing column units.

A *Vertical Exaggeration* of 1 is considered no vertical exaggeration when the X, Y, and depth units are the same. This means that the distance covered by one page unit vertically is the same as the distance covered by the same page unit horizontally, when the units are the same. For instance, when all of the values are reported in feet or all of the values are reported in meters, a *Vertical Exaggeration* of 1 shows one foot or meter the same vertically and horizontally.

When the X, Y, and depth units are not the same, the map units (X and Y) are converted to the depth units internally. The *Vertical Exaggeration* value should then be altered to include the difference in units. For instance, if the map units are in meters and the depth units are in feet, a *Vertical Exaggeration* of 3.28084 will provide teh same distance equally in the horizontal and vertical directions.

If the X, Y, or depth units are unspecified, the units should be the same.

Standard Scale 1

The *Standard Scale 1* displays the ratio between the scale depth per inch and the depth units you select. For example, if the scale depth per inch is set at 2 and the depth units are *Feet* the standard scale automatically displays *24*, which is the number of inches per unit of depth (12 inches in a foot) multiplied by the scale depth per inch (2).

If you change the standard scale 1 number, the scale depth per inch automatically changes as well. For example, if you change the standard scale 1 number from 24 to 36 the scale depth per inch value changes to 3. If you change the depth unit to *meters* the standard scale value changes to 118.11, which is the number of inches in 3 meters.

Depth Units

Select the borehole unit type from the *Depth Units* list. The units selected here are the base units for the depth log. These units are converted in the cross section view to the units for any depth logs.

Log Display Mode

The *Log Display Mode* shows the current borehole in either *Page View* or *Full View*.

Page View separates the log into multiple pages with page breaks. The header and footer can be shown on each page, on only the first or last pages, or not at all by setting the display and size of the panes in the Page Setup dialog. If the *Log Display Mode* is set to *Page View* select **View | Page** or click the  buttons to move among the pages.

The *Full View* shows the header and footer but expands the log pane to show the whole length of the log with no breaks.

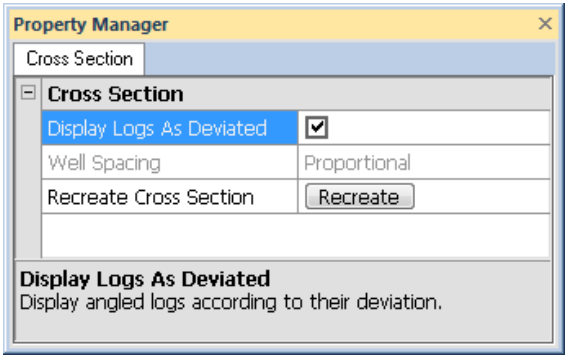
Cross Section Pane Line / Header Pane Line / Footer Pane Line tabs

Use these tabs to adjust the line properties that surrounds each pane. Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

Cross Section Properties

Some cross section properties edit the entire cross section view. These include the well spacing and whether the logs are displayed as deviated. Individual objects can still be changed, but these default properties control all of the objects that have not been specifically changed.

To edit the common cross section properties, click on the *Cross Section* object in the **Object Manager**. The properties are listed in the **Property Manager**.



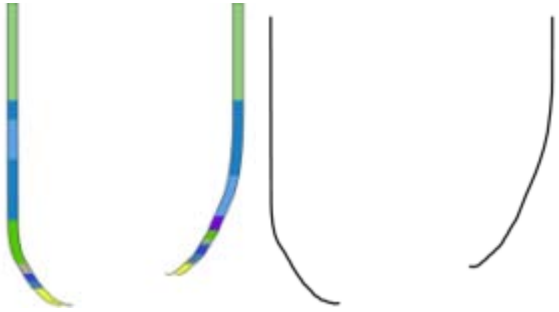
*Set the cross section properties on the **Cross Section** tab.*

Display Logs As Deviated

Check the box next to the *Display Logs As Deviated* to show all deviated logs as non-vertical in the cross section. In addition to checking this box, make sure that the *Depth Method* on the cross section View properties page is set to *True Vertical Depth* and set the *Hole Inclination Column* (or *Hole Dip Column*) and *Hole Azimuth Column*

on the **Logs** page. To display all wells as vertical, uncheck the *Display Logs As Deviated* box.

When displayed as deviated, lithology and zone bar logs display the log with all properties deviated. Line/symbol logs remove the trace of the line and create a single line that run the length of the borehole, displaying the deviation.



The cross section on the left shows lithology logs as deviated. The cross section on the right shows line/symbol logs as deviated, with the trace removed from the line.

Well Spacing

The *Well Spacing* sets the method to use to place wells on the page. The options are *Proportional* and *Uniform*. Setting the spacing to *Proportional* makes 1 unit of distance the same between all wells. So, two wells that are 200 units apart will be twice as far apart in the cross section as two wells that are 100 units apart. Setting the spacing to *Uniform* places all wells an equal distance from all neighboring wells, regardless of the actual distance between wells. To change the spacing, click on the existing option and select the desired option from the list.

When the *Display Logs As Deviated* option is checked, the *Well Spacing* is automatically set to *Proportional* and cannot be changed.

Cross section linked scale bars should only be used when the *Well Spacing* is set to *Proportional*. When a linked scale bar is attached to a cross section that has a *Proportional* well spacing that is changed to *Uniform*, a warning message appears indicating that the cross section scale bar may not be accurate with the *Uniform* well spacing. In this case, the distances will not be accurate across the entire cross section. Click *Yes* to continue changing the *Well Spacing* to uniform. It is then recommended that the scale bar be deleted. Click *No* to keep the cross section as *Proportional* so that the scale bar is accurate.

When a scale bar is added to a cross section that already has *Well Spacing* set to *Uniform*, a warning message appears indicating that the scale bar measurement will not be accurate. Click *Yes* to add the scale bar. Click *No* to not add the scale bar.

Recreate Cross Section

To recreate the connections between the wells in the cross section, click the *Recreate* button. Click *Yes* in the warning dialog to remove any customizations. Click *No* in the dialog to keep the customizations and not update the cross section.

Cross Section Layer Properties

Click on the *Layers* item in the **Object Manager** to edit properties for all layers in the cross section. Scheme properties, layer names, layers to compare, line properties, fill properties, and label properties can be edited. The Info tab displays information about the number of layers in the cross section.

Tip For Changing Layer Properties

If the individual layer line and fill properties or the *Layers* line, fill, or label properties are not available, a keyword scheme may be in use by the *Layers* object. To turn off the display of the keyword scheme, click on the *Layers* object to select it. Click on the **Layers** tab in the **Property Manager**. Uncheck the boxes next to *Use Scheme for Line/Fill* and *Use Scheme For Label Font*. The layers line, fill, and font properties can now be edited separately.

Layers Properties

Click on the *Layers* item in the **Object Manager** to edit properties for all layers in the cross section. Scheme properties, layer names, layers to compare, line properties, fill properties, and label properties can be edited. The **Info** tab displays information about the number of layers in the cross section.

Use Scheme For Line/Fill

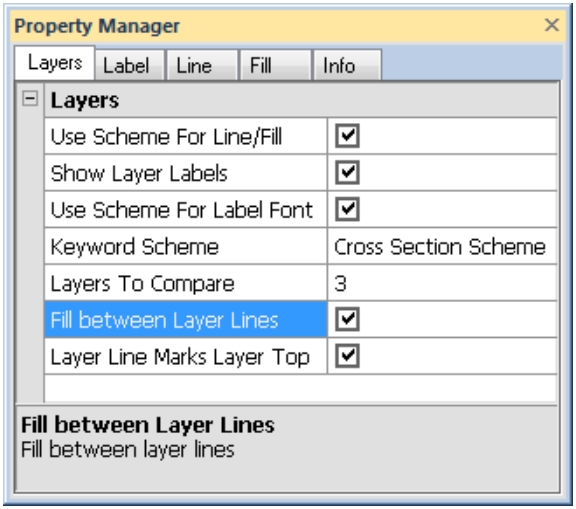
Check the box next to *Use Scheme For Line/Fill* to use a keyword scheme to determine the line and fill properties for each layer in the cross section. Uncheck the box to set the layer properties using the Line and Fill tabs for all layers at the same time. Or, uncheck the box and set the layer properties for each layer individually.

Show Layer Labels

Check the box next to *Show Layer Labels* to display the names of the layers in the cross section. Uncheck the box to remove the layer names. The layer names are determined by the scheme item names.

Use Scheme For Label Font

Check the box next to *Use Scheme For Label Font* to set the font properties for the layer names using the keyword scheme. Uncheck the box to set the layer name font properties Font tab for all layers at the same time. Using the scheme allows each layer to have a different size font, which may work better for displaying names on thin layers.



*Click on the **Layers** tab in the **Property Manager** to load a scheme for the layers in a cross section.*

Keyword Scheme

The *Keyword Scheme* is the scheme that determines the fill and line properties when *Use Scheme For Line/Fill* is checked and the font properties when *Use Scheme For Label Font* is checked. The items in the selected scheme should match the text that appears in the interval or lithology table. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the ... next to the scheme name to open the Scheme Editor, where the scheme can be created or edited.

Layers to Compare

A cross section is created by matching layers between neighboring wells. Sometimes a layer doesn't have a match in the neighboring borehole and a pinchout is created. The *Layers To Compare* option determines the number of layers from each neighboring borehole that each layer in a log should examine before a pinchout is created. The default option is 3. The larger this option is, the less pinchouts will appear on the cross section, but the more likely that layers will connect when they should not. To change the number of layers to compare, highlight the existing value and type the new value. Alternatively, click the to increase or decrease the value. Press ENTER on the keyboard to make the change.

Fill Between Layer Lines

The *Fill between Layer Lines* option is only available for a line/symbol cross section. After importing or creating layer marks, check the box next to *Fill between Layer Lines* to fill the areas between the layer marks. When the box is unchecked, layer lines will appear, but the areas between layer lines will not be filled.

When the *Fill between Layer Lines* is checked, the fill colors for the layers come from the *Keyword Scheme* if the *Use Scheme For Line/Fill* is checked. If the *Use Scheme For Line/Fill* is unchecked, set the layer properties using the Line and Fill tabs for all layers at the same time or set the layer properties for each layer individually.

Layer Line Marks Layer Top

The *Layer Line Marks Layer Top* option controls whether the imported or created layer marks are the location for the layer's top or bottom location. When the box next to *Layer Line Marks Layer Top* is checked, the layer marks are the top of the layer. When the box is unchecked, the layer marks are the bottom of the layer.

Tip for Layer Display

If changing the individual layer line and fill properties or changing the *Layers* line, fill, or font properties shows no change on the layers in the cross section, a keyword scheme may be in use by the *Layers* object. To turn off the display of the keyword scheme, click on the *Layers* object to select it. Click on the **Layers** tab in the **Property Manager**. Uncheck the boxes next to *Use Scheme for Line/Fill* and *Use Scheme For Label Font*. The layers line, fill, and font properties can now be edited separately.

Label Properties

The **Label** tab for a *Layers* object contains font properties for the layer names. The *Font* section lets you define the font properties for all items in the *Map*. Changing this option overwrites any custom text properties. The font properties control the default text for all labels in the cross section layers.

If the options on the **Label** tab are not available, a scheme is being used. To change the label properties on the **Label** tab, uncheck the box next to the *Use Scheme For Label Font* option on the **Layers** tab. Using the scheme allows each layer to have a different size font, which may work better for displaying names on thin layers.

Refer to *Chapter 22 – Drawing Objects* for information about the font properties.

Line Properties

Line properties can be changed for selected objects. To edit the line properties, click on the object in the **Object Manager** or plot window to select it. The properties are listed in the **Property Manager**.

If the options on the **Line** tab are not available, a scheme is likely being used. To change the line properties on the **Line** tab, uncheck the box next to the *Use Scheme For Line/Fill* option on the **Layers** tab. Using the scheme allows layers to have speicfic line and fill properties, which usually works well for cross sections.

Refer to *Chapter 22 – Drawing Objects* for information about the line properties.

Fill Properties

Fill properties can be changed for selected objects. To edit the fill properties, click on the object in the **Object Manager** or plot window. The properties are listed in the **Property Manager**.

If the options on the **Fill** tab are not available, a scheme is likely being used. Uncheck the appropriate *Use Keyword Scheme, Use Range Scheme,* or *Use Indent Keyword Scheme* option to turn off the display of the scheme properties and set the fill properties on the **Fill** tab.

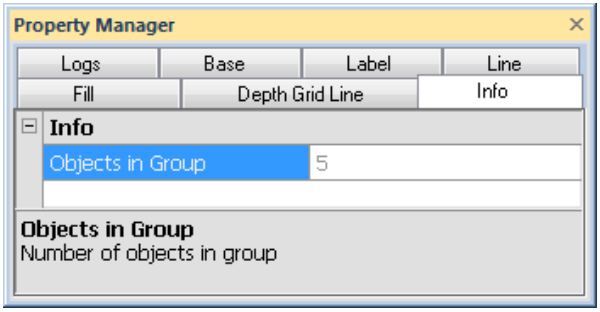
Refer to *Chapter 22 – Drawing Objects* for information about the fill properties.

Cross Section Info Page

The **Info** page for the *Logs* or the *Layers* contains information about the number of logs or the number of layers in the cross section.

Objects in Group

The *Objects in Group* option displays the number of *Logs* or the number of *Layers* that are in the current *Cross Section*.



*The **Info** tab contains information about the* Logs *layer.*

Cross Section Logs Properties

Click on the *Logs* item in the **Object Manager** to edit properties for all logs in the cross section. Log width, hole inclination, dip, and azimuth columns, keywords, and whether intervals are merged can be edited on the **Logs** tab.

The **Logs**, **Base**, **Label**, **Line**, **Fill**, **Display Properties**, **Grid Line**, **Depth Grid Line**, and **Info** tabs control other aspects for all logs in the cross section. Click on an individual log to set that log's properties separately. Refer to chapters 9, 11, and 19 for information about each log type.

Logs Properties

The **Logs** tab controls the log width, the inclination, and the schemes used to display the logs for all logs in the cross section.

Log Width

The log width controls the width for all logs in the cross section. Highlight the existing value and type a new value. Alternatively, click the  button to increase or decrease the size of the logs. Press ENTER on the keyboard to make the change. Click *Yes* in the dialog to recreate the cross section and the log width updates for all logs.

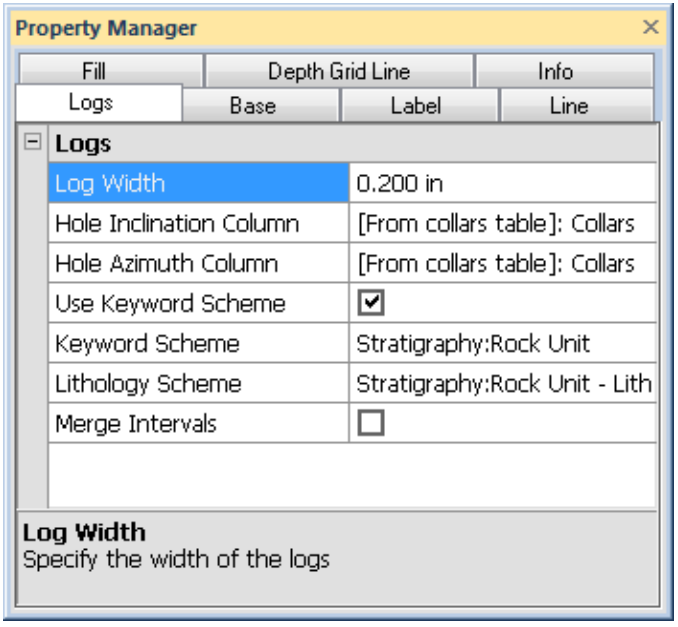
Hole Inclination, Hole Dip and Hole Azimuth Columns

The *Hole Inclination Column* or *Hole Dip Column* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).



*Click on the **Logs** item to edit the shared log properties for all logs in the cross section at once.*

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Zone Bar Table* for zone bar log cross sections, *Lithology Table* for lithology cross sections, or *Curve Table* for line/symbol log cross sections. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Use Keyword Scheme

The *Use Keyword Scheme* option is only available when zone bar logs are in the cross section. The *Use Keyword Scheme* option sets whether the line and fill properties should be based on a keyword scheme or all intervals should use the same properties. To use a keyword scheme, check the box next to the *Use Keyword Scheme* option. To use the same properties for all intervals on the zone bar log or lithology log, uncheck the *Use Keyword Scheme* option. The keyword scheme should match the text that appears in the *Data Column* for the logs.

Keyword Scheme

The *Keyword Scheme* option is only available when zone bar logs are in the cross section. The *Keyword Scheme* is the scheme that determines the fill and line properties when *Use Keyword Scheme* option is checked. The selected scheme should match the text that appears in the *Data Column* for the zone bar logs. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the ... next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Lithology Scheme

The *Lithology Scheme* option is only available when lithology logs are in the cross section. The *Lithology Scheme* is the scheme that determines the fill and line properties. The selected scheme should match the text that appears in the *Lithology Keyword Column* for the lithology logs. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the ... next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Merge Intervals

The *Merge Intervals* option is only available when zone bar logs or lithology logs are in the cross section. The *Merge Intervals* option merges consecutive intervals that contain the same data. Check the box next to the *Merge Intervals* option to merge consecutive intervals that are the same. Uncheck the box next to the *Merge Intervals* option to keep all intervals separate.

Selecting a Log

Click on any log in the **Object Manager** or in the cross section view to select it. When selecting in the cross section view, place the pointer directly over the log when clicking. Cyan circles appear at each end of the selected log. Because the log is part of the cross section on which it is drawn, the eight solid green square handles appear around the entire cross section. The log is also highlighted in the **Object Manager**. The properties for the log are shown in the **Property Manager**.

Editing the Cross Section

There are many parts of the cross section that can be edited, including the size, individual logs, individual layers, displaying logs as deviated, adding additional items to the cross section or recreating the cross section.

Resizing Cross Sections

Cross section views can be resized in a few different ways. The horizontal and vertical location and size are controlled separately because the vertical location is based on the depth, while the horizontal location is based only the well's collar position.

Horizontal Well Position

Initially, the wells are positioned so that all wells fit on the page. The horizontal well position is controlled by the Well Spacing. To edit the well spacing, click on the *Cross Section* object in the **Object Manager**. The *Well Spacing* can either be *Proportional* or *Uniform*. The distance between wells is the same between all adjacent wells if the spacing is *Uniform*. If the spacing is *Proportional*, the distance between wells is calculated with the collar location for each well. A scale is then applied based on the vertical exaggeration.

Horizontal Width

To change the width of the entire cross section, click on the *Cross Section* item in the **Object Manager**. With the cross section selected, you can either click and drag the side handles on the bounding box to make the cross section smaller or larger or you can edit the *W:* value in the *Position/Size* toolbar.

Vertical Position

Wells are located vertically on the cross section based on the starting borehole depth and the reference datum. The cross section can be moved up or down in the cross section pane by opening the cross section **View** properties, setting the *Depth Settings* option to *User Defined*, and adjusting the *Starting Borehole Depth* value.

To edit the reference datum, open the cross section View properties. To have all wells start at the top of the cross section pane, regardless of elevation, set the *Reference Datum* to *[None]*. To have all wells based on elevation, set the *Reference Datum* to *Mean Sea Level*. To have all well vertical locations based on a layer in the cross section, set the *Reference Datum* to *Marker Bed*. Then, set the *Marker Bed* option to the desired layer name.

Vertical Length

The length of the cross section is determined by the scaling. To change the scaling, open the cross section **View** properties. To automatically use a single sheet of paper and have the cross section fill the entire cross section pane, set the *Depth Settings* option to *Automatic* and check the box next to the *Auto-recalculate Scale* option. To change the length, uncheck the box next to the *Auto-recalculate Scale* option and set the *Vertical Exaggeration, Scaling Depth Per Inch,* and *Standard Scale 1.* The *Depth Settings* can be set to User Defined to manually set the *Starting Borehole Depth* or *Ending Borehole Depth*.

Recreate Cross Section

After most vertical and horizontal changes to the wells, the cross section will need to be recreated. Click on the *Cross Section* object in the **Object Manager**. Click the **Cross Section** tab in the **Property Manager**. Click the *Recreate* button. In the dialog, click *Yes* to automatically recreate the cross section.

Editing Individual Logs on a Cross Section

To edit individual logs on a cross section, click on the well log name in the **Object Manager**.

The zone bar, lithology log, or line/symbol log properties for the selected well are located in the **Property Manager**. Editing individual logs allows each well to have separate properties. Refer to chapters 9, 11, and 19 for information about specific log properties.

Editing All Wells in the Logs Layer

If the properties of the *Logs* layer should be the same as the other objects in the *Cross Section*, the properties can be edited by clicking on the *Logs* object in the **Object Manager** and editing the properties in the **Property Manager**. This changes the properties for all logs in the cross section at once.

Editing Individual Layers on a Cross Section

To edit individual layers on a cross section, click on the layer in the **Object Manager**.

Changing All Layer Properties

The cross section layer properties are normally controlled by a scheme. To change the scheme, click on the *Layers* object in the **Object Manager**. Click on the name of the scheme next to *Keyword Scheme*. In the list, click on the desired scheme and the entire cross section updates to display the new scheme colors.

Changing Individual Layer Properties

Editing individual layers allows each layer to have separate custom properties. To use individual properties, the scheme must be turned off for the *Layers* object.

1. Click on the *Layers* object in the **Object Manager**.
2. On the **Layers** tab, uncheck the box next to the *Use Scheme For Line/Fill* option.
3. Click on the desired layer name, such as *Granite,* to select only that layer.
4. The line and fill properties for the selected layer are located in the **Property Manager**.

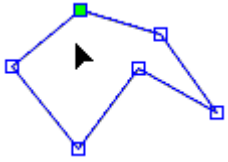
Reshaping Cross Section Layers

Click the **Draw | Reshape** command to move, add, or delete vertices from polylines and polygons. The **Draw | Reshape** command is also used to edit cross section connections.

Entering the Reshape Mode

For a cross section, click on the layer name in the **Object Manager** or in the cross section view window and click the **Draw | Reshape** command to edit a specific layer.

After selecting **Reshape**, the cursor changes to to indicate reshape mode. The object's vertices appear as hollow blue squares. Reshape mode is persistent and you can reshape multiple items until you exit the reshape mode. After you reshape an object, select another object to reshape or exit reshape mode.



*When **Reshape** is activated the lines of the object turns blue, with blue squares for vertices.*

Exiting the Reshape Mode

To exit reshape mode and save the changes made to the object, press ENTER on the keyboard, press ESC on the keyboard, select another command or toolbar button, or double-click in the white space in the view window.

Selecting Vertices

- Left-click on a vertex to select it. The selected vertex is indicated by a solid cyan square.
- To select the first vertex, press the HOME key. To select the last vertex, press the END key.
- To shift the selected vertices forward by one position, press the TAB key. To shift the selected vertices backward by one position, hold the SHIFT key and press the TAB key.
- Hovering the mouse over an unselected vertex will display a grey highlight around the vertex indicating it may be selected or dragged.
- The cursor will change to when it is over a vertex to indicate the vertex may be selected or dragged.



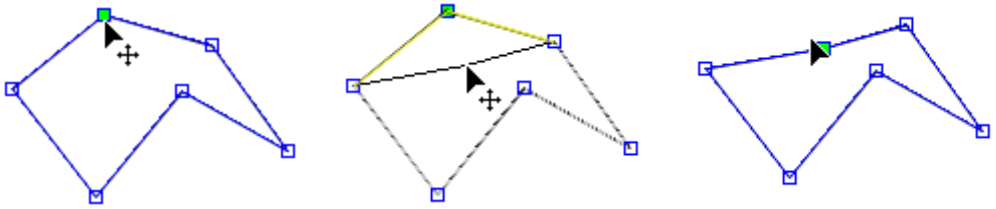
A selected vertex turns cyan.

Deselecting Vertices

All vertices can be deselected by clicking in an unused space in the view window.

Moving Vertices

When a vertex is selected and the cursor displays as , hold the left mouse button down and drag the vertex to a new location. As the vertex is dragged its prior position is still visible as a cyan square. The location of the former line segments are displayed in yellow, and the current location of the line segments is displayed in black. Release the left mouse button to place the vertex in the new location. Alternatively, place the cursor over the vertex, hold the SPACEBAR, and use the ARROW keys on the keyboard to move the vertex to a new location.



Click on a vertex and drag it to the new location.
Release the mouse button and the vertex is moved.

Undo Moving Vertices

Each individual edit can be undone using the **Edit | Undo** command.

Adding Vertices

To enter insert mode, hold down the CTRL key. The cursor will change to ⊕. Left-click anywhere in the view window, or on the existing object and a new node will be added at that location to the closes point on the existing object.

Deleting Vertices

To delete a vertex, select the vertex and press the DELETE key on the keyboard.

Unlinking Vertices

If two or more vertices are linked together, you can unlink them by pressing the SHIFT key on the keyboard, selecting one vertex and moving it to a new location.

Linking Vertices

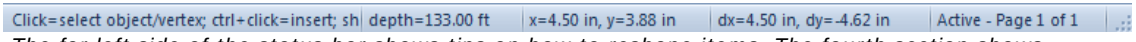
If two or more vertices should be linked together, you can press the SHIFT and ALT keys on the keyboard. Then, click on the first vertex and drag it near the other vertex. The point will snap to the nearby point.

Panning

While in reshape mode you can move the page by holding down the left mouse button in an area where there are no vertices and dragging the mouse.

Status Bar

When the reshape tool is active, the status bar displays tips on reshaping objects on the far left side. The fourth section indicates how far the selected vertex has been moved.



The far left side of the status bar shows tips on how to reshape items. The fourth section shows how far the vertex has been moved (4.50 inches to the right in the X direction and 4.62 inches down in the Y direction).

To Edit a Cross Section Layer

Cross section layers can be edited with the **Draw | Reshape** command. To enter the reshape mode, click on any of the layers in the cross section view window or click on the specific layer to edit in the **Object Manager**. Click the **Draw | Reshape** command to enter reshape mode.

To change the shape of the layer:

1. Click on any of the vertices, indicated by the hollow blue squares.
2. Hold down the left mouse button and drag the vertex to the new location.
3. If the vertex is shared between different layers and you only want to move it for one layer, press and hold the SHIFT key on the keyboard. Click on the vertex and drag it to the desired location. The vertex only moves for the selected layer. This is very useful for pinchouts that connect.
4. If a vertex should be shared between different layers, press and hold the SHIFT and ALT keys on the keyboard. Click on the vertex and drag it near the other vertex. The vertices will snap together and be linked.
5. To add a vertex, hold down the CTRL key on the keyboard and click the area on the layer to add the point.
6. To delete a vertex, click on the vertex and press the DELETE key on the keyboard.
7. To snap a vertex to the closest point of another layer, click on the vertex. Hold the left mouse button down and begin moving the vertex. Press the ALT key on the keyboard and the vertex snaps to the closest point of the layer nearest the cursor.
8. After reshaping the layer, click on another layer to select it.
9. Press ESC on the keyboard or click on *Cross Section, Logs,* or *Layers* object in the **Object Manager** to end reshape mode.

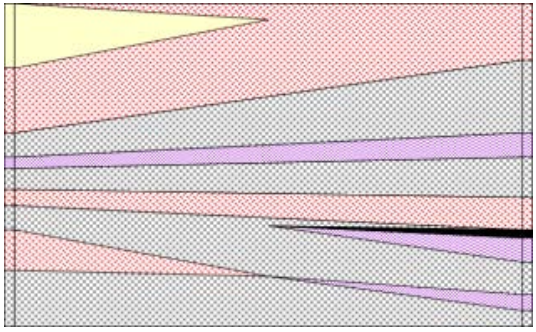
Recreating the Cross Section

If all of the edits should be removed from the cross section, click on the *Cross Section* object in the **Object Manager**. In the **Property Manager**, click on the **Cross Section** tab. Click the 

button. Click *Yes* in the dialog warning that all modifications are lost to return to the default look. Click *No* to keep the customizations and not redraw the layers.

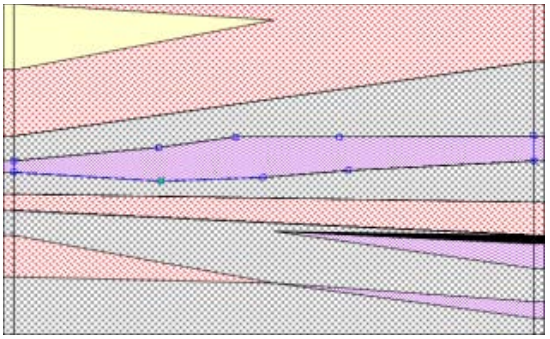
Example Cross Section Editing

1. Click the **File | Open** command.
2. Select the *Example Logs.sdg* file in the Samples folder. By default, the Samples folder is located at C:\Program Files\Golden Software\Strater 4\Samples. Click *Open*.
3. Create a new cross section view by clicking the **File | New | Cross Section View** command.
4. Create the default cross section by clicking the **Cross Section | Create Cross Section** command.
5. In the **Create Well Selector** dialog, click *OK*.
6. In the **Import Or Select Data To Create Cross Section Logs** dialog,
   a. Set the *Table* for both wells to *Lithology* by clicking on the existing table name and selecting *Lithology* from the list.
   b. Make sure that the *Data Column* is set to *Lithology Keyword* for both wells.
   c. Click *OK*.



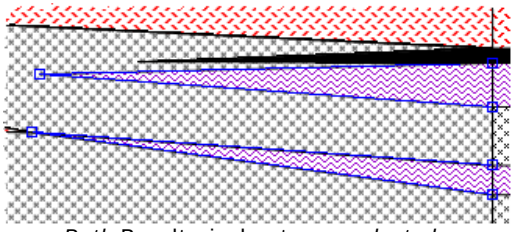
The default cross section is created by connecting the two wells at the far ends of the cross section.

7. Let's assume that we know that the basalt layer (the wavy line purplish colored layer in the center of the cross section) has a thick section in the center of the cross section. Click on the *Basalt* layer in the **Object Manager** or in the cross section view window.
8. Click the **Draw | Reshape** command to enter reshape mode.
9. Hold down the CTRL key on the keyboard. Click several points above the purple area to create a curved area at the top of the basalt layer.
10. Continuing to hold down the CTRL key on the keyboard, click several points below the purple area to create a curved area at the bottom of the layer.



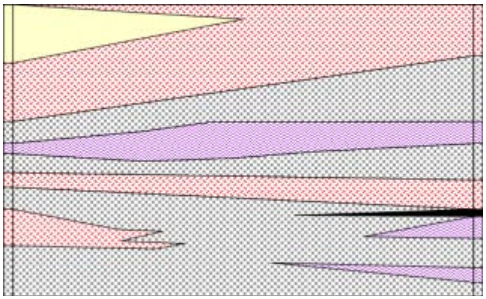
Add points to the layer by pressing the CTRL key and clicking on the screen. This makes the layer thicker or thinner.

11. Click on the *Magnetite-pinchouts* layer in the **Object Manager** or in the cross section view window. The magnetite pinchout is the small thin black layer on the far right side cross section.
12. The magnetite pinchout and the basalt pinchout below it share the same left end. To reshape these separately, press the SHIFT key on the keyboard. Click on the left point and drag it upward, toward the *Granite* pink layer.
13. Click on the *Basalt-pinchouts* layer in the **Object Manager** or in the cross section view window. Notice that both purplish colored pinchouts on the right side are selected.



Both Basalt-pinchouts *are selected*.

14. Click on the upper left point and drag it down and to the right slightly to create more separation between it and the magnetite pinchout above it.
15. Hold down the SHIFT key. Click and drag the lower left point down and to the right. Holding the SHIFT key enables the purple pinchout on the right side of the cross section and the pink pinchout on the left side of the cross section to be separated.
16. Click on the *Granite-pinchouts* on the left side of the cross section. Pinchouts can appear however you want them to in the cross section. You can add points by holding down the CTRL key on the keyboard and clicking on the screen or you can move points by clicking and dragging points. Add a few points and change the right side of the *Granite-pinchouts*.



Add points and move them to reshape the layer to the desired shape.

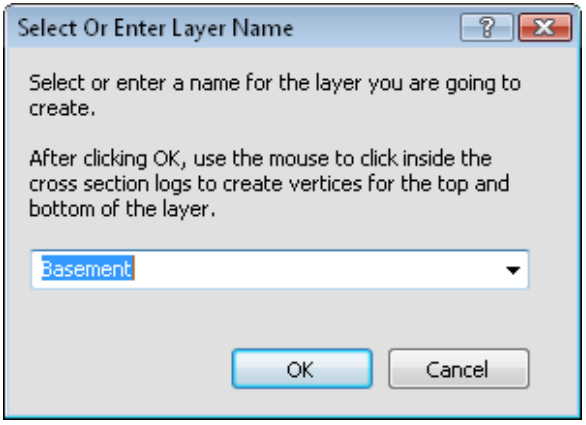
17. When the cross section appears as you want it, press the ESC key on the keyboard to end reshape mode.

Connect Logs with Layers

Click the **Cross Section | Connect Logs with Layers** command to create new layers in a lithology, zone bar, or line/symbol log cross section. If the command is unavailable, click on the *Cross Section, Logs,* or *Layers* object in the **Object Manager** before selecting the command. The **Connect Logs with Layers** command can be used to draw all layers on a cross section or can be used as an editing tool to add additional layers or pinchouts to existing layers on a cross section.

To manually draw layers on the cross section:

1. Click on the *Cross Section* object to select the cross section.
2. Click the **Cross Section | Connect Logs with Layers** command.
3. In the **Select Or Enter Layer Name** dialog,
   a. Click on the existing layer name to select a layer from the list.
   b. Type any new layer name in the box.
   c. When all changes are made, click *OK* and draw the layer on the cross section.
   d. To quit without drawing a new layer, click *Cancel*.
4. The cross section is now in layer



Select the layer name from the list or type any layer name in the box to create a new layer.

drawing mode:

a. Click on a log where the layer should connect with the log.

b. Hold down the SHIFT key on the keyboard and click between logs to add points.

c. Hold down the CTRL key to click on another layer and constrain the connecting line to a 45 degree angle (0, 45, 90, etc).

d. Hold down the SHIFT and ALT keys on the keyboard and click between logs to snap the new point to an existing point on a different layer.

e. Hold down the SHIFT and CTRL keys on the keyboard to connect two points with a line at a 45 degree angle.

f. Draw points around the entire area, including the sides, top surface, and bottom surface.

g. Double-click the last point or press ENTER on the keyboard to accept the changes.

5. Additional layers with this same layer name can be created by following the steps 4, 5, and 6 to draw additional polygons.

6. Press ESC to end drawing layers mode.

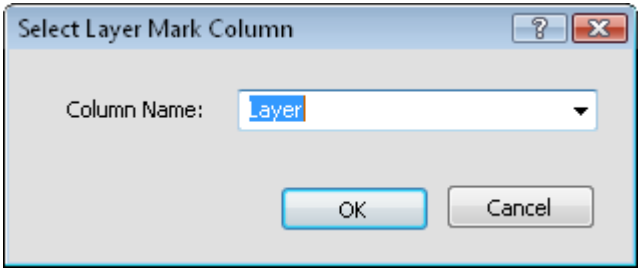
Layer Marks

Layer marks are used to indicate the tops or bottoms of layers or zones in the cross section. Layer marks are used for manually connecting logs on a cross section.

Import Layer Marks

Click the **Cross Section | Layer Marks | Import** command to import a table that contains the layer marks. Layer marks are the tops or bottoms of the zones or layers that should be connected in the line/symbol plot cross section. The table that the top or bottom values are in should be imported into **Strater** as a depth or text table type.

1. Click the **Cross Section | Layer Marks | Import** command.
2. In the **Import Layer Marks** dialog, select the existing table or a new file that contains the layer marks and click *Open*.
3. If a new file was selected, step through the import data dialogs to import the data into a new depth type table.
4. In the **Select Layer Mark Column** dialog, select the column in the table that contains the layer mark names and click *OK*.



Select the appropriate column in the Column Name *list and click* OK.

5. Click *Yes* in the warning that the user modifications will be lost to create the cross section from the imported layer marks.

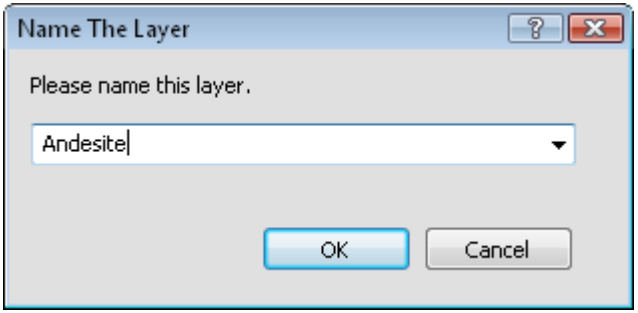
The layers are connected with lines in the cross section, showing the layer names and locations from the table.

Create/Edit Layer Marks

Click the **Cross Section | Layer Marks | Create/Edit** command to manually create or edit layer marks. Layer marks are the tops or bottoms of the zones or layers that should be connected in the line/symbol cross section. After all layer marks are selected on the cross section, the marks can be saved to a table.

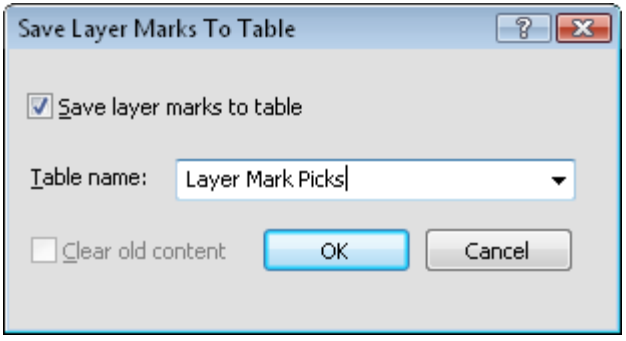
Creating Layer Marks

1. Click the **Cross Section | Layer Marks | Create/Edit** command.
2. Click on the first log in the location where the layer top or bottom should be located. As the cursor nears a log, the log name and depth are displayed in a pop-up window.
3. In the **Name The Layer** dialog,
   a. Click on an existing layer name from the list,
   b. Type a new name in the box.
   c. Click *OK* to draw the layer on the cross section.
   d. Click *Cancel* to close the dialog and not draw the layer.



Select the table name from the list or type any table name in the box to create a new table.

4. Continue clicking on the various logs and naming the layers until all layer marks have been created. Not all layer marks need be clicked in each log.
5. When finished creating layer marks, press ENTER on the keyboard. Press ESC to cancel ALL layer marks.
6. In the **Save Layer Marks To Table** dialog,
   a. Check the box next to *Save layer marks to table* to save the manual layer marks to a table. This is useful if you want to edit the mark locations or import into other cross sections. Uncheck the box to not store the cross section layer marks in a table. **Strater** will internally save the locations of the marks.select the *Table name* to save the layer marks or type a new table name.
   b. Click on the existing *Table name* to select an existing table from the list. Alternatively, type any new table name in the box to save the layer marks to a new table.



Select the table name from the list or type any table name in the box to create a new table.

c. Check the *Clear old content* box to remove all content from the existing table and replace it with the current layer mark locations.

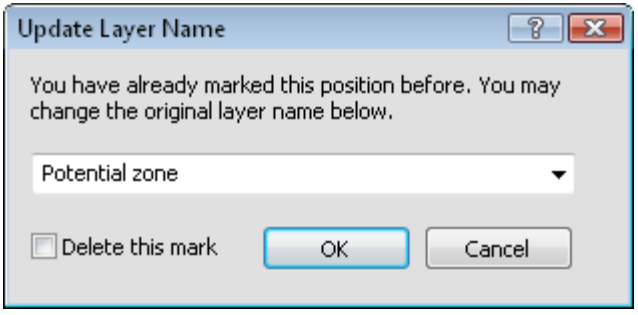
d. Click *OK* to save the file or *Cancel* to not save the file.

7. Click *Yes* in the warning that the user modifications will be lost to create the cross section from the imported layer marks.

The layers are connected with lines in the cross section, showing the layer names and locations from the table.

Editing Layer Marks

1. Click the **Cross Section | Layer Marks | Create/Edit** command.
2. To add a new layer mark,
   a. Click on the location in the log where the layer top or bottom should be located. As the cursor nears a log, the log name and depth are displayed in a pop-up window. When the cursor nears an existing layer mark, that layer mark name is also displayed in the pop-up window.
   b. In the **Name The Layer** dialog, select an existing layer name from the list or type a new name in the box.
   c. Click *OK*.
3. If an existing layer mark name should be changed,
   a. Click on the layer mark to select it.
   b. In the **Update Layer Name** dialog, type a new layer name or select an existing layer name from the list.
   c. Click *OK* to update the layer mark name.



Select the layer name from the list or type any layer name in the box to create a new layer.

4. If an existing layer mark should be deleted,
   a. Click on the layer mark to select it.
   b. In the **Update Layer Name** dialog, check the box next to the *Delete this mark* option.
   c. Click *OK* and the layer mark is deleted.
5. When finished creating layer marks, press ENTER on the keyboard. Press ESC to cancel ALL layer marks.

6. In the **Save Layer Marks To Table** dialog, select the *Table name* to save the layer marks or type a new table name.
7. Click *OK*.
8. Click *Yes* in the warning that the user modifications will be lost to create the cross section from the imported layer marks.

The layer lines in the cross section are updated, showing the new layer names and locations from the table.

Clear Layer Marks

Click the **Cross Section | Layer Marks | Clear** command to remove all layer marks from the current cross section. The cross section is redrawn without any layer marks. Layers created with layer marks are completely removed from the cross section. Layer mark tables are not deleted.

Layer marks can be recreated by clicking the **Edit | Undo** command, clicking the **Cross Section | Layer Marks | Import** command, or clicking the **Cross Section | Layer Marks | Create/Edit** command. Layers can also be created with the **Cross Section | Connect Logs with Layers** command.

Well Headers

The **Cross Section | Add Well Headers** command displays a well header in the header pane, the footer pane if there is no header pane, or the cross section pane if there are no header or footer panes in the cross section view. Up to five different header lines can be displayed for each well, in addition to the well symbol. To edit the well header, click on the *Well Header* object in the *Header Pane Objects* section of the **Object Manager**.



The well header displays up to five lines of text and the well symbol.

Well Header Properties

The cross section well header is created with the **Cross Section | Add Well Headers** command. Click on the *Well Header* object in the **Object Manager** to edit the well header properties.

Header 1

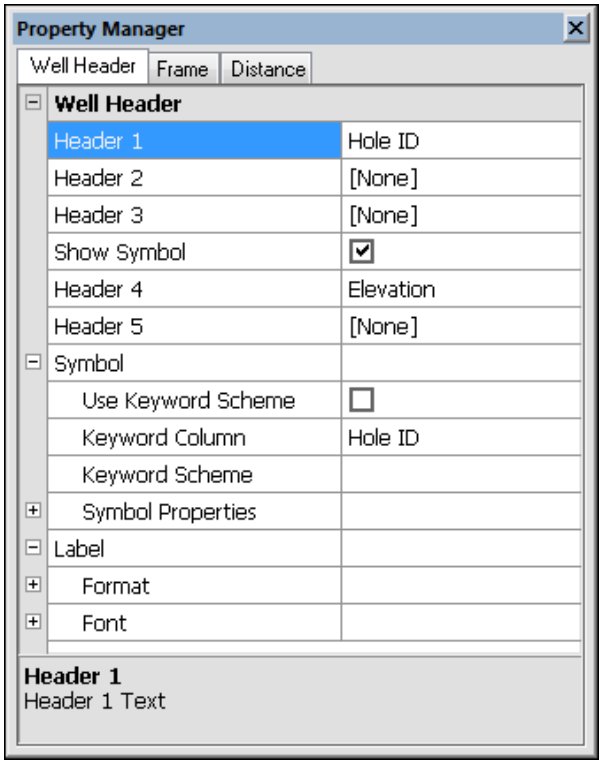
The *Header 1* text is the first line of text that can be displayed above the symbol in the well header. To set the text, click on the existing option and select the desired option from the list. Click *[None]* if the line of text should not be created.

Header 2

The *Header 2* text is the second line of text that can be displayed above the symbol in the well header. This text appears above the borehole symbol and below the *Header 1* text. To set the text, click on the existing option and select the desired option from the list. Click *[None]* if the line of text should not be created.

Header 3

The *Header 3* text is the third line of text that can be displayed above the symbol in the well header. This text appears above the borehole symbol and below the *Header 2* text. To set the text, click on the existing option and select the desired option from the list. Click *[None]* if the line of text should not be created.



*Edit the text that appears in the cross section well headers on the **Well Header** tab in the **Property Manager**.*

Show Symbol

Check the box next to *Show Symbol* to show symbols for each borehole in the well header. Symbols can be determined from a keyword scheme or all symbols in the well header can appear the same. To set symbol properties, open the *Symbol* section.

Header 4

The *Header 4* text is the first line of text that can be displayed below the symbol in the well header. This text appears below the borehole symbol and above the *Header 5* text. To set the text, click on the existing option and select the desired option from the list. Click *[None]* if the line of text should not be created.

Header 5

The *Header 5* text is the second line of text that can be displayed below the symbol in the well header. This text appears below the borehole symbol at the bottom of the well

header. To set the text, click on the existing option and select the desired option from the list. Click *[None]* if the line of text should not be created.

Symbol

Click the ⊞ next to *Symbol* to set the symbol properties. Symbols can be determined from a keyword scheme or all symbols can appear the same in the well header. To show symbols, check the box next to *Show Symbol.*

Use Keyword Scheme

The *Use Keyword Scheme* option sets whether the symbol properties should be based on a keyword scheme or all symbols should use the same properties. To use a keyword scheme, check the box next to *Use Keyword Scheme*. To use the same properties for all symbols in the cross section well header, uncheck the box next to the *Use Keyword Scheme* option. The keyword scheme should match the text that appears in the *Keyword Column*. To change whether the header uses a scheme, click on the existing option and select the desired option from the list.

Keyword Column

The *Keyword Column* is the column used for keyword matching. To use a keyword scheme for symbol properties, check the *Use Keyword Scheme* box and set the *Keyword Column* to the column that contains the keyword to match to the scheme. If you do not want to use a keyword scheme and simply want to plot all symbols the same in the well header, uncheck the *Use Keyword Scheme* box. You can use the settings in the *Symbol Properties* section to specify the symbol properties for the all items in the well header.

Keyword Scheme

The *Keyword Scheme* is the scheme that determines the symbol properties when the *Use Keyword Scheme* option is checked. The selected scheme should match the keyword text in the *Keyword Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the … next to the scheme name to open the Scheme Editor, where the scheme can be created or edited.

Symbol Properties

Click the ⊞ next to *Symbol Properties* to set the symbol properties for all wells in the well header when the *Use Keyword Scheme* option is unchecked.

Label

Click the ⊞ next to *Label* to open the *Label* section, where the distance text that appears in the header can be formatted. The font properties can be adjusted on the **Well Header** tab and will be the same as the text for the well headers.

Format

Click the ⊞ next to *Format* to set the well header label format properties.

Font

Click the ⊞ next to *Font* to set the well header label font properties.

Well Header Frame Properties

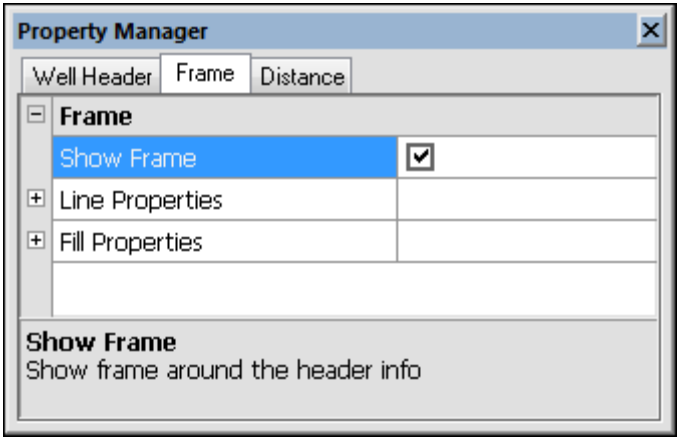
The cross section header is created with the Cross Section | Add Well Headers command. Click on the *Well Header* object in the **Object Manager** to edit the well header properties. Click on the **Frame** tab to set the box properties that surround the well header.

Show Frame

Check the box next to *Show Frame* to create a box around each borehole's header information in the well header. Uncheck the box to turn off the display of the box.

Line Properties

Click the ⊞ next to *Line Properties* to set the well header frame line properties.



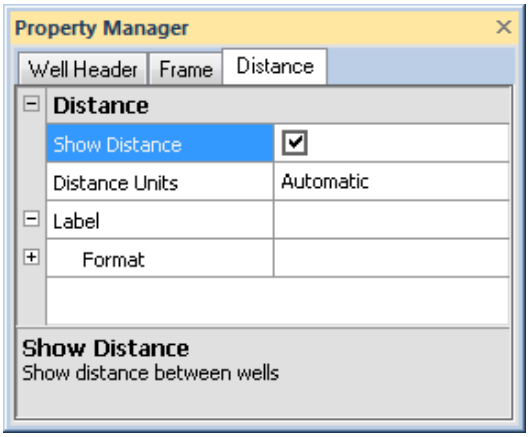
Turn on the display of the frame around the well header by checking the Show Frame *option on the* ***Frame*** *tab in the* ***Property Manager****.*

Fill Properties

Click the ⊞ next to *Fill Properties* to set the well header frame fill properties.

Well Header Distance Properties

The cross section header is created with the Cross Section | Add Well Headers command. Click on the *Well Header* object in the **Object Manager** to edit the well header properties. Click on the **Distance** tab to set the distance display properties between boreholes.



Check the Show Distance *box to show distances between boreholes on the cross section.*

Show Distance

Check the box next to *Show Distance* to show distance values between boreholes on the cross section. Uncheck the box to not display distances.

Distance Units

The *Distance Units* option controls the units used to display the distance on the cross section well header. To change the units, click on the existing option and select the desired option from the list. Setting the *Units* to *Automatic* reads the units from the coordinate system of the map in the associated map view.

If the units are not specified for the *Map*, the Column units from the *Easting* and *Northing* column in the collars table are used. If the units are different in these columns, the *Easting* column is used. If only one of the *Easting* or *Northing* column has units, that column's units are used. If the *Easting* and *Northing* columns do not have column units, a *Numeric Suffix* can be added in the *Format* section to display the units.

When the column units are not recognized, conversion between units is not done properly. The label will not display properly in this instance.

Label

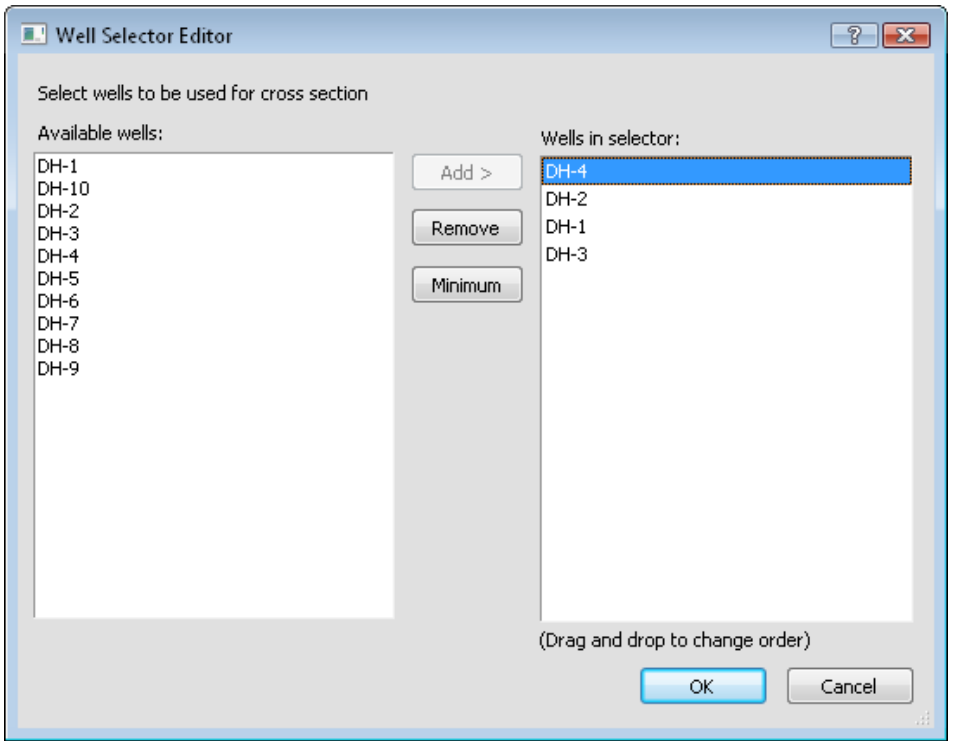
Click the ⊞ next to *Label* to open the *Label* section, where the distance text can be formatted.

Format

Click the ⊞ next to *Format* to set the distance text format properties.

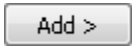
Well Selector Dialog

In the **Create Well Selector** dialog or **Well Selector Editor** dialog, wells can be rearranged, added, and deleted from the well selector line. The **Create Well Selector** dialog appears when creating a cross section. The **Well Selector Editor** dialog appears when editing a well selector line from a map view.



The left side contains a list of all available wells in the map.
The right side contains a list of wells in the current well selector.

Adding Wells

To add wells, open the **Well Selector Editor** dialog. Click on the well name that should be added in the *Available* wells list. To select multiple wells that are not located above or below other wells in the list, press and hold the CTRL key on the keyboard. Click and select each well to add multiple wells. To select multiple wells that are located above or below other wells, click the first well, press and hold the SHIFT key on the keyboard, and press the last well. All wells between the first and last are selected. Once all wells are selected, click the 

button. The selected wells

are added to the bottom of the list of *Wells in selector* list. Click *OK* when all of the wells are in the *Wells in selector* list and the well selector line updates.

Modifying Well Order

To modify the order the wells in the well selector are connected, open the **Well Selector Editor** dialog. On the right side of the dialog in the *Wells in selector* list, change the wells so that the wells are in the order they should appear in the cross section. To move wells, click on the well to move, hold down the left mouse button, and drag the well to the desired location. A ➡ indicates a location where the well can be moved. a  appears in a location where the selected well cannot be moved. Click *OK* when all of the wells are in the proper order and the well selector line updates.

Deleting Wells

To delete wells from the well selector, open the **Well Selector Editor** dialog. Click on the well to be removed in the *Wells in selector* list. Click the 

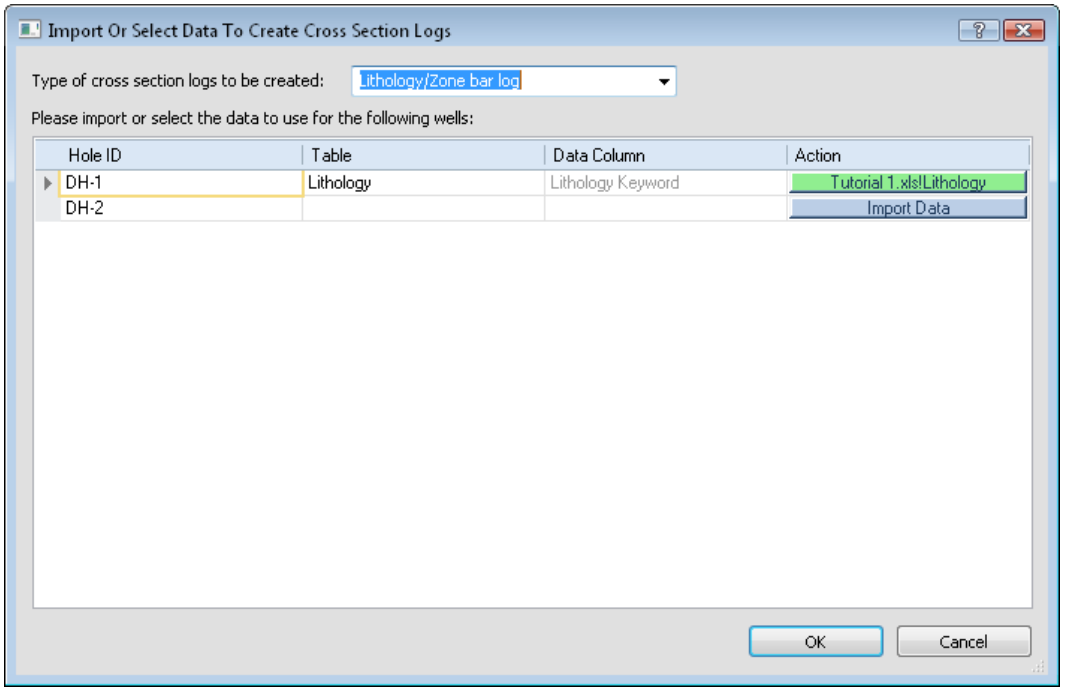
button and the selected well is removed from the list. Click *OK* and the well selector line is updated to not include the deleted wells.

To remove all wells but the top two, click the 

button. After clicking the *Minimum* button, all wells except for the top two are removed from the *Wells in selector* list. This is a quick way to recreate the well selector line or delete multiple wells at once.

Import Or Select Data To Create Cross Section Logs Dialog

The **Import Or Select Data To Create Cross Section Logs** dialog appears when creating a cross section. This dialog allows you to set the type of cross section to create and set the table and data column for each log in the cross section. To open the **Import Or Select Data To Create Cross Section Logs** dialog, click the **Cross Section | Create Cross Section** command or click the  button. Click through the dialogs and the **Import Or Select Data To Create Cross Section Logs** dialog will appear.



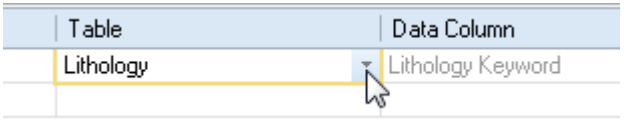
*Set the type of cross section, tables, and data columns for each well in the **Import Or Select Data To Create Cross Section Logs** dialog.*

Cross Section Type

To change the type of cross section created, click on the existing option in the *Type of cross section logs to be created* list. Select the type of cross section desired. Available options are *Lithology/Zone bar log* or *Line/Symbol log*. When *Lithology/Zone bar log* is selected, either zone bar logs or lithology logs are created, based on the type of table selected.

Assigning Tables to Boreholes

To assign data to a borehole, click on the existing table name and click the down arrow button to the right of the *Table* name. Any open table that can create either the lithology/zone bar logs or line/symbol logs are listed. Select the appropriate table and the *Table* option updates to show the selected table. If no tables are listed, a new data file must be opened.

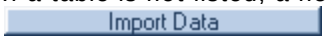


Click on the arrow to the right of the table name to select a different table.

Assigning Data Columns to Boreholes

To change the data that the borehole displays in the log, click on the existing column name and click the down arrow button to the right of the *Data Column* name. All available columns are listed. Select the appropriate column and the *Data Column* option updates to show the selected column. If no columns are listed, select a different *Table* or open a new data file.

Opening a New Data File

If a table is not listed, a new table needs to be opened in the project. Click the 

button. In the Import Data dialog, select the appropriate data file and click *Open*. Step through the data import options dialogs. When the table is imported, it will be listed under the *Table* column, if the table type matches the type needed for the log type.

OK or Cancel

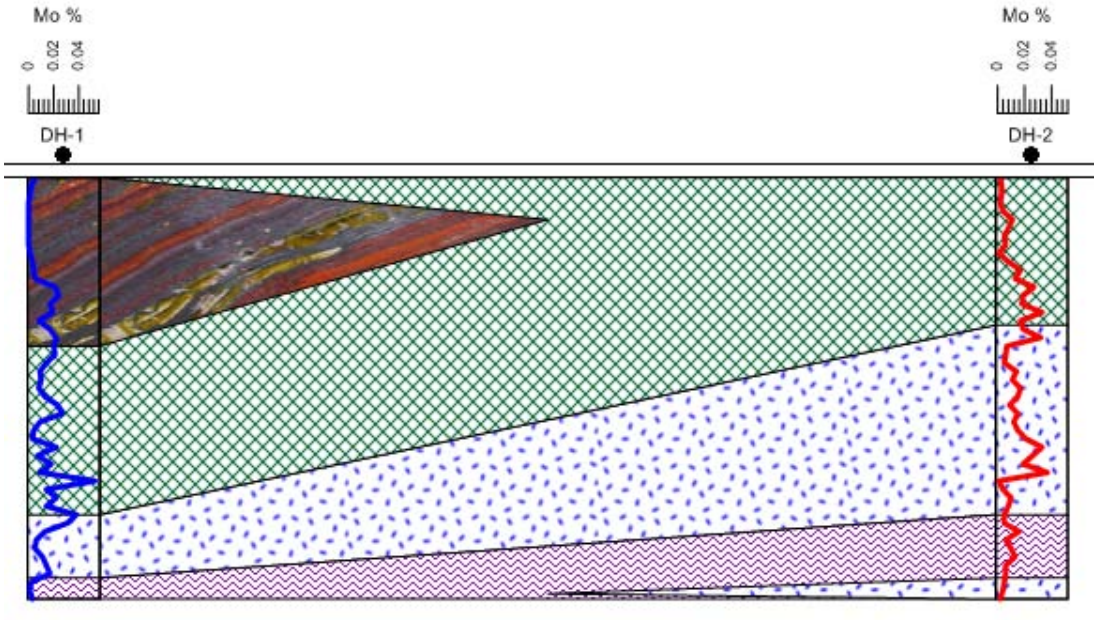
When all boreholes have a *Table* and *Data Column* listed, click *OK* to display the cross section. If a lithology/zone bar log cross section is created, the logs and connected layers are displayed. If a line/symbol log cross section is created, the logs are displayed without connected layers.

Click *Cancel* to cancel the creation of the cross section. The map and well selector line will still be created.

Overlay Logs

The **Log | Overlay Logs** command overlays all logs that use the same borehole ID in the borehole view or cross section view. The **Overlay Logs** command places all of the logs for each well directly on top of one another. The **Overlay Logs** command works on all logs in the borehole view or cross section view at the same time.

For instance, in a cross section view with several zone bar logs, draw additional line/symbol logs using the **Log | Line/Symbol** command. The logs are automatically placed at the center of the cross section. To change the Hole ID for each line/symbol log, click on the line/symbol log and change the *Hole ID Filter* on the **Base** tab in the **Property Manager**. After all line/symbol logs have been assigned a Hole ID, click the **Log | Overlay Logs** command. The line/symbol logs are placed on top of the zone bar logs.

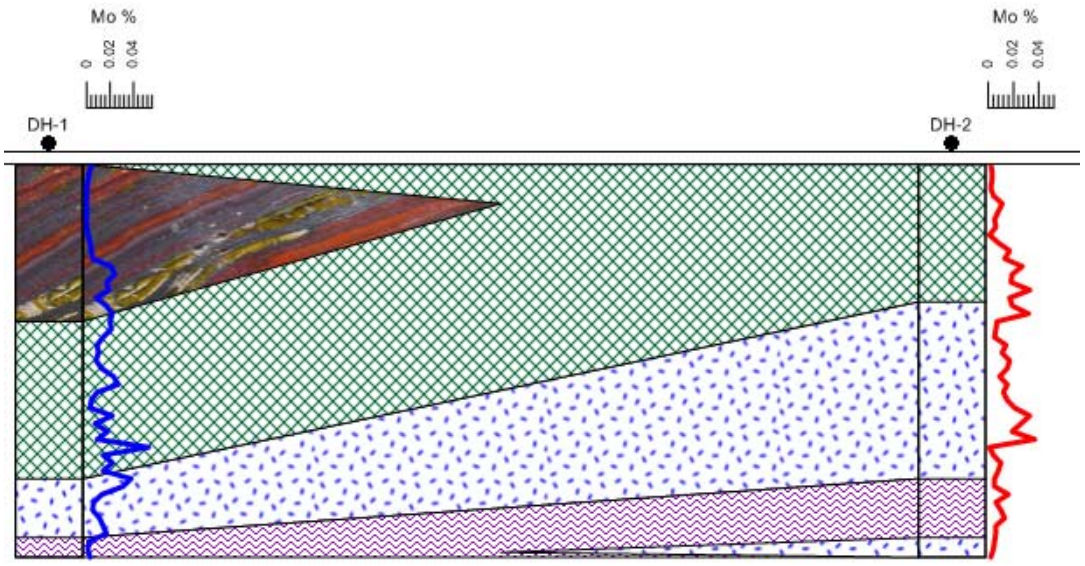


This cross section shows a blue line/symbol log for DH-1 and a red line/symbol log for DH-2 overlaid onto the zone bar logs for the same wells.

Adjoin Logs

The **Log | Adjoin Logs** command places all logs that use the same Hole ID side-by-side in the borehole view or cross section view. The **Adjoin Logs** command places all of the logs for each well with the bounding boxes for each log touching the previous bounding box. The **Adjoin Logs** command works on all logs in the borehole view or cross section view at the same time.

For instance, in a cross section view with several zone bar logs, draw additional line/symbol logs using the **Log | Line/Symbol** command. The logs are automatically placed at the center of the cross section. To change the Hole ID for each line/symbol log, click on the line/symbol log and change the *Hole ID Filter* on the **Base** tab in the **Property Manager**. After all line/symbol logs have been assigned a Hole ID, click the **Log | Adjoin Logs** command. The line/symbol logs are placed beside the zone bar logs.



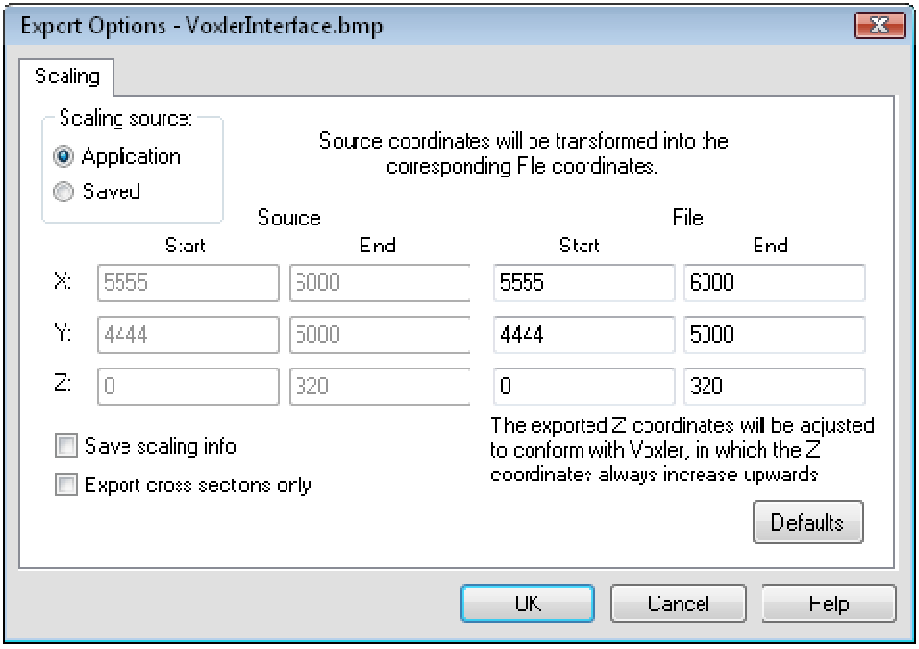
This cross section shows a blue line/symbol log for DH-1 and a red line/symbol log for DH-2 adjoined beside the zone bar logs for the same wells.

Export Cross Section to Voxler

The **Voxler | Export Cross Section** command creates an image of the cross section for use in **Voxler 3** (or higher). Only the contents of the cross section pane will be exported. The contents of the header and footer panes will not be exported.

For best display, the X, Y, and Z data should all be in the same units in the cross section. For example, the X and Y coordinates could be in UTM (meters) and the depth could be in meters. If the units are not the same, **Strater** will attempt to automatically convert X and Y units to match Z units. X and Y units are determined based on the map's target Coordinate System. Z units are determined based on the cross section's depth units. If no information about the map units exists, the column units for the collars table type are used. If no column unit information is available, no automatic conversion is done. The *Depth Units* for the cross section should be set for each cross section, otherwise the conversion may not be accurate.

After clicking the **Cross Section | Export to Voxler**, the **Export Options** dialog appears. Click OK in the dialog and the image is loaded into **Voxler**. The image being exported appears in 3D space in the **Voxler** program.



*Set the export options in the **Export Options** dialog.*

Scaling Source

Scaling information can be retrieved from two sources: Application, and Saved. **Strater** provides potentially useful scaling info from the collars table, whenever possible. Otherwise, the application sets the scaling rectangles so the coordinates will be the same as the document page units. *Application* will load scaling info calculated by the application based on the collars table and elevation and depth information from the well. *Saved* will use the previously saved values.

Source and File Coordinates

Source scaling is accomplished by specifying the corner points of a rectangle (in *cross section units*) in the application document and the corner points of a rectangle in the desired *File* units. The document coordinates will be offset and/or scaled so the corner points of the document rectangle will have the desired coordinates.

The *Source* lists two points on the page in the X, Y, and Z coordinates. The *File* lists the same two points on the page in the coordinates to be exported. Normally, the *File* coordinates should not be changed.

The Z coordinates will be adjusted to always have the Z values increase upwards for conformity with **Voxler**. This may mean the coordinates are changed if the depth coordinates increase down in **Strater**.

Save Scaling Info

Checking *Save scaling info* will cause the scaling information to be stored for future use.

Export Cross Sections Only

Checking the *Export cross sections only* box exports only the cross section to the **Voxler** file. All drawn objects, logs, text, or other items in the cross section pane are ignored in the export. Unchecking the box exports all objects in the cross section pane to the **Voxler** file.

Defaults

The *Defaults* button sets all buttons and check boxes to default conditions. The scaling rectangles will, in turn, be reloaded with values from the default scaling source.

Warning

If the X and Y ranges are very different from the Z range, a warning message appears. Click *Yes* in the warning to export the cross section to **Voxler** regardless of the units. This may make an image in **Voxler** that is long and thin, making it difficult to determine what the cross section contains. Click *No* in the warning to not export the cross section to **Voxler**. You may wish to edit the X, Y, and Z values in the collars table and recreate the cross section before exporting.

Cancel Sending Data to Voxler

Click the *Cancel* button at the far right of the status bar to cancel the creation of the cross section in **Voxler**.

Export XYZ Data

The **Cross Section | Export XYZ Data** command creates a data file of the cross section connections for use in **Voxler** or **Surfer**.

After clicking the **Cross Section | Export to Voxler**, the **Export Cross Section as XYZ Data** dialog appears. Type a *File name* and click *Save* to create the data file.

The data file that is created contains seven columns: *X, Y, Z-top, Z-bottom, Z-thickness, Hole ID*, and *Key*.

X	Y	Z-top	Z-bottom	Z-thickness	Hole ID	Key
5555	4444	0		40	DH-1	Jasperoid
5555	4444		40	40	DH-1	Jasperoid
5555	4444	40		40	DH-1	Granite
5555	4444		80	40	DH-1	Granite
5555	4444	80		15	DH-1	Andesite
5555	4444		95	15	DH-1	Andesite
5555	4444	95		7	DH-1	Basalt
5555	4444		102	7	DH-1	Basalt
5555	4444	102		13	DH-1	Andesite
5555	4444		115	13	DH-1	Andesite
5555	4444	115		10	DH-1	Granite
5555	4444		125	10	DH-1	Granite
5555	4444	125		15	DH-1	Andesite

*The data file created contains seven columns, with information needed for gridding in **Surfer** or **Voxler**.*

Column Information

X	If the Depth Method for the cross section is *Measured Depth*, then the X is the X value from the collar table. If the *Depth Method* is set to *True Vertical Depth*, then the X is adjusted with respect to the azimuth and inclination (or dip) along the well.
Y	If the Depth Method for the cross section is *Measured Depth*, then the Y is the Y value from the collar table. If the *Depth Method* is set to *True Vertical Depth*, then the Y is adjusted with respect to the azimuth and inclination (or dip) along the well.
Z-top	The Z-top column contains the top of each interval in the cross section.
Z-bottom	The Z-bottom information contains the bottom of each interval in the cross section.
Z-thickness	The Z-thickness is the Z-bottom value minus the Z-top value. This column contains the layer thickness.
Hole ID	The Hole ID column contains the Hole ID for the recorded point.
Key	The Key column contains the layer names from the cross section.

The X, Y and one of the Z columns can be used to create surface maps or contours in **Surfer**. The data can also be loaded into **Voxler** for gridding. If depth is being used for the Borehole Orientation, the Z-top and Z-bottom values will need to be multiplied by -1 for use in **Surfer** and **Voxler**.

Chapter 7

Logs and Log Items

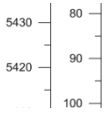
Log Types

Both borehole views and cross section views display logs. Several different log types can be created in **Strater**. Refer to the specific chapter for more information on each of the log types.

- Bar Log
- Classed Post Log
- Complex Text Log
- Crossplot Log
- Depth Log
- Function Log
- Graphic Log
- Line/Symbol Log
- Lithology Log
- Percentage Log
- Post Log
- Tadpole Log
- Well Construction Log
- Zone Bar Log

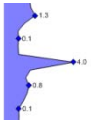
To create a log in either the borehole view or cross section view, click the **Log | [log type]** command. Click on the screen where the log should be created. In the **Open** dialog, select the table to use or data file to import and click *Open*. The log is displayed with the default options.

Depth



Depth logs are used as a scale bar to display the depth or elevation of the data in the log or cross section pane. True vertical depth can be displayed on a depth log, if azimuth and inclination (or dip) are available for the wells.

Line/Symbol



Line/symbol logs are used to display data as a symbols with connected lines. Line/symbol logs are useful for displaying assay values, geophysical parameters, moisture content, etc.

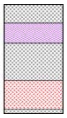
Crossplot



Crossplot logs are used to display intersections of two data curves on a graph. Crossplot logs can be used to characterize properties such as

porosity, water saturation, or clay content by comparing where two logs intersect.

Zone Bar



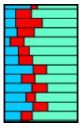
Zone bar logs display data as filled blocks within intervals, and can show a wide variety of logging data. For instance, zone bars can represent sample intervals, alteration zones, contamination layers, etc.

Bar



There are two types of bar logs: standard bars and polarity bars. Standard bar logs plot a bar from the data minimum value to the row's data value. Polarity bar logs plot data based upon zero so there are bars on both sides of zero if there is a mix of negative and positive data.

Percentage



Percentage logs are similar to bar logs. Percentage logs display the percentage of each alteration in a sample; the amounts of sand, clay, gravel, silt, etc. The percentage log uses data to create either a series of blocks (interval data) or polygons (depth data) that always add up to 100%.

Tadpole



Tadpole logs are used to display dip and dip direction down the borehole. This gives an indication of strike and dip of bedding planes, fractures, or any other structure along the depth of the borehole. The symbols, colors, and labels can be altered to display the most useful information along the well.

Post



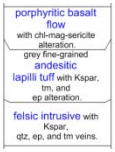
Post logs are used to display a symbol and text at the data position. The symbols can represent sample locations at depth or intervals, and in the case of monitoring wells, the depth to water, contamination, etc.

Classed Post



Classed post logs are similar to the post logs, except classed post logs use range schemes and numerical values to determine the symbol properties.

Complex Text



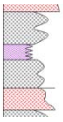
Complex text logs show text in intervals. This type of complex text is generally used for rock descriptions, alteration descriptions, or any general descriptive text that represents interval data. Long text blocks are wrapped to fit within the log width. Separator styles can be used to separate text in long descriptions, and if adjacent sections contain the same text they can be combined into a single, larger section.

Graphic



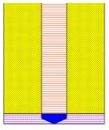
Graphic logs allow you to specify image file names and show the images at specified intervals. This is useful in displaying photos of the core, rock type, alteration, etc.

Lithology



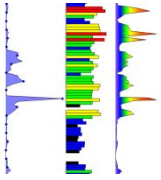
Lithology logs show the various stratigraphic layers in the borehole. The display can be as simple as a filled block from the top to bottom, or the display can be more elaborate and show weathering patterns and line types.

Well Construction



Well construction logs replicate a well construction diagram for the log, and is generally used in the environmental industry. This log type shows items such as screen, packing material, end caps, and covers.

Function



Function logs combine multiple existing log variables into a new log using mathematical formulas. The log variables being combined can contain different depth spacings and be from different tables. A new table is created from the output data of the input logs. *Example: 1*

Data Formatting Requirements for Logs

There are specific data table setup requirements for each log type in **Strater.** The actual source file type of the data is not important as long as the resulting data table in **Strater** is formatted appropriately to create the desired log(s). The following table provides information on data formatting for each log type.

Data Log Properties - General Concepts

Required data columns must be present in an imported data file. However, they do not have to be named the default names found in **Strater** or positioned in their default **Strater** position. For example, the default name for the column containing the identification number for the borehole is named *Hole ID* and is located in the first (far left) column in **Strater**; however, the actual column containing this data in the data file can have any name and be in any column position.

Many users have data in external tables (such as .XLS) that they want to import into **Strater** to be used in logs. Use the information in Modifying Loaded Data for Logs to make this importing process as easy as possible.

Table of Required Columns for Strater Logs

Use the following table to determine the types of data columns required for each log type.

Log Type: Click the *log type* name for additional information about the log type and data needed for that log.

Table Columns Required: Required columns are automatically created in the data table when you create this type of log. They cannot be deleted from the data table. In the case of *Lithology* and *Well Construction* logs the required columns also include the data columns because the full functionality of the logs requires these specific columns.

Data Columns Needed: These columns contain the data that is displayed in the logs in the borehole view. They are not required to create the data table, although they must be present (with data) to display a functioning log in the borehole view.

Log Type	Table Columns Required	Data Columns Needed
Depth	Hole ID, Depth	None
Line/Symbol	Hole ID, Depth	One data column (numeric)
Crossplot	Hole ID, Depth	Two data columns (numeric)
Zone Bar	Hole ID, From, To	Keyword
Bar	Hole ID, Depth	One data column (numeric)
Percentage	Hole ID, Depth	At least two data columns (numeric)

Log Type	Table Columns Required	Data Columns Needed
Tadpole	Hole ID, Depth	Two data columns (numeric), optional keyword
Post	Hole ID, Depth	One data column (numeric)
Classed Post	Hole ID, Depth	One data column (numeric)
Complex Text	Hole ID, From, To or Hole ID, Depth	One data column (numeric or alphanumeric)
Graphic	Hole ID, From, To	One data column (contains image file names)
Lithology	Hole ID, From, To, Lithology Keyword, Lithology Description, Indent Percentage, Indent Keyword, Indent Line Scale	Lithology Keyword (alphanumeric), optional Lithology Description (alphanumeric), optional Indent Keyword (alphanumeric), optional Indent Percentage (numeric), optional Indent Line Scale (numeric)
Well Construction	Hole ID, From, To, Well Item, Offset, Inner Diameter, Outer Diameter	Well Item (alphanumeric), Offset (numeric), Inner Diameter (numeric), Outer Diameter (numeric)
Function	Hole ID, Depth	One data column (numeric - calculated from function)

Strater default settings are controlled through the **Tools | Options** dialog.

Modifying Imported Data for use with Logs

Many users have data in external tables (such as .XLS) that they want to import into **Strater** to be used in logs. Use the following information to make this importing process as easy as possible.

Strater Data Table Requirements

Strater data tables have specific requirements for column names and types of data in columns, and each log type has required columns that must be present in order for **Strater** to even recognize the table as usable for a particular log type.

In some cases, the external data is not formatted in a manner usable by **Strater**. However, the data importing process includes dialog boxes that allow you to modify and adjust the data being imported to conform with the data table requirements.

Using Data Tables Without Headers

Strater assumes that the first row is the default location for column header information. If a imported data table does not include this information you can add it during the import process or edit the row number for the row containing the header. Column header labels are not required, but do make working with data easier.

As an example, the following is a data table that does not include header column information.

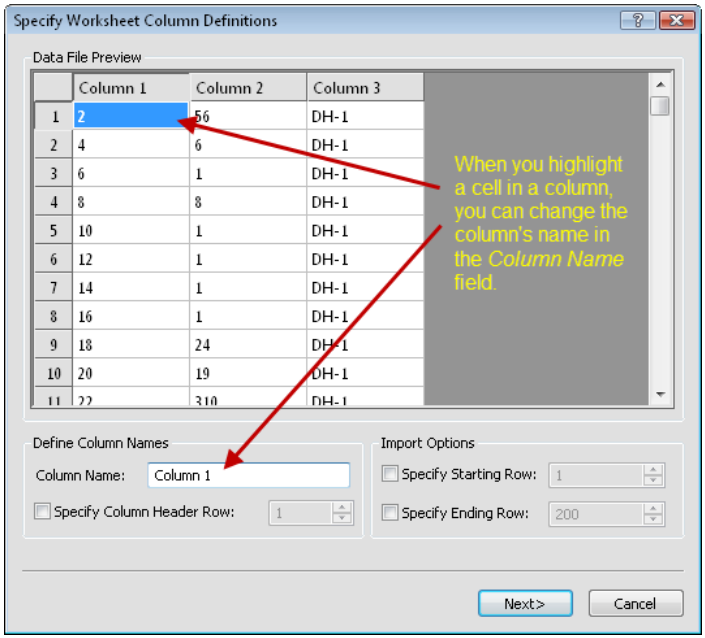
log symbol data no headers.xls

	A	B	C
1	2	56	DH-1
2	4	6	DH-1
3	6	1	DH-1
4	8	8	DH-1
5	10	1	DH-1
6	12	1	DH-1
7	14	1	DH-1
8	16	1	DH-1
9	18	24	DH-1
10	20	19	DH-1
11	22	310	DH-1

***Strater** can use data tables that do not have column header information.*

There is usable data in this table, but because the columns are not labeled you can add the column headers during the import function:

1. Click the **Log | Line / Symbol** command or click the  button.
2. Click inside the log pane to fix the position where a line/symbol log will be displayed.
3. The **Open** dialog is displayed. Navigate to the location of the file to open, click on the file name to select it, and click *Open*.
4. The **Specify Worksheet Column Definitions** dialog opens. Note the content of the *Column Name* field.



*The **Specify Worksheet Column Definitions** dialog allows you to name each column in an imported data table.*

5. Enter a name for the first column in the *Column Name* field.
6. Click a cell in column 2, which changes the contents of the *Column Name* field.
7. Enter the name for column 2 in the *Column Name* field.
8. Repeat this process for Column 3.
9. Do not click the *Specify Column Header Row* check box because the actual column header is not in a table row.
10. Click *Next*.
11. In the **Specify Data Type and Column Positions** dialog, link the data columns and click *Finish*. The data appears in the table, ready to use.

Associating Data Table Columns to Required Log Columns

Each log type has specific required columns of data that must appear in a specific location in the table. As an example, the Hole ID column is always in the first (far left) position in the **Strater** data tables.

You can specify which column of data in the data file corresponds to the required column in the data table. **Strater** will then change the location of the columns to match the position you specified during the import process.

Let us use as an example an Excel spreadsheet data table, such as the one to the right.

All the required columns (Hole ID, Depth) are present for a line/symbol log, but they are named differently and not in the default order.

To import into **Strater** for a line/symbol log:

1. Click the **Log | Line/Symbol** command or click the  button.
2. Click inside the log pane to fix the position where a line/symbol log will be displayed.
3. The **Open** dialog is displayed. Navigate to the location of the file to

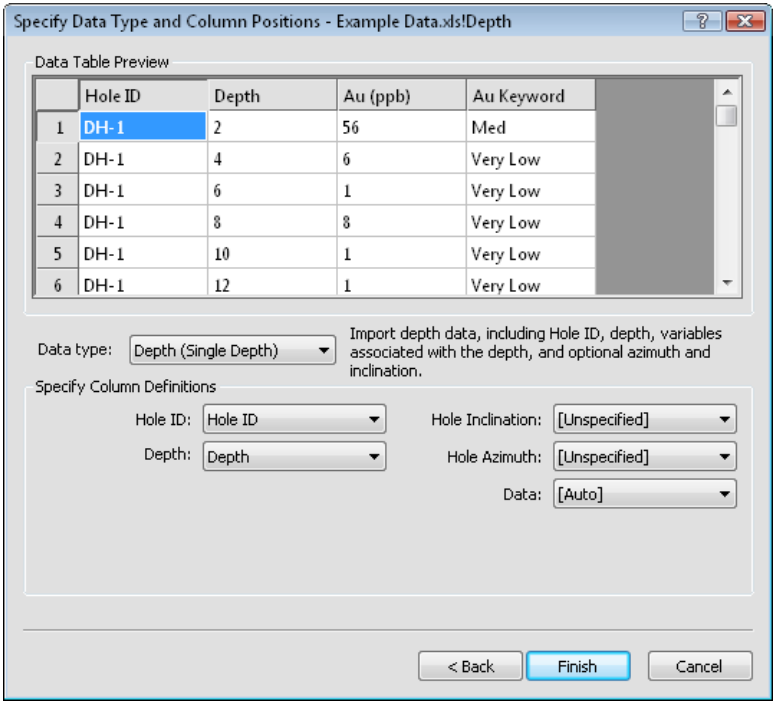
log symbol data.xls

	A	B	C
1	drill depth	Au	Borehole Name
2	2	56	DH-1
3	4	6	DH-1
4	6	1	DH-1
5	8	8	DH-1
6	10	1	DH-1
7	12	1	DH-1
8	14	1	DH-1
9	16	1	DH-1
10	18	24	DH-1
11	20	19	DH-1

*You can import from .XLS files even if the columns are not named or placed in accordance with **Strater** default values.*

import, highlight the file and click *Open*.

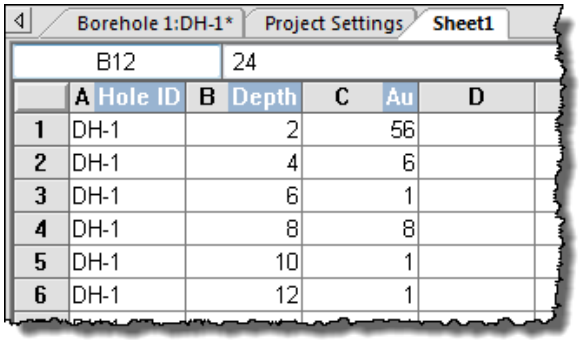
4. The **Specify Worksheet Column Definitions** dialog opens. Click the *Specify Column Header Row* check box because the column header information (Drill Depth, Au, Borehole Name) is in row 1, which is the default row for header information.
5. Click *Next*. The **Specify Data Type and Column Positions** dialog opens.
   a. Note that the contents of the *Hole ID* and *Depth* fields are incorrect. They display the column names associated with the default positions for these two required data columns. Because the columns of the imported .XLS file has these required columns in different locations you must change these two fields.
   b. Use the drop-down menus to select the appropriate columns for *Hole ID* and *Depth*:



Change the required column definitions to match the column locations in the imported data table.

6. Click *Finish*. The log is correctly displayed.

7. Click the **Sheet1** tab. Note that the names of the required columns have changed from their names in the imported .XLS file. In addition, their positions have changed:



	A Hole ID	B Depth	C Au	D
1	DH-1	2	56	
2	DH-1	4	6	
3	DH-1	6	1	
4	DH-1	8	8	
5	DH-1	10	1	
6	DH-1	12	1	

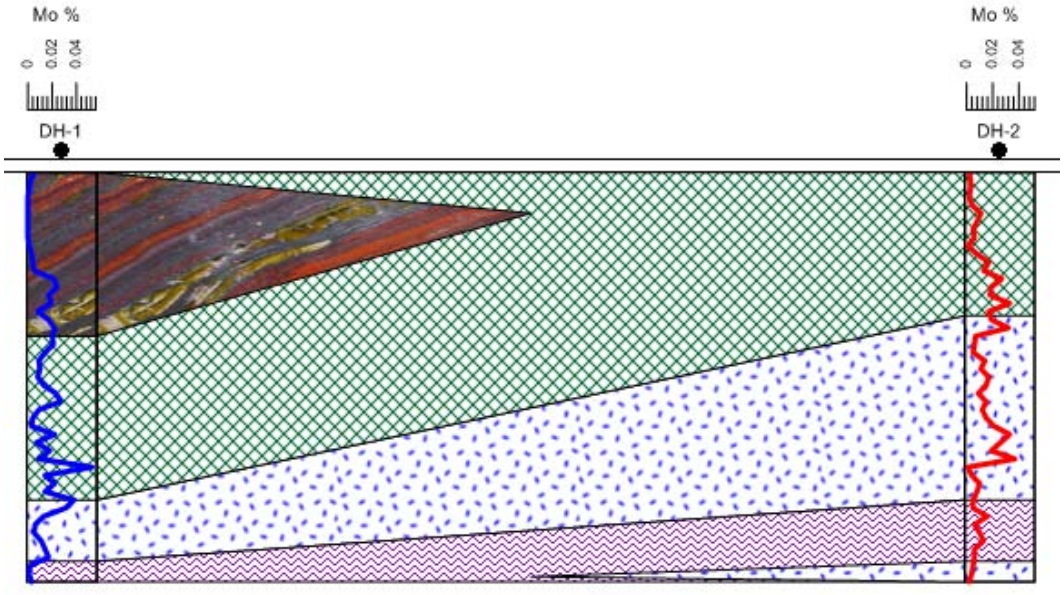
The required column names will always appear as the default names, even when the source data has different names for these columns.

By using this technique you can adapt data files in **Strater** without having to go into the source data file location and make edits in the original file. As long as the required data is present in columns, you can make the necessary adjustments during the data importing process.

Overlay Logs

The **Log | Overlay Logs** command overlays all logs that use the same borehole ID in the borehole view or cross section view. The **Overlay Logs** command places all of the logs for each well directly on top of one another. The **Overlay Logs** command works on all logs in the borehole view or cross section view at the same time.

For instance, in a cross section view with several zone bar logs, draw additional line/symbol logs using the **Log | Line/Symbol** command. The logs are automatically placed at the center of the cross section. To change the Hole ID for each line/symbol log, click on the line/symbol log and change the *Hole ID Filter* on the Base tab in the Property Manager. After all line/symbol logs have been assigned a Hole ID, click the **Log | Overlay Logs** command. The line/symbol logs are placed on top of the zone bar logs.

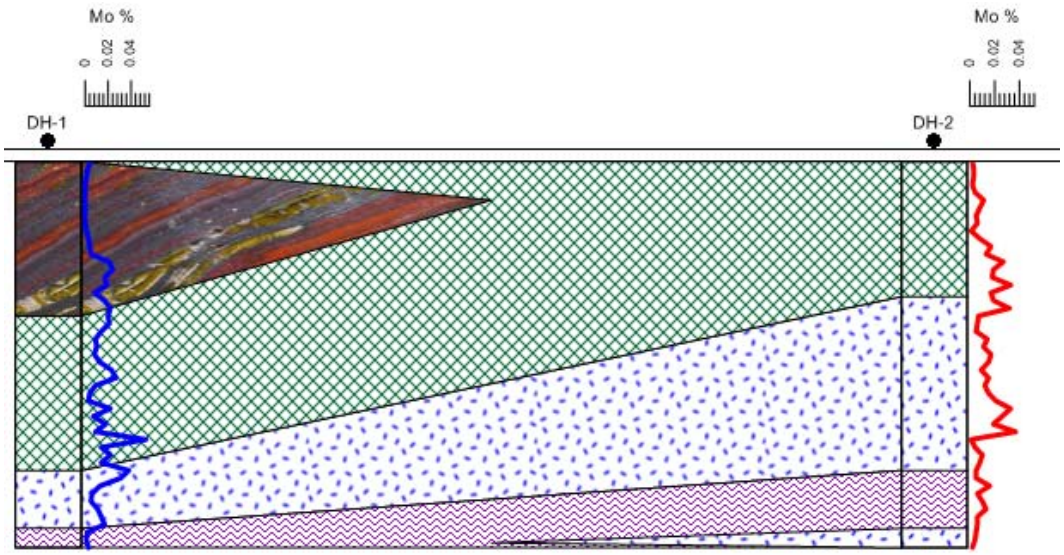


This cross section shows a blue line/symbol log for DH-1 and a red line/symbol log for DH-2 overlaid onto the zone bar logs for the same wells.

Adjoin Logs

The **Log | Adjoin Logs** command places all logs that use the same Hole ID side-by-side in the borehole view or cross section view. The **Adjoin Logs** command places all of the logs for each well with the bounding boxes for each log touching the previous bounding box. The **Adjoin Logs** command works on all logs in the borehole view or cross section view at the same time.

For instance, in a cross section view with several zone bar logs, draw additional line/symbol logs using the **Log | Line/Symbol** command. The logs are automatically placed at the center of the cross section. To change the Hole ID for each line/symbol log, click on the line/symbol log and change the *Hole ID Filter* on the Base tab in the Property Manager. After all line/symbol logs have been assigned a Hole ID, click the **Log | Adjoin Logs** command. The line/symbol logs are placed beside the zone bar logs.



This cross section shows a blue line/symbol log for DH-1 and a red line/symbol log for DH-2 adjoined beside the zone bar logs for the same wells.

True Vertical Depth

When boreholes are not completely vertical, the measured depth (MD) and true vertical depth (TVD) of the borehole are different. The measured depth is the total distance travelled along the borehole from the starting point (usually the collar) to the bottom of the borehole. The measured depth is used in combination with azimuth and inclination or dip information to calculate the true vertical depth, the actual depth below the starting point where a measured value should be displayed.

Inclination or dip and azimuth are indicators of how far off vertical a borehole is. When recorded in a collars table, the azimuth and inclination or dip apply to the entire borehole length. When recorded in a survey table, the azimuth and inclination or dip apply from the depth to the next recorded depth.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

In the borehole view properties or cross section view properties, when the *Depth Method* is set to *True Vertical Depth*, the individual log depths are calculated using the azimuth and inclination or dip values. These values can be set from a depth, interval, survey, or collars table. There are three ways to enter the inclination or dip and azimuth data:

1. A single set of azimuth and inclination or dip data can be entered for each borehole in the collars table. The azimuth and inclination or dip data would apply to all points throughout the borehole.
2. A deviation survey could be imported for each borehole into a survey table. The deviation or survey data does not have to have the same sample interval as the wireline or depth/interval data.
3. Azimuth and inclination or dip data can be entered for each data point in the borehole directly in the depth or interval table as additional columns with the rest of the borehole data.

Once inclination or dip data is entered into a data table, the *Hole Inclination Column or Hole Dip Column* and *Hole Azimuth Column* need to be specified for each log in the borehole view or cross section view in the Property Manager. When the inclination or dip and azimuth data is entered in the table and the columns are specified for each log in the view window, the view window can be set to true vertical depth measurements.

Click on the **View | View Properties** command or click the  button. The view properties are listed in the **Property Manager**. Change the *Depth Method* from *Measured Depth* (the default) to *True Vertical Depth*. All the logs in the view will update with the selected depth method.

Depth logs are the only log types that have their own depth method selection, so you can set the depth scope of the depth log independently of the depth method for the view. This allows you to create one depth log showing measured depth and another showing true vertical depth side-by-side. To set the depth log to true vertical depth, click on the depth log in the **Object Manager** or view window to select it. In the **Property Manager**, set the *Depth Scope* to *Hole True Vertical Depth*.

True Vertical Depth Calculation Methods

When boreholes are deviated, the true vertical depth can be calculated by **Strater**. Several calculation methods are available. Each method creates a mathematical approximation of the true X, Y, and Z value along the borehole path. Each technique is used in different circumstances. Available options are *Tangential*, *Average Tangential, Balanced Tangential, Radius of Curvature,* and *Minimum Curvature*.

Tangential

The tangential method is probably the most simple method for computing true vertical depth. This method uses only the inclination and direction measured at the lower end of the borehole. The borehole path is assumed to be a straight line throughout the course. This method has historically been used more than any other, but is the least accurate. Boreholes calculated with the tangential method often appear too shallow and the lateral displacement along the borehole is too large. In a typical deviated borehole, the true vertical depth can be wrong by more than 50 feet. The error is minimized if short intervals are used between points.

Average Tangential

The average tangential method uses the inclination and direction measured at the top and bottom of the borehole and averages the two sets of measured angles. This averaged angle is used over the course of the borehole. This method is very simple and provides a more accurate calculation than the tangential method. The longer the distance between survey points, the greater the error in the true vertical depth.

Balanced Tangential

The balanced tangential method uses the inclination and direction at the top and bottom of the borehole and averages the two sets of measured angles. Unlike the average tangential method, this method calculates the inclination at the top and bottom and combines them in the proper sine or cosine functions before averaging. This technique provides a smoother curve than either the tangential method or the average tangential method and more closely approximates the actual borehole trace between surveys points. The longer the distance between survey points, the greater the error in the true vertical depth.

Radius of Curvature

The radius of curvature assumes that the borehole follows a smooth, spherical arc between survey points and passes through the measured angles at both ends. This method is one of the more accurate means of calculating the position when the survey spacing is large. This method is less sensitive to placement of the survey points. When the survey data is closely spaced or if a single inclination value is used (from a collars table, for example), this method is not recommended.

Minimum Curvature

The minimum curvature method is the default method in Strater. This method assumes that the borehole follows the smoothest possible circular arc between points. This method is very similar to the Balanced Tangential Method, with each result multiplied by a ratio factor.

True Vertical Depth Reference

For additional information on these methods, refer to the following locations.

Crain's Petrophysical Handbook at http://www.spec2000.net/19-dip13.htm#b1

"Bulletin on Directional Drilling Survey Calculation Methods and Terminology," American Petroleum Institute (API) Bulletin D20, December 31, 1985.

Example True Vertical Depth

To create boreholes in true vertical depth requires having data for the borehole that includes azimuth and inclination or dip. The azimuth and inclination or dip values can be in a survey table, a collars table, or in the depth table. Once the azimuth and inclination or dip data are entered, the view window and logs can all be set to display true vertical depth. This example imports two tables: a survey table with inclination or dip and azimuth and a depth table. A line/symbol log is created from the depth table. Two depth logs are then created: one display true vertical depth and one displays measured depth.

1. Click the **File | New | Project** command or click the  button to open a new project.
2. Click on the *Project Settings* tab to enter the table view.
3. Open the data tables:
    a. Click the **File | Open Multiple** command.
    b. In the **Open Data** dialog, click on the *Example Data.xls* file in the Samples directory. By default, the Samples directory is located at C:\Program Files\Golden Software\Strater 4\Samples.
    c. Click *Open.*
    d. Select the *Deviation Survey* sheet.
    e. Press and hold the CTRL key on the keyboard and select the *Depth* sheet.
    f. Click *OK*.
    g. For the Depth table:
        i. In the **Specify Worksheet Column Definitions** dialog, make sure that the *Specify Column Header Row* is checked and set to 1. Click *Next*.
        ii. In the **Specify Data Type and Column Positions** dialog, make sure that the *Data type* to *Depth (Single Depth)* and that all of the columns are set correctly and click *Finish*.
    h. For the Deviation Survey:
        i. In the **Specify Worksheet Column Definitions** dialog, make sure that the *Specify Column Header Row* is checked and set to 1. Click *Next*.
        ii. In the **Specify Data Type and Column Positions** dialog, set the *Data type* to *Survey*. Make sure all of the columns are set correctly and click *Finish*.
4. Click on the *Borehole 1* tab or click **Window | Borehole 1** to return to the borehole view.
5. Create a line/symbol log by clicking the **Log | Line/Symbol** command or clicking the  button.
    a. Click near the center of the log pane to position the line/symbol log.
    b. In the **Open** dialog, select *Depth* in the *Use Current Table* list.
    c. Make sure that *Depth* is listed in the *File name* option.
    d. Click *Open*.
6. Set the line/symbol log to use true vertical depth measurements.

a. Click on the line/symbol log in the view window or in the **Object Manager** to select it.

b. In the **Property Manager**, click on the **Line/Symbol Log** tab.

c. Next to *Hole Inclination Column or Hole Dip Column*, click on *[Unspecified]* and select *[From survey table]: Deviation Survey*.

d. Notice that the *Hole Azimuth Column* automatically is set to *[From survey table]: Deviation Survey*. When using a survey table, the inclination or dip or dip and azimuth columns must come from the same table.

7. Create a depth log by clicking the **Log | Depth** command or clicking the  button.
8. Click on the far left side of the page in the log pane to position the first depth log.
9. Set the depth log to use measured depth.

a. With the depth log selected, in the **Property Manager**, click on the **Depth Log** tab.

b. Set the *Depth Scope* to *Hole Measured Depth* by clicking on the existing option and select *Hole Measured Depth* from the list.

c. Next to *Hole Inclination Column* or *Hole Dip Column*, click on *[Unspecified]* and select *[From survey table]: Deviation Survey*.

d. Notice that the *Hole Azimuth Column* automatically is set to *[From survey table]: Deviation Survey*. When using a survey table, the inclination or dip and azimuth columns must come from the same table.

10. Click the **Draw | Text** command or click the  button.

a. Click above the depth log to position the text.

b. In the **Text Editor**, type *Measured Depth* and click *OK*.

c. Press ESC on the keyboard to end drawing mode.

11. Create a depth log by clicking the **Log | Depth** command or clicking the  button.
12. Click between the existing depth log and the line/symbol log to position the second depth log.
13. Set the depth log to use true vertical depth.

a. With the new depth log selected, in the **Property Manager**, click on the **Depth Log** tab.

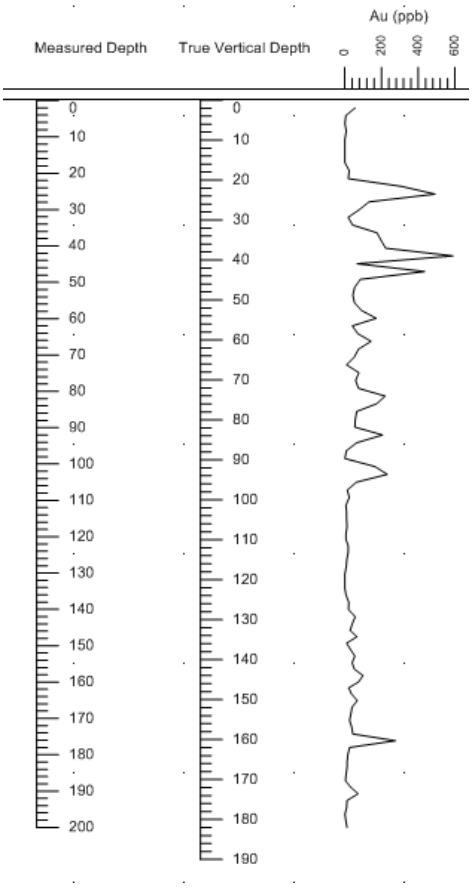
b. Set the *Depth Scope* to *Hole True Vertical Depth* by clicking on the existing option and select *Hole True Vertical Depth* from the list.

c. Next to *Hole Inclination Column or Hole Dip Column*, click on *[Unspecified]* and select *[From survey table]: Deviation Survey*.

d. Notice that the *Hole Azimuth Column* automatically is set to *[From survey table]: Deviation Survey*. When using a survey table, the inclination or dip and azimuth columns must come from the same table.

14. Click the **Draw | Text** command or click the  button.
    a. Click above the second depth log to position the text.
    b. In the **Text Editor**, type *True Vertical Depth* and click *OK*.
    c. Press ESC on the keyboard to end drawing mode.
15. Click the **View | View Properties** command or click the  button to display the borehole view properties.
16. Click on the *Measured Depth* option next to *Depth Method* and select *True Vertical Depth* from the list.

The view is displayed in true vertical depth. The first depth log shows measured depth and the second depth log shows true vertical depth. The log is also shown with true vertical depth.



The measured depth and true vertical depth are both displayed.

Setting the Log Scale

There are a few ways to set the scaling depth in **Strater**.

Setting the Scale to Show 1"=10'

You can set the scale of the map in the view properties. To open the view properties, click the **View | View Properties** command. Then, in the Property Manager, the method depends on what is set for the *Depth Settings*.

If the *Depth Settings* is set to:

- *Automatic*, then uncheck the box next to the *Auto-recalculate Scale* option. Set the *Scaling Depth Per Inch* to 10.
- *Collars Table*, then click on the collars table and enter 10 in the *Scale* column for that Hole ID. Or, uncheck the box next to *Auto-recalculate Scale*, and set the *Scaling Depth Per Inch* to 10.
- *User Defined*, then uncheck the box next to the *Auto-recalculate Scale* option. Set the *Scaling Depth Per Inch* to 10.

Setting the Scale to 1:500

To set a proportional scale where 1 inch on the page is 500 log inches (1"= 500", or 1:500), click the **View | View Properties** command. Then, in the Property Manager, set the *Standard Scale 1* to 500. If this option is not available, uncheck the box next to the *Auto-recalculate Scale* option first.

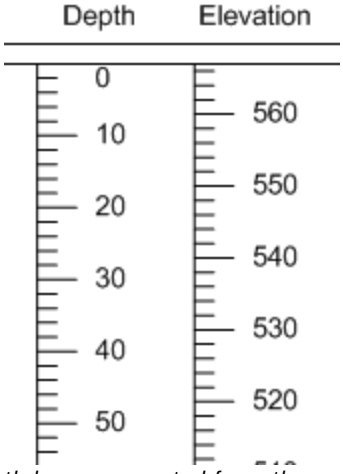
Setting Elevation

There are multiple methods used to set elevation in **Strater**. In all of the examples below, the borehole being displayed has a total depth of 200 units from the top of the borehole to the bottom, with a starting elevation of 567 units, based on the Elevation column in the Collars table.

Depth Logs

The depth log *Orientation* option controls only the display of labels on the depth log. Labels can be displayed in elevations or depth down the borehole in **Strater**. This does not change the "hanging" elevation or convert depths in the cross section to elevation. It only changes the display of the labels on the depth log. The *Orientation* option uses the starting elevation in the collars table and the data in the data table. This requires you have Elevation values specified in the Collars table.

In this example, the data in the depth column has values between 0 and 200. The elevation in the collars column is 567.

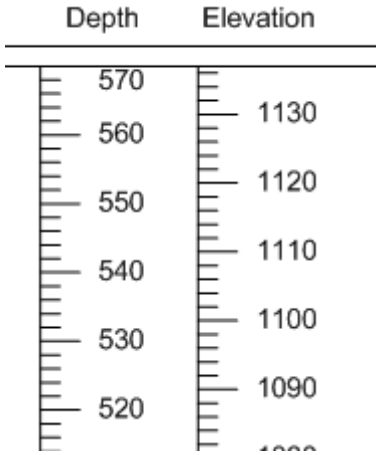


Both depth logs are created from the same data. The log on the left displays depth increasing down the borehole. The log on the right shows elevation based on the Collars table Elevation column.

Borehole Orientation

The borehole view properties *Orientation* option tells **Strater** if the data in the table is elevation data (increasing upwards) or depth data (increasing downwards). This does change the display of all the logs in the view. However, you must select the appropriate option for the existing data in the data table (so do not select "Elevation" if your data in the data table is really depth data).

In this example, the data in the depth column has values between 567 and 367. The elevation in the collars column is 567.

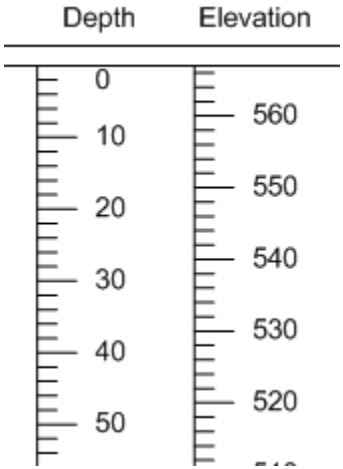


When the borehole view properties Orientation *is set to* Elevation*, the largest value in the data column is displayed at the top of the log and the values decrease going down the borehole. Note that the depth log on the right shows elevation values that do not make sense in this situation. The depth log* Orientation *should be set to Depth.*

Reference Datum

The *Reference Datum* option in the borehole view properties tells **Strater** whether the data contains depth or elevation. If the data in the data table is really depth data, but you want to see the boreholes in their elevation, set the *Reference Datum* to *Mean Sea Level*. That will adjust the logs to be displayed in their real world elevation position, with respect to their elevation in the Collars table. If you do this, you probably want to put the depth log *Orientation* to *Elevation* as well. This does require you have *Elevation* specified in the Collars table.

In this example, the data in the depth column has values between 0 and 200. The elevation in the collars column is 567.

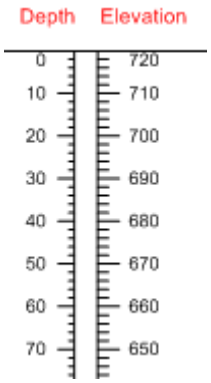


The Reference Datum *is set to* Mean Sea Level.

Chapter 8

Depth Logs

Depth Logs



Depth logs can display depth or elevation.

Click the **Log | Depth** command or click the button to create a depth log. The depth log is used as a scale to display the depth or elevation of the data in the borehole view or cross section view.

Data Requirements

Depth logs use depth or interval data tables. In the data table, there are two required columns. The required columns are *Hole ID* and *Depth*. The depth log displays from the minimum depth value to them maximum depth value listed in the table.

	A Hole ID	B Depth
1	DH-1	2
2	DH-1	4
3	DH-1	6
4	DH-1	8
5	DH-1	10
6	DH-1	12

The Hole ID, *and* Depth *are required for a depth log.*

Creating a Depth Log

To create a depth log:

1. Click the **Log | Depth** command or click the button.
2. Click inside the log pane where you want the depth log to appear. If other logs exist in the current view window, the depth log is created.
3. If a depth log is the first log item created in this view window, in the **Open** dialog, click on the data file. If the data was already opened, click on the table name in the *Use Current Table* section. Click *Open*.

4. Set the data importing options in the Specify Worksheet Column Definitions dialog, if necessary, and click *Next*.
5. Finish the importing of data in the Specify Data Type and Column Positions dialog and click *Finish*.
6. The depth log appears in the view window.

If you are in active mode a depth log is created using the default properties. If you are in design mode, a depth log graphic is displayed as a place holder after step 2.

Editing Depth Log Properties

To change the features of a depth log, including the depth orientation, units, and tick interval properties, click on the depth log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Depth Log**, **Ticks**, **Base**, **Label**, and **Line**.

Depth Log Properties

The **Depth Log** page in the **Property Manager** includes options for defining the style of the depth scale, display unit type, and depth orientation of a depth log. To view and edit depth log properties, click on the depth log in the view window or **Object Manager** to select the log. Then, click on the **Depth Log** tab in the **Property Manager**.

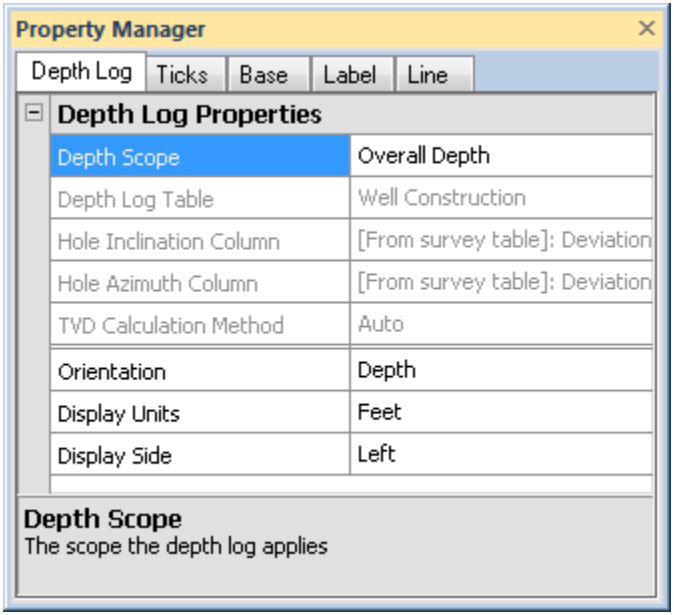
Depth Scope

The *Depth Scope* determines how the depth on the depth log is shown. Available options are *Overall Depth, Hole Measured Depth*, and *Hole True Vertical Depth*. When *Overall Depth* is selected, the depth is reported for all boreholes in the view window. The depth shown is the reported depths in the tables. The *Hole Measured Depth* option sets the depth to a single borehole and the labels are displayed as the measured depth values in the table. The *Hole True Vertical Depth* option sets the depth to a single borehole and the labels are displayed as the calculated true vertical depths, based on the *Hole Inclination Column (or Hole Dip Column)* and *Hole Azimuth Column.*

When the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Depth Log Table, Hole Inclination Column* (or *Hole Dip Column*), and *Hole Azimuth Column* options become available. Set the borehole to base the depth values on the Base tab. Set the *Hole ID Filter* to the desired borehole that should be used to display the depth values on the depth log.

Depth Log Table

Use the *Depth Log Table* to define the data table for the depth log. The table type can be an interval, lithology, well construction, or a depth table. The *Depth Log Table* option is not available if the *Depth Scope* is set to *Overall Depth*. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Depth Log Table* defines the table from which the measured values should be read.



*Set the depth log properties on the **Depth Log** tab in the **Property Manager**.*

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From*

collars table:collars name], [From survey table: survey name], or data columns in the existing *Depth Log Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

TVD Calculation Method

When the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the displayed depth value is calculated using the depth from the table and the azimuth and inclination. The *TVD Calculation Method* determines how the values are combined to get the true vertical depth. Available options are *Auto, Tangential, Average Tangential, Balanced Tangential, Radius of Curvature,* and *Minimum Curvature*. The default is *Auto*, which uses the method from the borehole view properties or cross section view properties to calculate the true vertical depth for the depth log. To change the calculation method, click on the existing option and select the desired option from the list.

Strater allows the depth log to have a different *TVD Calculation Method* than the other log items so that the depth log can display measured depth, true vertical depth, or overall depth for the entire view window. Refer to the True Vertical Depth page for an example of when this might be useful.

Orientation

The *Orientation* option sets whether the labels on the depth log are in depth units or elevation units. Depth units start at a small value and increase down the borehole. Elevation units are generally in feet or meters above sea level. Elevation for each borehole must be specified in the collars table. If the elevation is not specified the value is assumed to be zero, creating a depth log rather than an elevation log. To change the *Orientation*, click on the existing option and select the desired option from the list.

When the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Elevation*, click on the Base tab. Set the *Hole ID Filter* to the desired borehole that should be used to display the elevation values on the depth log.

Display Units

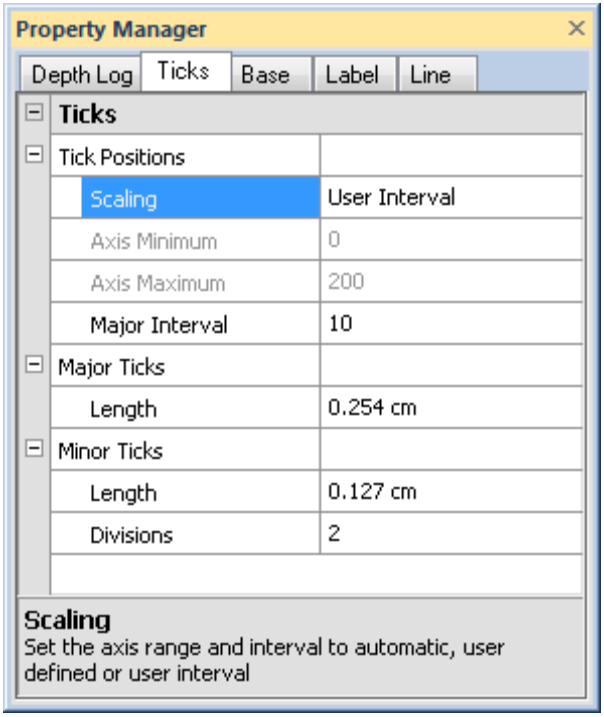
Select the *Display Units* to specify the units the depth log tick labels should display. If the units are different than the units in the borehole view properties or cross section view properties, the labels are automatically converted to the units specified here. For example, if the borehole view properties units are feet and you select *Inches* as the display units, **Strater** multiplies the values in the data table by 12. In addition, by using multiple units with multiple depth logs, you can show depth as feet and meters in one borehole, as in this example. To change the units, click on the existing option and select the desired option from the list.

Display Side

Use the *Display Side* option to move tick marks and labels to the *Left* or *Right* side of the depth log. Positioning the tick marks on opposite sides of the line is useful when displaying multiple depth logs side by side or on opposite sides of the page. To change the side, click on the existing option and select the desired option from the list.

Ticks Properties

The **Ticks** page in the **Property Manager** includes options for setting the tick scaling, interval, and length of the ticks for a depth log. To view and edit depth log tick properties, click on the depth log in the view window or **Object Manager** to select the log. Then, click on the **Ticks** tab in the **Property Manager**.



*Set the depth log tick properties on the **Ticks** tab in the **Property Manager**.*

Scaling

The *Scaling* controls how tick marks appear on the depth log. To change the *Scaling,* click on the existing option and select the desired option from the list. Available options are *Automatic*, *User Defined*, and *User Interval*. Set the *Scaling* to *Automatic* to automatically define the starting and ending ticks, based on all of the logs and depth settings in the view window. Set the *Scaling* to

User Defined if you want to manually define the tick range and interval. Set the *Scaling* to *User Interval* if you want the tick range calculated automatically, but want to set the *Major Interval* to a custom value.

Axis Minimum and Maximum

When *Scaling* is set to *User Defined*, you can enter an *Axis Minimum* and an *Axis Maximum*. The *Axis Minimum* must be less than the *Axis Maximum*. Values are in *Display Units*, as set on the Depth Log tab. To change the *Axis Minimum* or *Axis Maximum* value, highlight the existing number and type the desired value. Press ENTER on the keyboard to make the change.

Major Interval

When *Scaling* is set to *User Defined* or *User Interval*, change the *Major Interval* setting to control the spacing between major tick marks. The interval value is specified in *Display Units*, as set on the Depth Log tab. The interval must be greater than zero. A *Too many intervals* warning message appears is the number typed in the *Major Interval* creates more than 200 tick marks on the depth log. To change the interval, set the *Scaling* option to *User Defined* or *User Interval.* Then, highlight the existing value next to *Major Interval* and type the desired number. Press ENTER on the keyboard to make the change.

Major Tick Length

The length of the major tick marks is set in the *Major Ticks* section with the *Length* option. Values are in page units and range between 0.0 to 2.0 inches (0 and 5.08 centimeters). To change the value, highlight the existing value and type the desired length. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the tick length.

Minor Tick Length

The length of the minor tick marks is set in the *Minor Ticks* section with the *Length* option. Values are in page units and range between 0.0 to 2.0 inches (0 and 5.08 centimeters). To change the value, highlight the existing value and type the desired length. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the tick length.

Minor Divisions

The *Divisions* are the number of divisions (gaps) between the major tick marks. The value should be between 1 and 20. A value of one creates no minor tick marks and one gap. A value of 10 is entered into the *Divisions* box, there are nine minor tick

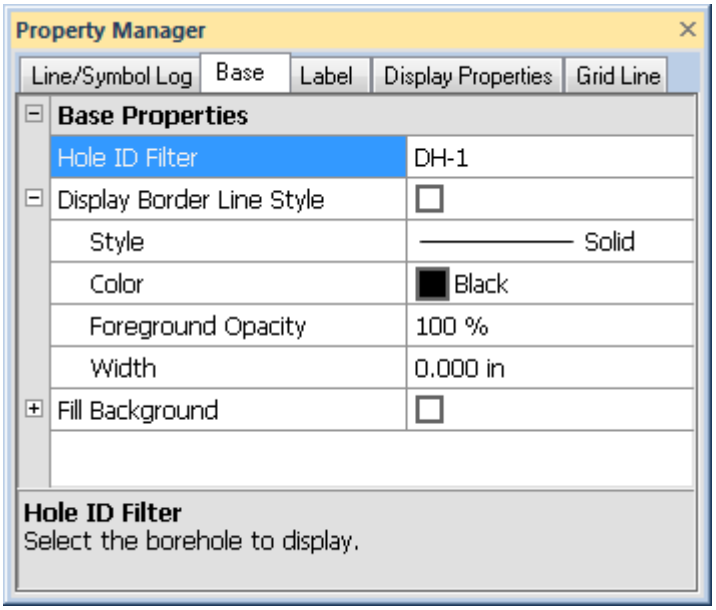
marks and 10 gaps between major ticks. To change the number of divisions, highlight the existing value and type the desired value. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the number of divisions.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Depth Log Label Properties

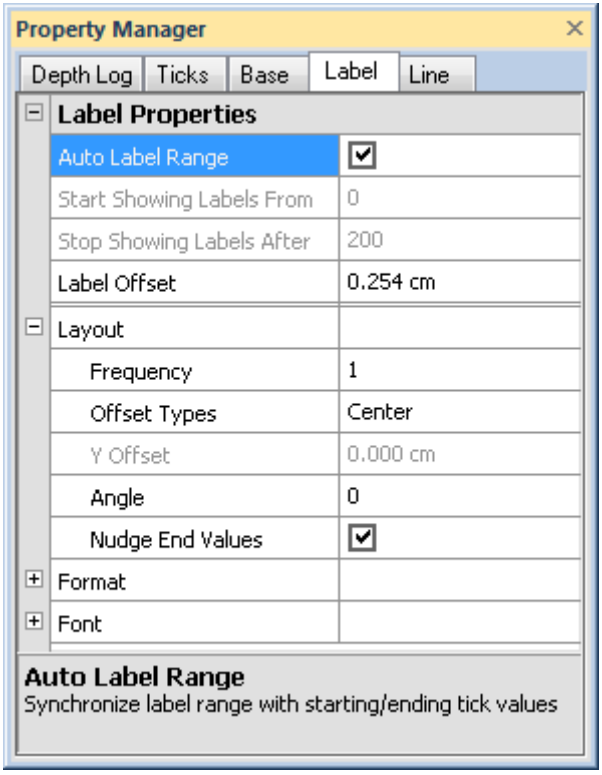
The **Label** page in the **Property Manager** includes options for defining the tick mark label range, layout, font, and format. To view and edit depth log properties, click on the depth log in the view window or **Object Manager** to select the log. Then, click on the **Label** tab in the **Property Manager**.

Auto Label Range

Check the box next to *Auto Label Range* to have the starting and stopping labels set to the starting and ending tick marks. When unchecked, the *Start Showing Labels From* and *Stop Showing Labels After* options become available.

Start Showing Labels From

When the *Auto Label Range* is unchecked, the *Start Showing Labels From* option lists the first tick value on the depth log that should contain a label. To change the first label value, uncheck the *Auto Label Range* option. Then, highlight the number next to *Start Showing Labels From* and type the desired starting label value. Press ENTER on the keyboard to make the change. The label value is specified in *Display Units*, as set on the Depth Log tab.



*Set the tick label properties for a depth log on the **Label** tab in the **Property Manager**.*

Stop Showing Labels From

When the *Auto Label Range* is unchecked, the *Stop Showing Labels From* option lists the last tick value on the depth log that should contain a label. To change the last label value, uncheck the *Auto Label Range* option. Then, highlight the number next to *Stop Showing Labels From* and type the desired ending label value. Press ENTER on the keyboard to make the change. The label value is specified in *Display Units*, as set on the **Depth Log** tab.

Label Offset

The *Label Offset* option moves the label number away from the tick mark, in the direction the tick mark is pointing. Larger values move the label further from the tick mark. Smaller values move the label closer to the tick mark. Values range from zero to 2 inches (0 to 5.08 centimeters). To change the offset, highlight the existing number and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the offset value.

Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many labels appear on the log. Setting the value to zero displays no labels on the log. Setting the value to one displays a label at all tick marks. Change the *Frequency* to two to display a label at every other tick mark or three to display a label at every third tick mark. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press ENTER on the keyboard to make the change. Alternatively, click on the  to increase or decrease the value.

Offset Types

The *Offset Types* determines the location of the label relative to the tick mark. To change the location, click on the existing option and select the desired option from the list. Available options are *Center, Top, Bottom,* and *User Defined*.

Y Offset

The *Y Offset* field is active only when the *Offset Types* is *User Defined*. The *Y Offset* moves the label numbers up (positive offset) or down (negative offset).

Angle

The *Angle* option sets the displayed data at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change.

Format

Click the ⊞ next to *Format* to set the numeric format options for the labels.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

Line Properties

Use line properties to change line properties for selected lines in the view. To edit the line properties, click on the object in the **Object Manager** or plot window to select it. The properties are listed in the **Property Manager**.

Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

Creating Multiple Depth Logs

Depth logs are used as scale bars to display the depth or elevation of the data in the view window. You can include multiple depth logs with multiple units in your borehole graphics. For example, you may want to include a depth log with feet and another depth log with meters.

Original Units

First, set the project data units so **Strater** has a basis to perform the conversions.

To set the data units:

1. Open the view window.
2. Click the **View | View Properties** command or click the  button.
3. Set the *Depth Units* to the data's depth units in the **Property Manager**.

Create the First Depth Log

Once the base units are set, you can create the first depth log. To create a depth log:

1. Click the **Log | Depth** command or click the  button.
2. Click in the log pane where you want the depth log to appear.
3. If there are no other logs in the log pane, you are prompted to import data.
4. Click on the depth log in the **Object Manager** or view window, if it is not already selected.
5. Edit the depth log *Display Units* in the **Property Manager**. If, for example, you want one scale bar in feet then set the *Display Units* to *Feet*.
6. To display the labels and ticks on the left side of the log, change the *Display Side* to *Left*.

Create the Second Depth Log

The second depth log is created just like the first depth log:

1. Click the **Log | Depth** command or click the  button.
2. Click in the log pane where you want the depth log to appear.
3. Select the depth log if it is not already selected.
4. Edit the depth log *Display Units* in the **Property Manager**. If, for example, you want one scale bar in meters then set the *Display Units* to *Meters*.

Positioning the Depth Logs

Position the depth logs by dragging them to a new location or by setting the position in the *Position/Size* toolbar. The following directions show how to position a depth log on the left side of the borehole.

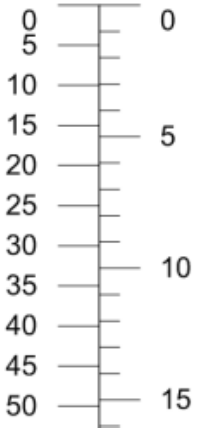
To position the depth log:

1. Click once on the depth log to select it.
2. Hold down the left mouse button and drag the depth log to the desired location at the far left side of the page. Release the mouse button when the log is in the desired position.
3. Alternatively, in the *Position/Size* toolbar, highlight the value next to *X*: and type the desired value. In the default borehole view, the furthest left an object can be placed is at the page margin which is 0.25 inches, by default. Type 0.25 and press ENTER on the keyboard.

Spacing the Depth Logs

The depth logs can be automatically spaced after setting the first depth log's position. To automatically space the depth logs on the left side of the page:

1. Click on the first depth log name in the **Object Manager**.
2. Press and hold the CTRL key on your keyboard.
3. Click on the second depth log name in the **Object Manager**. Both names are highlighted.
4. Click the **Arrange | Space Objects | Right to Left** command or click the  button. This aligns the right depth log bounding box edge to the right side of the left depth log bounding box edge.



Different scales can be displayed on two adjacent logs.

The depth log line appears with feet on one side and meters on the other.

Display Both Depth and Elevation

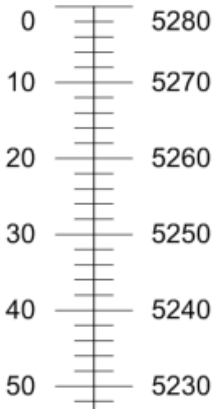
To display the elevation, you just need to have a collars table with the elevation of the top of the hole defined. Be sure that the data is in a collars table, not an interval, text, or depth table type.

Then, use these steps to create two depth logs. One will show depth and one will show elevation.

Create the First Depth Log

Create the first depth log showing depth units:

1. Click the **Log | Depth** command or click the  button.
2. Click in the log pane where you want the depth log to appear.
3. If there are no other logs in the log pane, you are prompted to import data.
4. Click on the depth log in the **Object Manager** or view window, if it is not already selected.
5. In the **Property Manager**, set the *Orientation* to *Depth*.



Two depth logs are displayed. The one on the left shows depth and the one on the right shows elevation.

Create the Second Depth Log

The second depth log is created just like the first depth log, except the units will be elevation:

1. Click the **Log | Depth** command or click the  button.
2. Click in the log pane where you want the depth log to appear.
3. Select the new depth log if it is not already selected.
4. Set the *Orientation* to *Elevation*.

Depth Grid Lines

Grid lines are typically shown for individual logs. You can, however, display depth grid lines across the entire page. To create grid lines across the width of the page, you need to create a log item that spans the width of the page. See *LAS Example-1.sdg* for an example, which is located in the **Strater** Samples directory. The *Depth Grid* log is as wide as the page and displays only the grid lines.

To reproduce the depth grid lines that span the entire page, follow these steps:

1. Click the **File | New | Project** command or click the  button to open a new blank project.
2. Create a line/symbol log:
   a. Click the **Log | Line/Symbol** command or clicking the  button.
   b. Click in the view window where the log should be placed.
   c. In the **Open** dialog, select the data file. The data file should contain depth data that matches the desired depth range. Select *Example Data.xls* as an example and click *Open*.
   d. Select the *Depth* sheet and click *OK*.
   e. Click *Next* in the **Specify Worksheet Column Definitions** dialog, accepting the defaults.
   f. In the **Specify Data Type and Column Positions** dialog, verify the columns are set correctly and click *Finish*.
3. Set the line/symbol log to display the depth data and no lines or symbols.
   a. Click on the line/symbol log in the **Object Manager** or view window, if it is not already selected.
   b. Click on the **Display Properties** tab in the **Property Manager**.
   c. Click the ⊞ next to *Line Properties*.
   d. Click the solid line next to *Style*. Select the invisible line from the list.

4. Set the log position and width:
   a. With the log selected, highlight the number next to *X:* in the Position/Size toolbar. Type 0.00 and press ENTER on the keyboard. The value will automatically update to the minimum value (0.25 inches, if the margins are set to the default values).
   b. Highlight the value next to W: in the Position/Size toolbar. Type the maximum value, depending on the page size and margins. For instance, if you are using a letter size page (8.5 inches x 11 inches) and have a 0.25 inch margin on the left and right sides, you would type 8.0. Press ENTER on the keyboard to make the change and the log fills the entire view window.
5. Add grid lines that extend the entire width of the log:
   a. Click on the **Grid Line** tab in the **Property Manager**.
   b. Click the ⊞ next to the *Depth Grid Lines*.
   c. Click *Hide* next to *Grid Line Display Order* and select *Top.*
   d. Change the *Scaling* to *User Defined*.
   e. Set the *Grid Minimum* and *Grid Maximum* values to the desired first and last grid line value.
   f. Check the box next to *Show Major Depth Grid Lines*. The grid lines are now displayed on the page.
   g. Click the ⊞ next to the *Show Major Depth Grid Lines*.
   h. Set the *Grid Interval* to the interval that you want to see depth grid lines on the page. 50 would place a grid line every 50 depth units.
   i. Set the line *Style, Color, Foreground Opacity*, and *Width*.
6. Delete the scale bar by clicking on the scale bar in either the view window or **Object Manager** and pressing DELETE on the keyboard.

Tips:

- After adding all other logs, you can position the grid lines to be on top of all logs by clicking on the grid line log and clicking the **Arrange | Order Objects | Move to Front**. The grid will now appear on top of all other logs.
- You can move the grid behind individual logs by selecting these other logs and clicking the **Arrange | Order Objects | Move to Front** command. Only these logs will appear over the grid.
- Use the instructions in Grid Line Properties to adjust the appearance of the grid.

Change the Numeric Format for Depth Logs

A depth log currently shows labels reading 0, 0, 1, 1, 1, 1, 2, etc. The log should show 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5, etc. How do I change the format?

This is related to the number of decimal digits specified for the depth log labels. If the number of decimal digits is set to 0, your log would only show whole numbers. So instead of labels like 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5, they would be rounded to 0, 0, 1, 1, 1, 1, 2.

To check the number of decimal digits, follow these steps.

1. Click on the depth log to select it.
2. In the **Property Manager**, click the Label tab.
3. Click the ⊞ next to *Format* to open the label format section.
4. Set the *Numeric Format Types* to *Fixed*.
5. Set the *Decimal Places* to 1 or 2, depending on how many decimal digits you want to see.
6. Press ENTER and the log is updated to show the desired values.

Setting the Depth Scale

Strater scales logs based on a scaling depth per inch (or centimeter, depending on how you have your *Page Units* set). To set it up so that there are exactly a certain number of depth units per page, follow these steps:

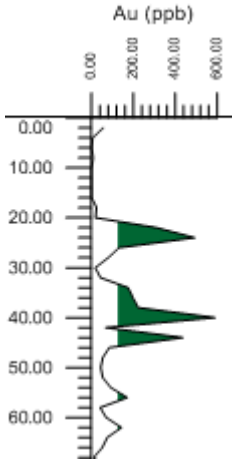
1. Click the **File | New | Project** command.
2. In the borehole view, click the **File | Page Setup** command.
3. In the **Page Setup** dialog, note the *Height* of the *Log Pane*.
4. Divide the scale you want per page (20 m in this case) by the height of the log pane. For example, if the log pane height is 7.8", you would divide 20 by 7.8 to get 2.56.
5. Click *Cancel* to exit out of the **Page Setup** dialog.
6. Click the **View | View Properties** command.
7. In the **Property Manager**, click on the **View** tab.
8. Uncheck the box next to *Auto-recalculate Scale*.
9. Set the *Scaling Depth per Inch* value to the number calculated in Step 3. Type 2.56 and press ENTER to make the change.

Chapter 9

Line/Symbol Logs

Line/Symbol Logs

Click the **Log | Line/Symbol** command or click the  button to create a log that is used to display data as a line, as symbols, or as a combination of line and symbols. The line connects the data in the depth order. Line/Symbol logs can display labels, and can be filled to a cutoff value. Line/symbol logs are useful for displaying assay values, geophysical parameters, moisture content, etc.



This line/symbol log displays a green fill that extends from the log to the left at a cutoff value.

Data Requirements

Line/symbol logs use depth or interval data tables. In the data table, there are three required columns. The required columns are *Hole ID, Depth,* and the data column being displayed. Points are plotted along the horizontal axis at the value recorded in the data column. Points are plotted at the depth recorded in the depth column for each row.

Interval table types can be used. When an interval table type is used, the point is plotted at the center point of the interval. For instance, if the interval goes *From* 1 *To* 4, the point is plotted at 2.5 on the depth axis.

	A Hole ID	B Depth	C Au (ppb)
1	DH-1	2	56
2	DH-1	4	6
3	DH-1	6	1
4	DH-1	8	8
5	DH-1	10	1
6	DH-1	12	1

The Hole ID, Depth, *and one column of data are required for a line/symbol log.*

Creating a Line/Symbol Log

To create a line/symbol log:

1. Click the **Log | Line / Symbol** command or click the  button.
2. Click inside the log pane where you want the line/symbol log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a line/symbol log is created using the default properties. If you are in design mode, a line/symbol log graphic is displayed as a place holder after step 2.

Editing Line/Symbol Log Properties

To change the features of a line/symbol log, including the data column used to create the log, click on the line/symbol log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Line / Symbol Log**, **Base**, **Label**, **Display Properties**, and **Grid Line**.

Line/Symbol Log Properties

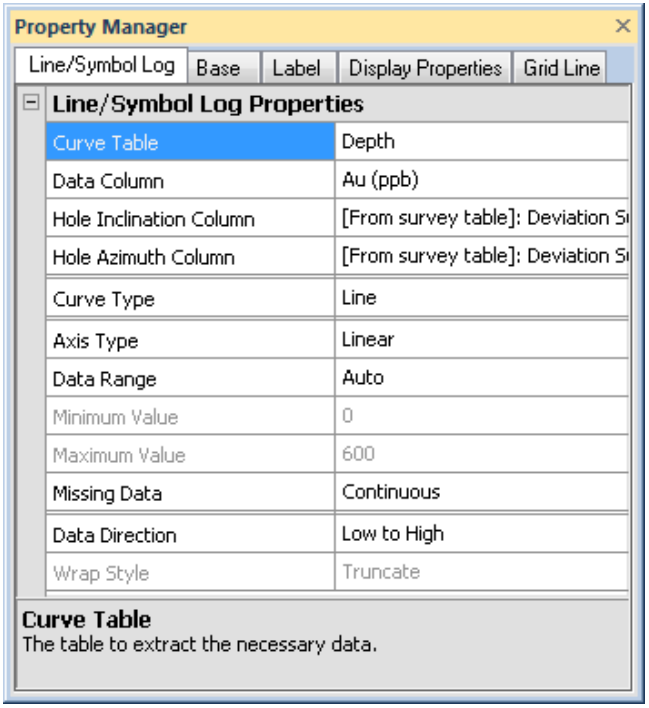
The **Line / Symbol Log** page in the **Property Manager** includes options for defining the data, scaling, range, data direction, and wrap style for line/symbol logs. To view and edit line/symbol log properties, click on the line/symbol log in the view window or **Object Manager** to select the log. Then, click on the **Line / Symbol Log** tab in the **Property Manager**.

Curve Table

Use the *Curve Table* to define the data table for the line/symbol log. The table type can be an interval table or a depth table. If the table is a depth table, the points are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Curve Table* that is being displayed by the line/symbol log. When the *Curve Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.



*Edit line/symbol log properties on the **Line/Symbol Log** tab in the **Property Manager**.*

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Curve Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Curve Type

The *Curve Type* determines how the line is displayed. Available options are *Line* and *Stair Step*. *Line* draws a simple line log, directly connecting adjacent points using the shortest path. *Stair Step* draws connecting lines between adjacent points using horizontal and vertical lines. To change the curve type, click on the existing option and select the desired option from the list.

Axis Type

The *Axis Type* is *Linear* or *Logarithmic*. The data must be greater than zero when using a *Logarithmic* axis. Values equal to and less than zero are ignored in the log when *Logarithmic* is selected. Logarithmic uses a log (base 10) scale for the horizontal axis. To change the axis type, click on the existing option and select the desired option from the list.

Data Range

The horizontal scale can be set manually or automatically with the *Data Range* option. The *Auto* option calculates a best-fit range of the data. The *User Defined* option activates the *Minimum Value* and *Maximum Value*, allowing manual control over the log's minimum and maximum values. The *Wrap Style* is also activated by setting the *Data Range* to *User Defined*. To change the data range, click on the existing option and select the desired option from the list.

Minimum and Maximum Values

The *Minimum Value* and *Maximum Value* are only available if the *Data Range* is set to *User Defined.* The *Minimum Value* is the smallest value that should be displayed on the log. The *Maximum Value* is the largest value that should be displayed on the log. To change the minimum and maximum values, set the *Data Range* to *User Defined*.

Then, highlight the existing value in *Minimum Value* or *Maximum Value* and type the desired value.

If the Hole ID is changed for the log, the new data may or may not fit into the user-defined range. If the data does not fit inside the range, change the *Minimum Value* and *Maximum Value* to new values or set the *Data Range* to *Auto*.

Missing Data

The *Missing Data* option controls how rows of empty data are displayed on the log. Set *Missing Data* to *Continuous* to show rows of missing data as a continuous line between the data values on each side of the missing data. Select *Discontinuous* to show the missing data as a gap in the line of the log. To set the missing data option, click on the existing option and select the desired option from the list.

Data Direction

The *Data Direction* is used to determine whether data should be displayed with low values on the left or right side of the log. Available options are *Low to High* and *High to Low*. *Low to High* creates a log with the minimum data value on the left and the maximum data value on the right. *High to Low* creates the log with the minimum data value on the right and the maximum data value on the left. To change the direction, click on the existing option and select the desired option from the list.

Wrap Style

Wrapping is unique to log plotting and is only available when the *Data Range* is set to *User Defined*. Wrapping determines how values that are larger than the *Maximum Value* are displayed. Available options are *None, Truncate, Wrap, Wrap - 10X, Wrap - 100X.*

- Select *None* to not have the log wrapped. If points are outside the data range, the points are removed from the display of the log, as if they were not in the data table. New data points are created where the line intersects the edge of the log.
- When *Truncate* is selected, the bounding box of the log clips any data out of range and a straight line is created at the edge of the log. New data points are created where the line intersects the edge of the log.
- Select *Wrap* to bring the part of the log that extends beyond the range to the other side of the log and continue. If the wrapping continues more than once, the edge of the graph is truncated. Wrapping more than once makes the graph difficult to follow and in this case, one of the other wrapping scales should be used.
- *Wrap - 10X* wraps the data as with *Wrap*, but the scale for the wrapped portion is 10 times the range of the main data. For instance, the original graph goes from 0 to 10, the wrapped range represents 10 to 110.

- *Wrap - 100X* is similar to *Wrap - 10X* but the wrapped scale ranges from 10 to 1010.

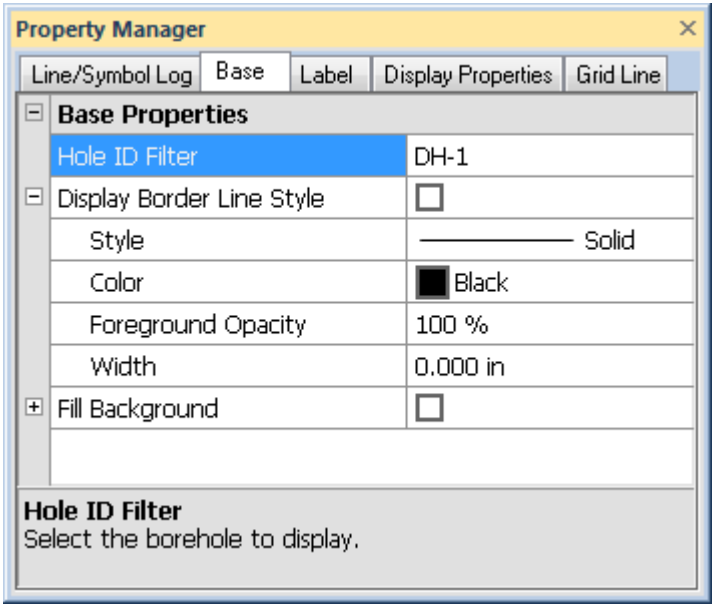
Note that fill properties are disabled when the *Wrap Style* is set to *Wrap, Wrap - 10X,* or *Wrap - 100X*.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

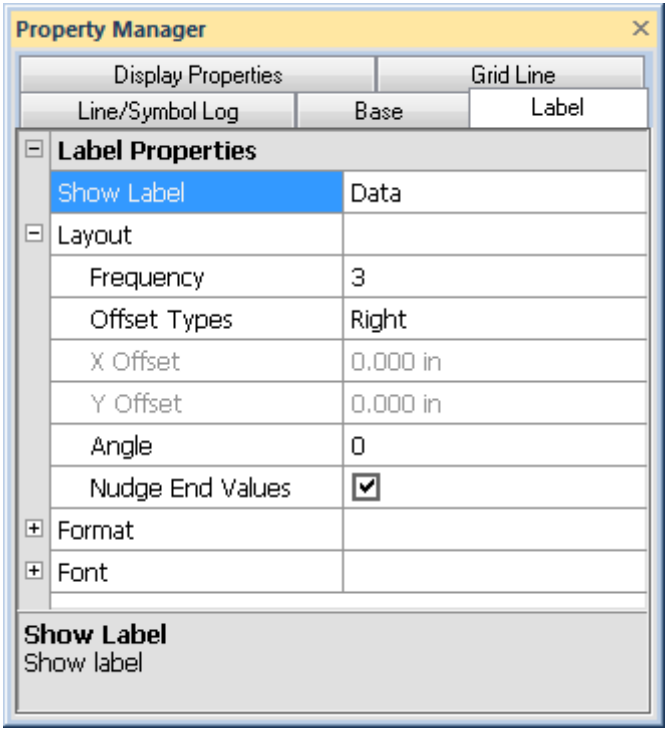
Label Properties

Label properties change the appearance of labels on line/symbol, post, and classed post logs. Click on the **Label** tab in the **Property Manager** to edit label properties.

Show Label

The *Show Label* option determines if labels are displayed at the point locations on the log. For classed post and post logs, check the box next to *Show Label* to show the labels. Data values are displayed at each point along the log.

For line/symbol logs, click on the existing option and select the desired option from the list. Available label types are *None* and *Data* for borehole views. Available label types are *None, Data, Layer Mark,* and *Data and Layer Mark* for cross section views. *None* turns off label display. *Data* displays only the data value from the column for each point. *Layer Mark* displays only the layer mark names. *Data and Layer Mark* displays all data points and layer marks for the entire line/symbol log.



*Set label properties on the **Label** tab in the **Property Manager**.*

Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many labels appear on the log. Setting the value to zero displays no labels on the log. Setting the value to one displays a label at all values. Change the *Frequency* to two to display a label at every other data value or three to display a label at every third value. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press ENTER on the keyboard to make the change. Alternatively, click on the  to increase or decrease the value.

Offset Types

The *Offset Types* determines the location of the label relative to the symbol. To change the location, click on the existing option and select the desired option from the list. Available options are *Center, Left, Top, Right, Bottom,* and *User Defined*.

X Offset

The *X Offset* field is active only when the *Offset Type* is set to *User Defined*. The *X Offset* moves the label number to the right (positive offset) or left (negative offset) by the number entered, in inches.

Y Offset

The *Y Offset* field is active only when the selected offset type is *User Defined*. The *Y Offset* moves the label numbers up (positive offset) or down (negative offset) by the number entered, in inches.

Angle

The *Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change. Check the box next to *Nudge End Values* to move the labels. Uncheck the box to keep the labels in the depth location specified.

Format

Click the ⊞ next to *Format* to set the numeric format options for the labels.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

If the options in the *Font* section are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option on the Post Log tab to turn off the display of the scheme properties and set the font properties in the *Font* section.

Display Properties

Use the **Display Properties** tab in the **Property Manager** to set the log's line properties, log fill properties, cutoff fill properties, and symbol properties for a line/symbol log. To view and edit the line/symbol log properties, click on the line/symbol log in the view window or **Object Manager** to select the log. Then, click on the **Display Properties** tab in the **Property Manager**.

Line Properties

Click the ⊞ next to *Line Properties* to set the line properties for the log.

Log Fill Properties

Click the ⊞ next to *Log Fill Properties* to set the fill properties for the log.

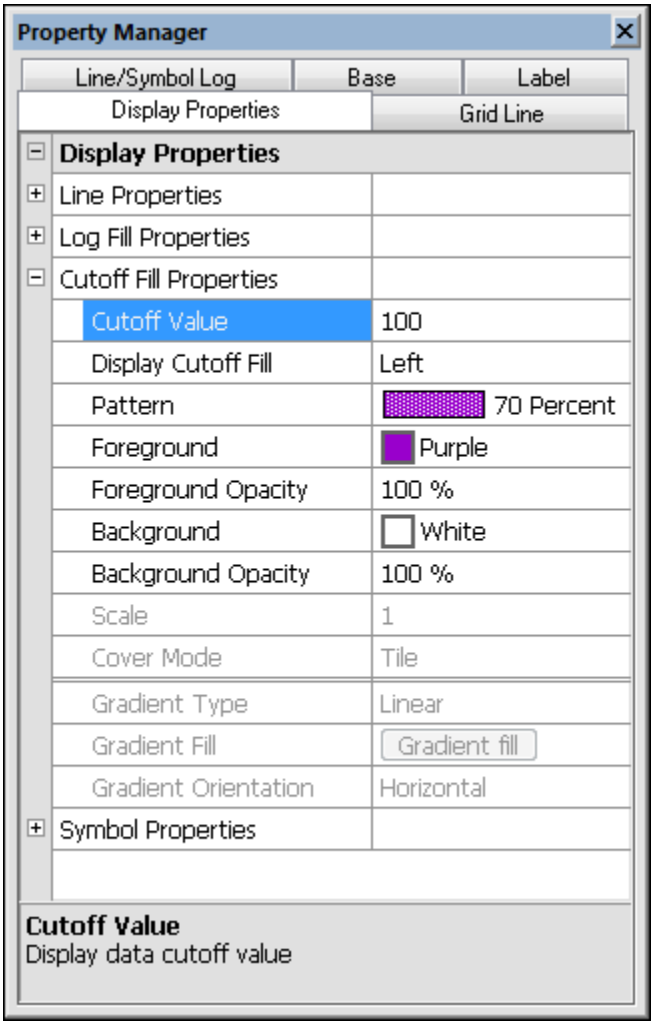
Display Log Fill

In addition to the standard fill options, the line/symbol log has a *Display Log Fill* option. The *Display Log Fill* option controls which way the fill goes from the log. Available options are *Left* and *Right*. Setting the *Display Log Fill* to *Left* fills from the log line to the left side of the bounding box or cutoff value.

Display fill can be used as a masking tool when two or more logs overlay each other.

Cutoff Fill Properties

Click the ⊞ next to *Cutoff Fill Properties* to set the fill properties for the cutoff portion of the log.



*Set the line, fill, cutoff fill, and symbol properties on the **Display Properties** tab in the **Property Manager**.*

Cutoff Value

In addition to the standard fill options, the cutoff fill has a *Cutoff Value* option. The cutoff value is a way to fill the log to a specific value. The *Cutoff Value* is the value where the cutoff fill properties stop. To change the *Cutoff Value*, highlight the existing value and type a new value. Values are in *Data Column* units.

Display Cutoff Fill

The cutoff fill properties also has a *Display Cutoff Fill* option. The *Display Cutoff Fill* option controls which way the cutoff fill goes from the *Cutoff Value*. Available options are *None, Left,* and *Right*. Setting the *Display Cutoff Fill* option to *None* turns off the display of the cutoff fill. Setting the *Display Cutoff Fill* to *Left* fills from the *Cutoff Value* to the left side of the bounding box or log. Setting the *Display Cutoff Fill* to *Right* fills from the *Cutoff Value* to the right side of the bounding box or log. The cutoff fill properties overwrite the log fill properties.

Symbol Properties

Click the ⊞ next to *Symbol Properties* to set the symbol properties for the log.

Symbol Frequency

In addition to the standard symbol options, the line/symbol log has a *Symbol Frequency* option. Symbols can be displayed on the log by setting the *Symbol Frequency* to a number greater than zero. A frequency of 1 posts every point as a symbol on the log. A frequency of 2 posts every other point, etc. *Symbol Frequency* can be used to thin the number of displayed data points to avoid overwriting each other.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.

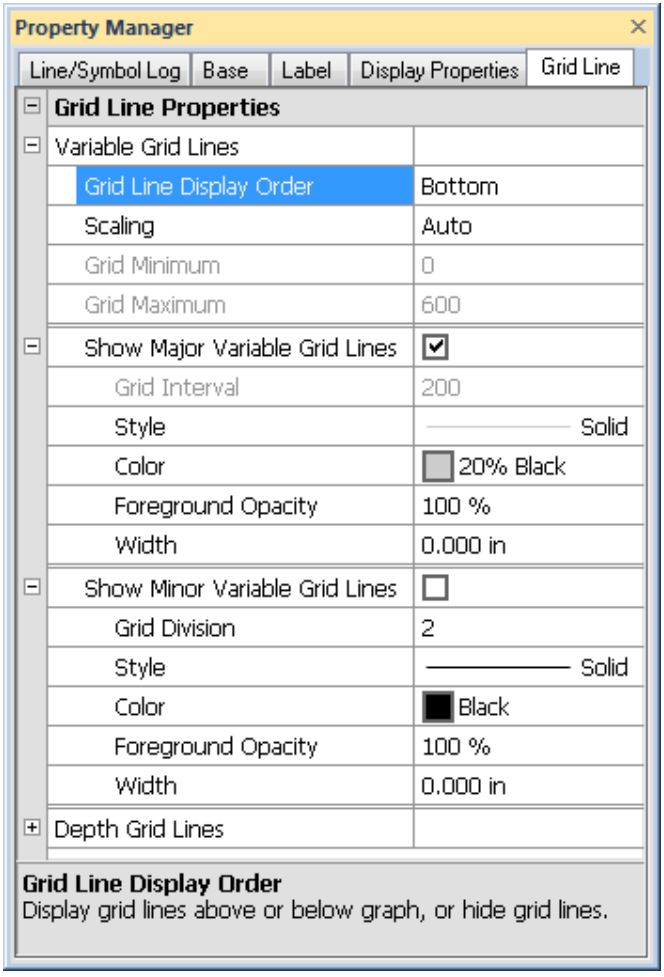
Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Discontinuous Line Log Example

Strater has the option to display missing data in a line log as either a continuous or discontinuous line.

1. For this example use the sample file SAMPLE VIEW 1.SDG, which is found in the **Strater** Samples. By default, this directory is located at C:\Program Files\Golden Software\Strater 4\Samples.
2. Click on the *Depth* data table tab.
3. In Column C (*Au*) delete the contents of rows 12 to 18 by highlighting them and pressing the DELETE key on the keyboard.
4. Click the *Borehole 1* tab to view the logs.
5. Click on the line/symbol log in the **Object Manager** or view window.
6. In the **Property Manager**, click on the **Line / Symbol Log** tab. The *Missing Data* option is set to *Continuous*.
7. Change the *Missing Data* property from *Continuous* to *Discontinuous* to create a gap in the missing data section.

10	DH-1	20	19
11	DH-1	22	310
12	DH-1	24	
13	DH-1	26	
14	DH-1	28	
15	DH-1	30	
16	DH-1	32	
17	DH-1	34	
18	DH-1	36	
19	DH-1	38	223
20	DH-1	40	590
21	DH-1	42	67

Delete some variable data from the table.

The line log changes to discontinuous, with a gap in the line where the data is missing.



Missing data can be displayed as a continuous line.

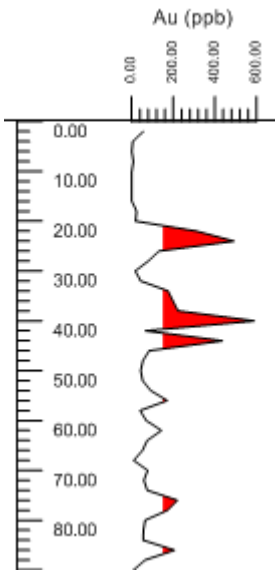


Missing data is plotted to create a discontinuous line.

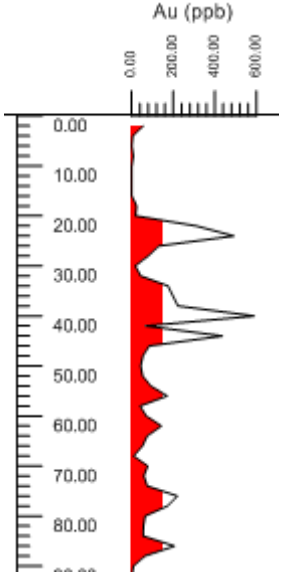
Cutoff Fill Example

Set a cutoff fill property for a line/symbol log to display the area in the log that is either greater or less than a specified cutoff value.

1. Click the **File | Open** command or click the  button.
2. In the **Open** dialog, select the *Sample View 1.sdg* file from the Samples directory. The default directory location is C:\Program Files\Golden Software**Strater** 4\Samples.
3. Click *Open*.
4. Select the line/symbol log in the **Object Manager** or view window.
5. In the **Property Manager** click on the **Display Properties** tab.
6. Click the ⊞ next to *Cutoff Fill Properties* to open the *Cutoff Fill Properties* section.
7. Highlight the zero next to the *Cutoff Value* and type 175. Press ENTER on the keyboard to make the change.
8. Click on the *None* next to the *Display Cutoff Fill* option and select *Right* from the list.
9. Click on the box next to *Pattern* and select *Solid*.
10. Click on the black color next to *Foreground* and select red.



A cutoff fill set to the right highlights the area of the log greater than Au (ppb) of 175.



A cutoff fill set to the left highlights the area less than 175 on the log.

Filling Line/Symbol Logs with Variable Color

One way to display geophysical data is to fill geophysical line/symbol logs (such as gamma logs) with a color gradient relative to the data value, or variable. To create a line/symbol log filled with a variable fill, you can overlay a bar log and a line log.

Creating the Bar Log

1. Click the **File | New | Project** command or click the  button.
2. Click the **Log | Bar** command or click the  button.
3. Click in the log pane where you want the log to be placed.
4. In the **Open** dialog, select the data file to use for the bar log, such as an LAS file, and click *Open*. In this example, I will use *SB20.las*, obtained from the USGS.
5. In the **LAS Import Options** dialog, accept the defaults and click *Import*. This loads the data from the LAS file into a table and creates the bar log from that data.
6. Click on the log to select it.
7. To change the column of data being displayed, In the **Property Manager**, change the *Data Column* to GR.

Creating the Color Scheme for the Bars

1. Click the **Draw | Scheme Editor** command or click the  button.
2. Click the  button at the bottom of the dialog to create a new scheme.
3. In the **New Scheme** dialog:
    a. Select *Base Scheme on Column Data*.
    b. Select *SB20* as the *Table Name*.
    c. Select *GR* as the *Column Name*.
    d. Type the *Scheme Name,* such as *SB20 - GR*.
    e. Select *Range* as the *Scheme Type*.
    f. Set the *Interval Count* to 5.
    g. Click *OK* to create the scheme.
4. Click the ⊞ to expand the *Range* scheme *SB20 - GR*. There are five items in this range scheme, each with its own properties.

5. Select the first item in this scheme. The properties for that item are displayed on the right side of the screen. You can change the *Lower Range Value* and *Upper Range Value*, if desired.
6. In the *Fill Properties* section, change the fill properties to be what you want for this data range. For example, click the *Foreground* color and change it to *Forest Green*.
7. In the *Line Properties* section, click on the existing *Style* and select *Invisible* to turn off the line display.
8. Select the next item in the scheme and repeat changing the fill color and setting the line style to *Invisible*.
9. Click *OK* to close the **Scheme Editor**.
10. Click on the log to select it.
11. In the **Property Manager**, check the box next to the *Use Range Scheme* option and the log is filled with the scheme colors.

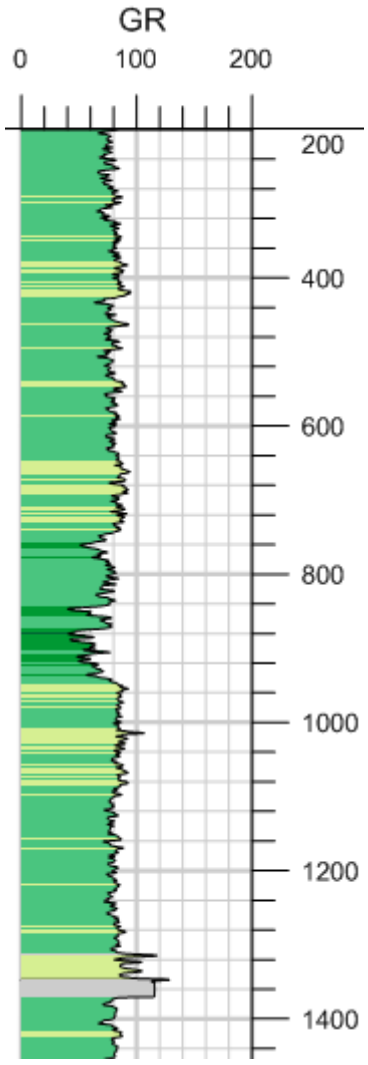
Adding the Line/Symbol Log

Now we want to overlay a line log to show a smooth line for the data.

1. Click the **Log | Line/Symbol** command or click the  button.
2. Click anywhere in the log pane.
3. In the **Open** dialog, make sure that *SB20* is listed in the *Use Current Table* list and in the *File name* box.
4. Click *Open* and the line/symbol log is created.
5. Click once on the line/symbol log to select it.
6. In the **Property Manager**, change the *Data Column* to the same column the bar log uses, *GR*.
7. To align the line/symbol log exactly with the bar log, click **Edit | Select All**.
8. Click **Arrange | Align Objects | Left**. The line/symbol log is on top of the bar log and the logs overlay exactly.
9. In the **Object Manager**, in the *Header Pane Objects* section, there are two scale bars. One was created for the bar log, and one was created for the line log. We only need one scale bar, so we can delete the second one. Select the scale bar called *Scale Bar – GR 1* and press DELETE on the keyboard.

Finalizing the Display

Add any additional items to enhance the appearance of the log. A depth log and grid lines will finish the log nicely.



Overlay a line log and a bar log to show a line log with variable fill.

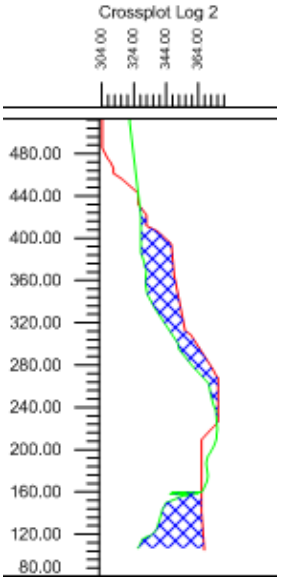
1. Click the **Log | Depth** command or click the button to add a depth log.
2. Click in the borehole view to the right of the overlaid line/bar log and the depth log is added.
3. To space the depth log right next to the line/symbol log by selecting both the line/symbol log and the depth log and going to **Arrange | Space Objects | Right to Left**.
4. To add grid lines to the log, click on the bar log.
5. Click on the **Grid Line** tab in the **Property Manager**.
6. In the *Variable Grid Lines* section, change the *Grid Line Display Order* to *Bottom*.
7. Check the box next to the *Show Major Variable Grid Lines* option.
8. Check the box next to the *Show Minor Variable Grid Lines* option.
9. In the *Depth Grid Lines* section, change the *Grid Line Display Order* to *Bottom*.
10. Check the box next to the *Show Major Depth Grid Lines* option.
11. Check the box next to the *Show Minor Depth Grid Lines* option.
12. You can change the properties for these grid lines, if desired.
13. You can adjust the starting depth of the borehole view by clicking the **View | View Properties** command.
14. In the **Property Manager**, set the *Depth Settings* to *User Defined*.
15. Change the *Starting Borehole Depth* to another value, such as 200.

Chapter 10

Crossplot Logs

Crossplot Logs

Click the **Log | Crossplot** command or click the  button to create a crossplot log. Crossplot logs display two intersecting line/symbol logs. Each log has separate options and can be displayed as lines, as symbols, or as a combination of line and symbols. The line connects the data for each log in the depth order. Crossplot logs can display labels, and can be filled. Crossplot logs are useful for displaying intersections of two data curves on a graph.



This crossplot log shows the area where one plot intersects and is greater than the values of another plot.

Data Requirements

Crossplot logs use depth or interval data tables. In the data table, there are four required columns. The required columns are *Hole ID, Depth,* and the two data columns being displayed. Points are plotted along the horizontal axis at the value recorded in the data columns. Each line has a separate scale. Points are plotted at the depth recorded in the depth column for each row.

Interval table types can be used. When an interval table type is used, the point is plotted at the center point of the interval. For instance, if the interval goes *From* 1 *To* 4, the point is plotted at 2.5 on the depth axis.

	A Hole ID	B Depth	C Cu%	D Mo%
1	DH-1	1	0.36	0.005
2	DH-1	3	0.37	0.002
3	DH-1	5	0.33	0.001
4	DH-1	7	0.27	0
5	DH-1	9	0.37	0
6	DH-1	11	0.27	0

Crossplot logs require Hole ID, Depth, and two columns of data.

Creating a Crossplot Log

To create a crossplot log:

1. Click the **Log | Crossplot** command or click the  button.
2. Click inside the log pane where you want the crossplot log to appear.
3. In the **Open** dialog, click on the data file. If the data was already opened, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a crossplot log is created using the default properties. If you are in design mode, a crossplot log graphic is displayed as a place holder after step 2.

Editing Crossplot Log Properties

To change the features of a crossplot log, including the data columns used to create the logs, click on the crossplot log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Crossplot**, **Base**, **Curve One**, **Curve One Display**, **Curve Two**, **Curve Two Display**, and **Grid Line**.

To change the columns associated with each curve, click on the **Curve One** or **Curve Two** tabs in the **Property Manager**. Set the overlapping fill properties on the **Crossplot** tab.

Crossplot Properties

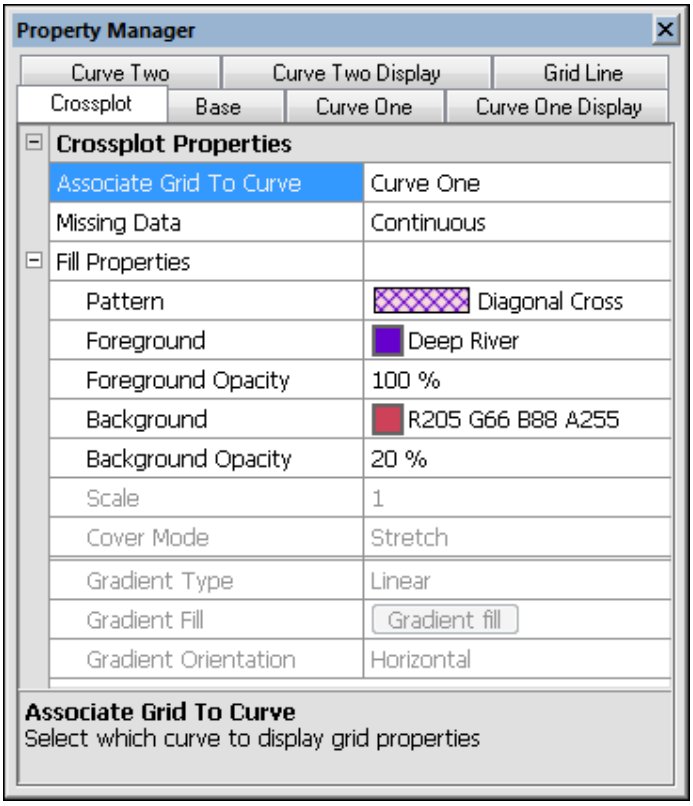
The **Crossplot** page in the **Property Manager** includes options for defining which curve to associate with the grid, how to display missing data, and the fill properties for the overlapping areas for crossplot logs. To view and edit crossplot log properties, click on the crossplot log in the view window or **Object Manager** to select the log. Then, click on the **Crossplot** tab in the **Property Manager**.

Associate Grid To Curve

The *Associate Grid to Curve* option determines which curve is associated with both the grid lines and the scale bar for this log. Select either *Curve One* or *Curve Two.*

Missing Data

The *Missing Data* option controls how rows of empty data are displayed on the log. Set *Missing Data* to *Continuous* to show rows of missing data as a continuous line between the data values on each side of the missing data. Select *Discontinuous* to show the missing data as a gap in the line of the log. To set the missing data option, click on the existing option and select the desired option from the list.



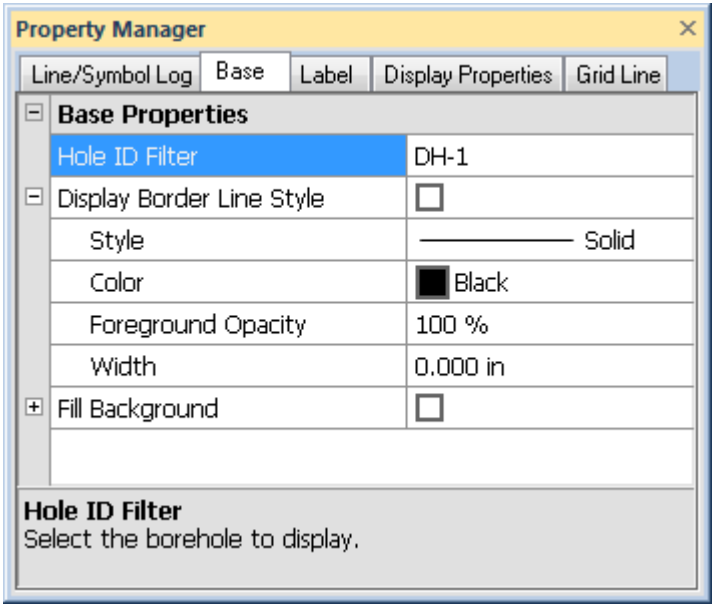
*Edit crossplot log properties on the **Crossplot** tab in the **Property Manager**.*

Fill Properties

Use the Fill Properties options to adjust the style of the fill area in the crossplot. The crossplot fill goes between the two curves, defined on the **Curve One Display** and **Curve Two Display** tabs.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box

that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Curve One Properties

The **Curve One** page in the **Property Manager** includes options for defining the data, scaling, range, and data direction for one of the two plots in a crossplot log. To view and edit crossplot log properties, click on the crossplot log in the view window or **Object Manager** to select the log. Then, click on the **Curve One** tab in the **Property Manager**.

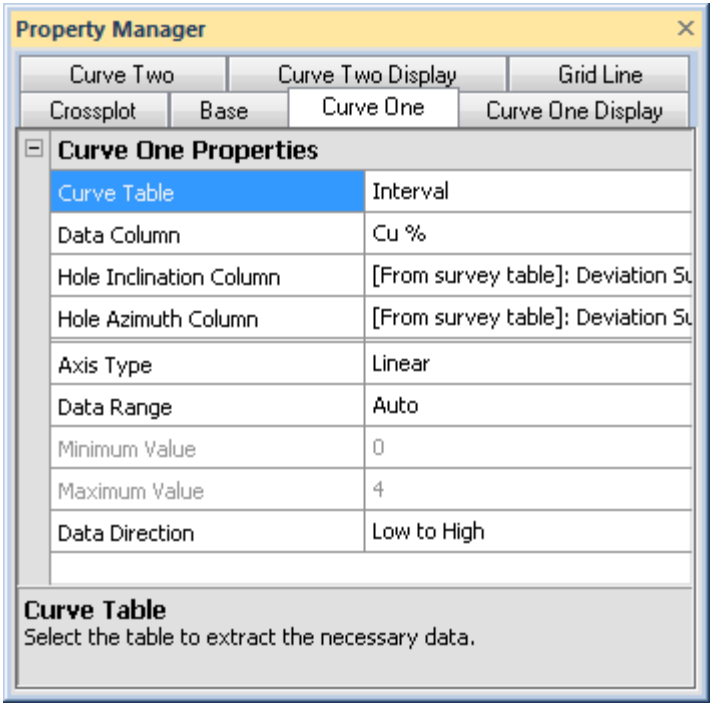
Note: You can select either curve as **Curve One** or **Curve Two**. There is no ranking distinction between the two curves.

Curve Table

Use the *Curve Table* to define the data table for the first curve for the crossplot log. The table type can be an interval table or a depth table. If the table is a depth table, the points are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Curve Table* that is being displayed by the first curve for the crossplot log. When the *Curve Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.



*Set the properties for the left curve on the **Curve One** tab in the **Property Manager**.*

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Curve Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Axis Type

The *Axis Type* is *Linear* or *Logarithmic*. The data must be greater than zero when using a *Logarithmic* axis. Values equal to and less than zero are ignored in the log when *Logarithmic* is selected. Logarithmic uses a log (base 10) scale for the horizontal axis. To change the axis type, click on the existing option and select the desired option from the list.

Data Range

The horizontal scale can be set manually or automatically with the *Data Range* option. The *Auto* option calculates a best-fit range of the data. The *User Defined* option activates the *Minimum Value* and *Maximum Value*, allowing manual control over the log's minimum and maximum values. To change the data range, click on the existing option and select the desired option from the list.

Minimum and Maximum Values

The *Minimum Value* and *Maximum Value* are only available if the *Data Range* is set to *User Defined.* The *Minimum Value* is the smallest value that should be displayed on the log. The *Maximum Value* is the largest value that should be displayed on the log. To change the minimum and maximum values, set the *Data Range* to *User Defined*. Then, highlight the existing value in *Minimum Value* or *Maximum Value* and type the desired value.

If the borehole is changed, the new data may or may not fit into the user-defined range. If the data does not fit inside the range, change the *Minimum Value* and *Maximum Value* to new values or set the *Data Range* to *Auto*.

Data Direction

The *Data Direction* is used to determine whether data should be displayed with low values on the left or right side of the log. Available options are *Low to High* and *High to Low*. *Low to High* creates a log with the minimum data value on the left and the maximum data value on the right. *High to Low* creates the log with the minimum data value on the right and the maximum data value on the left. To change the direction, click on the existing option and select the desired option from the list.

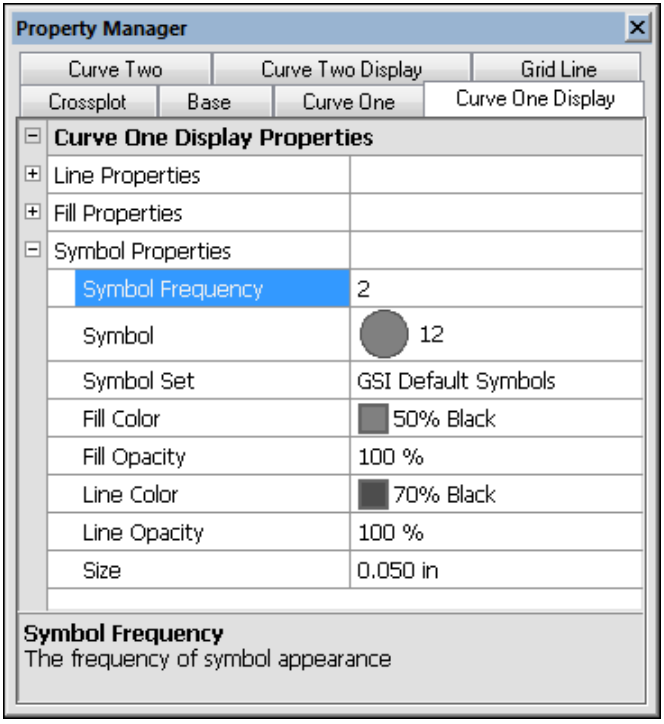
By default, curve one uses a data direction of low to high and curve two uses a data direction of high to low.

Curve One Display Properties

Use the **Curve One Display** tab in the **Property Manager** to set the log's line properties, fill properties, and symbol properties for the first curve in a crossplot log. To view and edit the crossplot log properties, click on the crossplot log in the view window or **Object Manager** to select the log. Then, click on the **Curve One Display** tab in the **Property Manager**.

Line Properties

Click the ⊞ next to *Line Properties* to set the line properties for the first curve in the crossplot log.



*Set the line, fill, and symbol properties for curve one on the **Curve One Display** tab in the **Property Manager**.*

Fill Properties

Click the ⊞ next to *Fill Properties* to set the fill properties for the first curve in the crossplot log.

Display Fill

In addition to the standard fill options, the crossplot log curve one has a *Display Fill* option. The *Display Fill* option controls which way the fill goes from the curve one. Available options are *Left* and *Right*. Setting the *Display Fill* to *Left* fills from the log line to the left side of the bounding box.

Symbol Properties

Click the ⊞ next to *Symbol Properties* to set the symbol properties for the first curve in the crossplot log.

Symbol Frequency

In addition to the standard symbol options, the crossplot log has a *Symbol Frequency* option. Symbols can be displayed on the log by setting the *Symbol Frequency* to a number greater than zero. A frequency of 1 posts every point as a symbol on the log. A frequency of 2 posts every other point, etc. *Symbol Frequency* can be used to thin the number of displayed data points to avoid overwriting each other.

Curve Two Properties

The **Curve Two** page in the **Property Manager** includes options for defining the data, scaling, range, and data direction for one of the two plots in a crossplot log. To view and edit crossplot log properties, click on the crossplot log in the view window or **Object Manager** to select the log. Then, click on the **Curve Two** tab in the **Property Manager**.

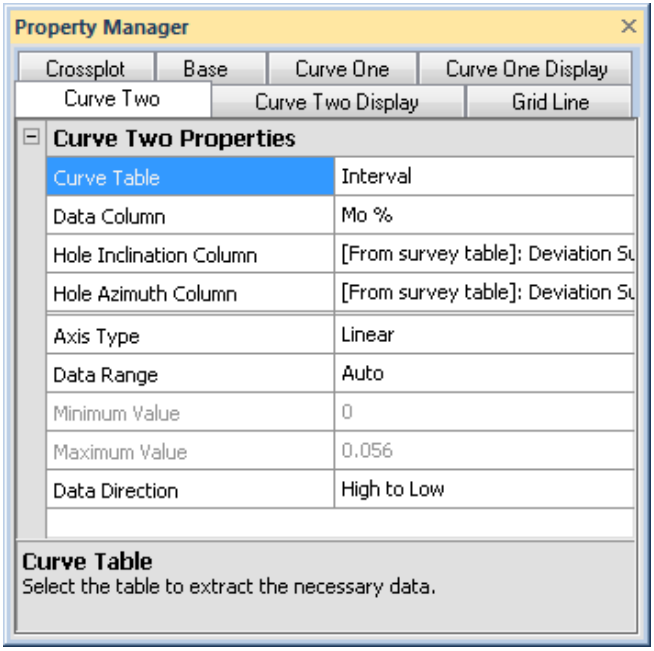
Note: You can select either curve as **Curve One** or **Curve Two**. There is no ranking distinction between the two curves.

Curve Table

Use the *Curve Table* to define the data table for the second curve for the crossplot log. The table type can be an interval table or a depth table. If the table is a depth table, the points are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Curve Table* that is being displayed by the second curve for the crossplot log. When the *Curve Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.



*Set the properties for the right curve on the **Curve Two** tab in the **Property Manager**.*

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Curve Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Axis Type

The *Axis Type* is *Linear* or *Logarithmic*. The data must be greater than zero when using a *Logarithmic* axis. Values equal to and less than zero are ignored in the log when *Logarithmic* is selected. Logarithmic uses a log (base 10) scale for the horizontal axis. To change the axis type, click on the existing option and select the desired option from the list.

Data Range

The horizontal scale can be set manually or automatically with the *Data Range* option. The *Auto* option calculates a best-fit range of the data. The *User Defined* option activates the *Minimum Value* and *Maximum Value*, allowing manual control over the log's minimum and maximum values. To change the data range, click on the existing option and select the desired option from the list.

Minimum and Maximum Values

The *Minimum Value* and *Maximum Value* are only available if the *Data Range* is set to *User Defined.* The *Minimum Value* is the smallest value that should be displayed on the log. The *Maximum Value* is the largest value that should be displayed on the log. To change the minimum and maximum values, set the *Data Range* to *User Defined*. Then, highlight the existing value in *Minimum Value* or *Maximum Value* and type the desired value.

If the borehole is changed, the new data may or may not fit into the user-defined range. If the data does not fit inside the range, change the *Minimum Value* and *Maximum Value* to new values or set the *Data Range* to *Auto*.

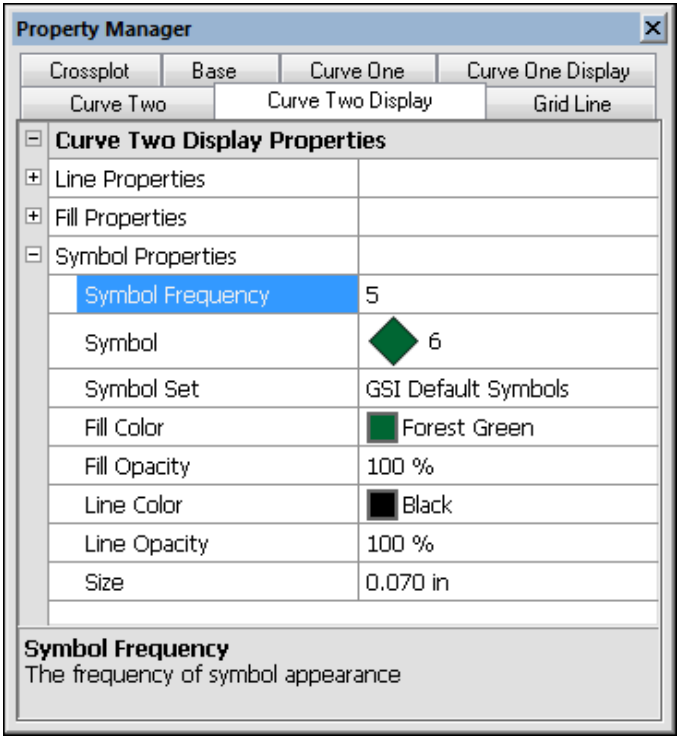
Data Direction

The *Data Direction* is used to determine whether data should be displayed with low values on the left or right side of the log. Available options are *Low to High* and *High to Low*. *Low to High* creates a log with the minimum data value on the left and the maximum data value on the right. *High to Low* creates the log with the minimum data value on the right and the maximum data value on the left. To change the direction, click on the existing option and select the desired option from the list.

By default, curve one uses a data direction of low to high and curve two uses a data direction of high to low.

Curve Two Display Properties

Use the **Curve Two Display** tab in the **Property Manager** to set the log's line properties, fill properties, and symbol properties for the second curve in a crossplot log. To view and edit the crossplot log properties, click on the crossplot log in the view window or **Object Manager** to select the log. Then, click on the **Curve Two Display** tab in the **Property Manager**.



*Set the line, fill, and symbol properties for curve two on the **Curve Two Display** tab in the **Property Manager**.*

Line Properties

Click the ⊞ next to *Line Properties* to set the line properties for the second curve in the crossplot log.

Fill Properties

Click the ⊞ next to *Fill Properties* to set the fill properties for the second curve in the crossplot log.

Display Fill

In addition to the standard fill options, the crossplot log curve two has a *Display Fill* option. The *Display Fill* option controls which way the fill goes from the curve two. Available options are *Left* and *Right*. Setting the *Display Fill* to *Left* fills from the log line to the left side of the bounding box.

Symbol Properties

Click the ⊞ next to *Symbol Properties* to set the symbol properties for the second curve in the crossplot log.

Symbol Frequency

In addition to the standard symbol options, the crossplot log has a *Symbol Frequency* option. Symbols can be displayed on the log by setting the *Symbol Frequency* to a number greater than zero. A frequency of 1 posts every point as a symbol on the log. A frequency of 2 posts every other point, etc. *Symbol Frequency* can be used to thin the number of displayed data points to avoid overwriting each other.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.

Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

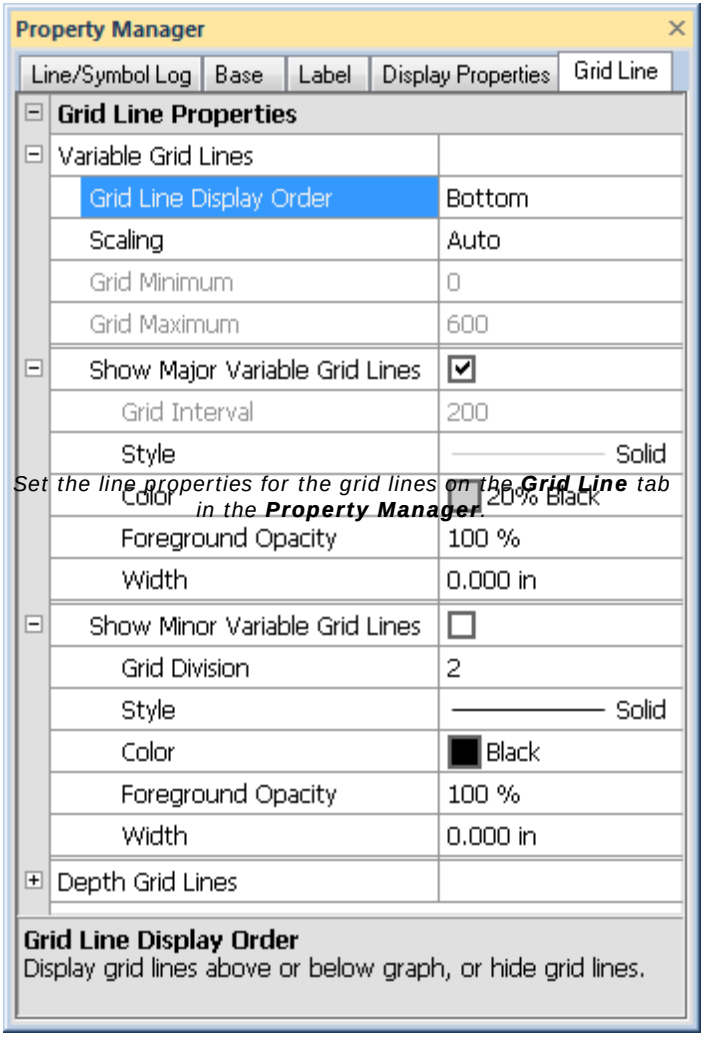
Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

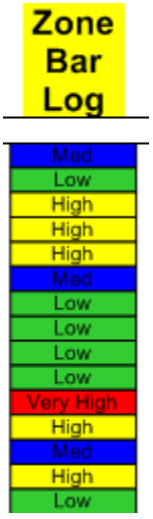
Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Chapter 11

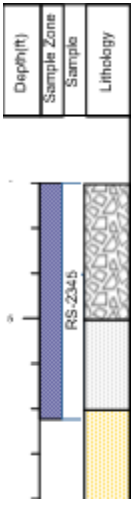
Zone Bar Logs

Zone Bar Logs

Click the **Log | Zone Bar** command or click the  button to create a log that is filled rectangles along the length of the borehole. Zone bars can display a wide variety of logging data. For example, zone bars can represent sample intervals, alteration zones, contamination layers, etc. They also provide a mechanism to display simple keyword text objects either with or without background fill.



Zone bar logs can display both text and colors to represent separate zones.



In this example, two zone bar logs are combined with a lithology and depth log.

Data Requirements

Zone bar logs use interval data tables. In the data table, there are four required columns. The required columns are *Hole ID, From, To,* and the data column being

displayed. The data column should contain text for each depth interval row. The text can be mapped to a keyword scheme. Bars are plotted the full width of the zone bar log and extend vertically over the interval: *From* the top depth and *To* the bottom depth.

	A Hole ID	B From	C To	D Cu Keyword
1	DH-1	0	2	Med
2	DH-1	2	4	Med
3	DH-1	4	6	Med
4	DH-1	6	8	Med
5	DH-1	8	10	Med
6	DH-1	10	12	Med

The Hole ID, From, To, *and one column of data are required for a zone bar log.*

Creating a Zone Bar Log

To create a zone bar log:

1. Click the **Log | Zone Bar** command or click the  button.
2. Click inside the log pane where you want the zone bar log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

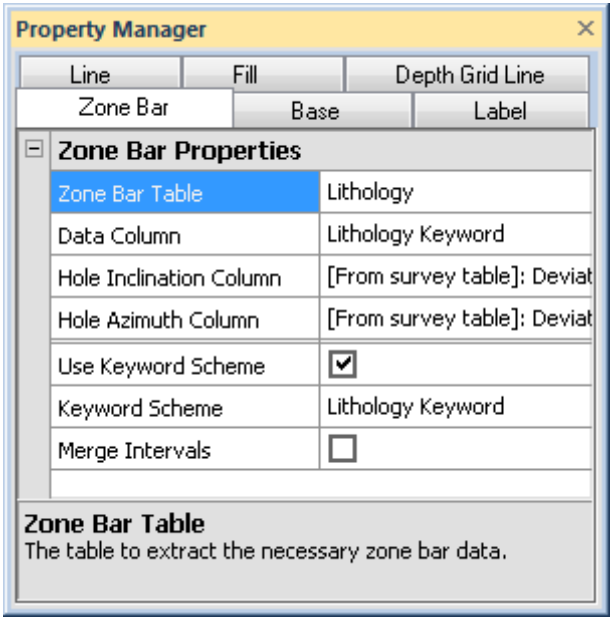
If you are in active mode a zone bar log is created using the default properties. If you are in design mode, a zone bar log graphic is displayed as a place holder after step 2.

Editing Zone Bar Log Properties

To change the features of a zone bar log, including the data column used to create the log, click on the zone bar log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Zone Bar**, **Base**, **Label**, **Line**, **Fill**, and **Depth Grid Line**.

Zone Bar Properties

The **Zone Bar** page in the **Property Manager** includes options for defining data, keyword schemes, and keyword text for zone bar logs. To view and edit zone bar log properties, click on the zone bar log in the view window or **Object Manager** to select the log. Then, click on the **Zone Bar** tab in the **Property Manager**.



*Edit line/symbol log properties on the **Line / Symbol Log** tab in the **Property Manager**.*

Zone Bar Table

Use the *Zone Bar Table* to define the data table for the zone bar log. The table type must be an interval table. Bars extend from the *From* value at the top and to the *To* value at the bottom. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Zone Bar Table* that is being displayed by the zone bar log. When the *Zone Bar Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.

The data column is used for keyword matching. If you do not want to use a keyword scheme and simply want to plot intervals of data, you can select any data column, uncheck the box next to the *Use Keyword Scheme* option, and use the settings on the **Line** and **Fill** tabs to specify the line and fill properties for the entire log.

Hole Inclination, Hole Dip and Hole Azimuth Columns

The *Hole Inclination Column* or *Hole Dip Column* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Zone Bar Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Use Keyword Scheme

The *Use Keyword Scheme* option sets whether the line and fill properties should be based on a keyword scheme or all intervals should use the same properties. To use a keyword scheme, check the box next to the *Use Keyword Scheme* option. To use the same properties for all intervals on the zone bar log, uncheck the box next to the *Use Keyword Scheme* option. The keyword scheme should match the text that appears in the *Data Column.*

If the *Use Keyword Scheme* option is checked, the options on the **Line** and **Fill** tabs and *Font* section on the **Label** tab are not available because a scheme is in use. Uncheck the *Use Keyword Scheme* option to turn off the display of the scheme properties and set the line, fill, and font properties on the **Line** and **Fill** tabs.

Keyword Scheme

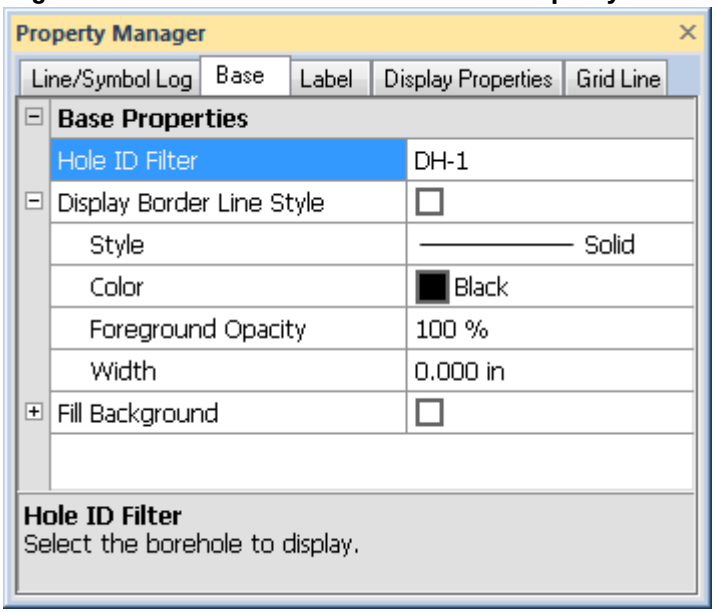
The *Keyword Scheme* is the scheme that determines the fill and line properties when the box next to the *Use Keyword Scheme* option is checked. The selected scheme should match the text that appears in the *Data Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the ... next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Merge Intervals

The *Merge Intervals* option merges consecutive intervals that contain the same data. Check the box next to the *Merge Intervals* option to merge consecutive intervals that are the same. Uncheck the box next to the *Merge Intervals* option to keep all intervals separate.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,*

the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

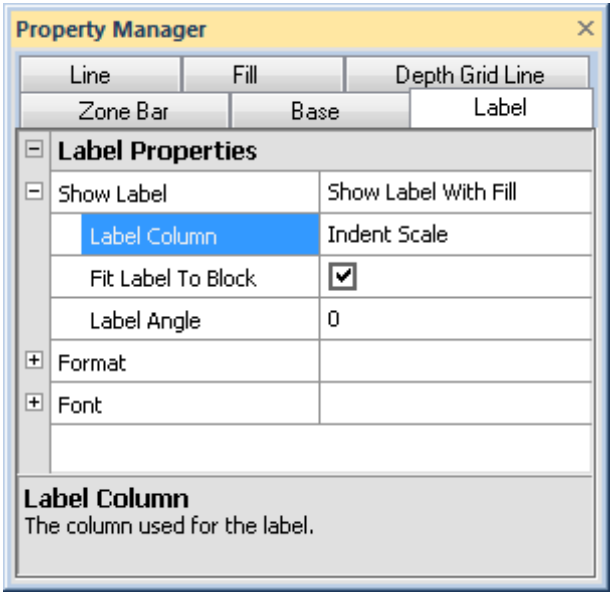
Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

Label properties change the appearance of labels on zone bar logs. Click on the **Label** tab in the **Property Manager** to edit label properties for zone bar logs.



*Set label properties on the **Label** tab in the **Property Manager**.*

Show Label

The *Show Label* option determines whether labels are displayed on the zone bar log. Available options are *No Label, Show Label With Fill*, and *Show Label Without Fill*.

- *Show Label* to *No Label* turns off display of labels for the log.
- *Show Label With Fill* turns on the display of labels on the log. The fill property, as set in the scheme or on the Fill tab, continues to display.
- *Show Label Without Fill* turns on the display of the labels on the log, but disables the fill properties.

To change the label display setting, click on the existing option and select the desired option from the list.

Label Column

The *Label Column* option sets the column to use for the zone bar labels. All of the columns in the currently selected *Zone Bar Table* are listed in the *Label Column*. When the *Zone Bar Table* is changed on the Zone Bar tab to another table, the *Label Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Label Column* and select the desired column from the list.

Fit Label To Block

The *Fit Label To Block* option determines the size of the label for each interval in the log. Check the box to automatically fit the label inside the interval box. The label size will become smaller if the label is long so that the entire label fits in the width of the log. Uncheck the box for all labels to be the same size, regardless of whether the label will fit in the width of the log. When this option is unchecked, the size is reported in

the *Font* section. When this option is checked, the maximum size for the font is reported in the *Font* section.

Label Angle

The *Label Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Format

Click the ⊞ next to *Format* to set the label format properties.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

If the options in the *Font* section are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option on the Zone Bar tab to turn off the display of the scheme properties and set the font properties in the *Font* section.

Line Properties

Use line properties to change line properties for selected lines in the view. To edit the line properties, click on the object in the **Object Manager** or plot window to select it. The properties are listed in the **Property Manager**. Default line properties are set in the **Tools | Options** dialog on the **Line** page.

If the options on the **Line** tab are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme For Line* option to turn off the display of the scheme properties and set the line properties on the **Line** tab.

Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

Fill Properties

Fill properties can be changed for selected objects. To edit the fill properties, click on the object in the **Object Manager** or plot window. The properties are listed in the **Property Manager**. Default fill properties are set in the **Tools | Options** dialog by clicking on the **Fill** page.

If the options on the **Fill** tab are not available, a scheme is likely being used. Uncheck the appropriate *Use Keyword Scheme* option to turn off the display of the scheme properties and set the fill properties on the **Fill** tab.

Refer to *Chapter 22 – Drawing Objects* for additional information about fill properties.

Depth Grid Line Properties

Depth grid lines are used to show depth increments on individual log items. To edit the depth grid line properties, select a log item. Click on the **Depth Grid Line** tab in the **Property Manager**.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

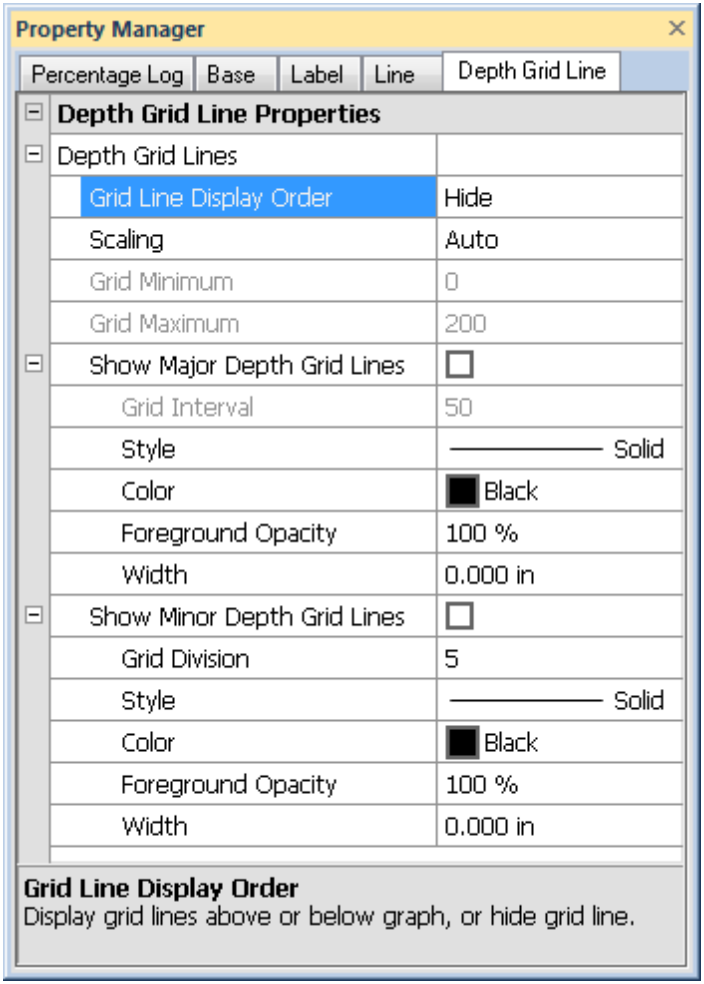
After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or the *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum

values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.



*Set the line properties for the grid lines on the **Depth Grid Line** tab in the **Property Manager**.*

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

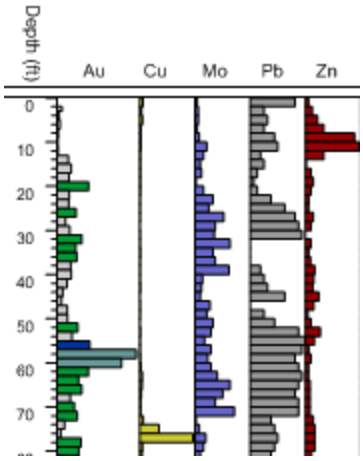
Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Chapter 12

Bar Logs

Bar Logs

Click the **Log | Bar** command or click the  button to create a log that displays data as bars drawn from the base value to the data value. There are two types of bar logs: *standard* bars and *polarity* bars. A standard bar sets the base value to the minimum value. The polarity bar sets the base value to zero. Bars extend either to the left or right of zero, creating a mix of negative and positive data bars on both sides of the zero line.



Use bar logs alone or in groups to display information.



Polarity bar logs are made with a few mouse clicks.

Data Requirements

Bar logs use depth or interval data tables. In the data table, there are three required columns. The required columns are *Hole ID, Depth,* and the data column being displayed. Bars are plotted horizontally from the base value to the value recorded in the data column. Bars are plotted vertically with the center of the bar at the depth recorded in the depth column for each row. The bar can have font, line, and fill properties determined by a range scheme.

Interval table types can be used. When an interval table type is used, the vertical center bar is plotted at the center point of the interval. For instance, if the interval goes *From* 1 *To* 4, the center of the bar is plotted at 2.5 on the depth axis.

	A Hole ID	B Depth	C Au (ppb)	D Au Keyword
1	DH-1	2	56	Med
2	DH-1	4	6	Very Low
3	DH-1	6	1	Very Low
4	DH-1	8	8	Low
5	DH-1	10	1	Very High
6	DH-1	12	1	Very Low

The Hole ID, Depth, *and one column of data are required for a bar log. An additional keyword column can be used to set keyword scheme properties.*

Creating a Bar Log

To create a bar log:

1. Click the **Log | Bar** command or click the  button.
2. Click inside the log pane where you want the bar log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a bar log is created using the default properties. If you are in design mode, a bar log graphic is displayed as a place holder after step 2.

Editing Bar Log Properties

To change the features of a bar log, including the data column used to create the log, click on the bar log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Bar Log**, **Base**, **Label**, **Line**, **Fill**, and **Grid Line**.

Bar Log Properties

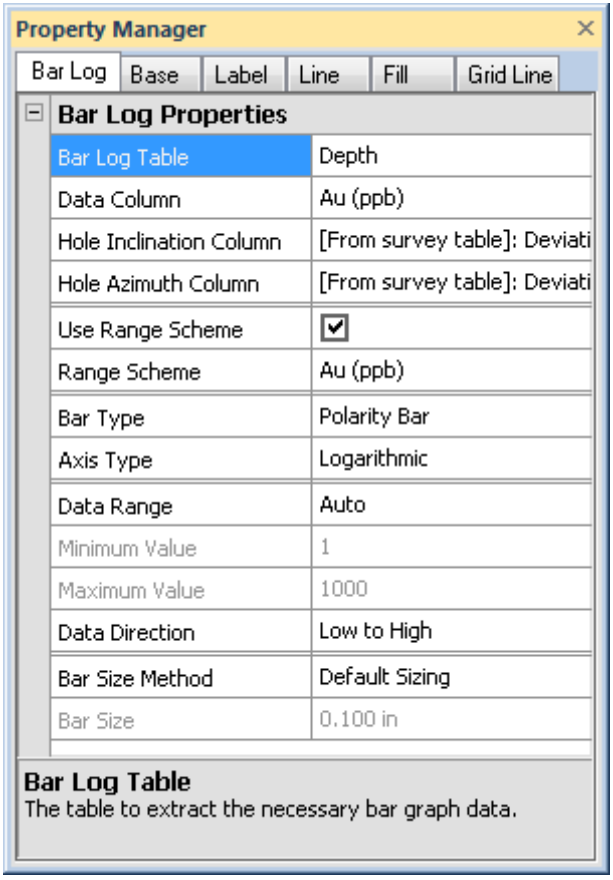
The **Bar Log** page in the **Property Manager** includes options for defining data, range schemes, bar type, scaling, data direction, and bar size for bar logs. To view and edit bar log properties, click on the bar log in the view window or **Object Manager** to select the log. Then, click on the **Bar Log** tab in the **Property Manager**.

Bar Log Table

Use the *Bar Log Table* to define the data table for the bar log. The table type can be an interval table or a depth table. If the table is a depth table, the bars are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Bar Log Table* that is being displayed by the bar log. When the *Bar Log Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.



*Edit line/symbol log properties on the **Line / Symbol Log** tab in the **Property Manager**.*

Hole Inclination, Hole Dip and Hole Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or

dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Bar Log Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Use Range Scheme

The *Use Range Scheme* option sets whether the line and fill properties should be based on a range scheme or all bars should use the same properties. To use a range scheme, check the box next to the *Use Range Scheme* option. To use the same properties for all bars on the bar log, uncheck the box next to the *Use Range Scheme* option. The data column is used for determine the properties, as set by the range scheme.

If the *Use Range Scheme* option is checked, the options on the **Line** and **Fill** tabs and *Font* section on the **Label** tab are not available because a scheme is in use. Uncheck the *Use Range Scheme* option to turn off the display of the scheme properties and set the line, fill, and font properties on the **Line**, **Fill**, and **Label** tabs.

Range Scheme

The *Range Scheme* is the scheme that determines the fill and line properties when the box next to the *Use Range Scheme* option is checked. The selected scheme should contain ranges that match the values that appear in the *Data Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the  next to the scheme name to open the Scheme Editor, where the scheme can be created or edited.

Bar Type

The *Bar Type* determines the base value from where bars are drawn. Available options are *Standard Bar* and *Polarity Bar*. Standard bars use the *Minimum Value* as the base value and draw bars from the *Minimum Value* to the row's data value. Polarity bars use zero as the base value and draw bars from zero to the row's data value. Typically, negative values are plotted to the left of zero and positive values are plotted to the right of zero. The directions are reversed if the *Data Direction* is set to *High to Low*. To set the bar type, click on the existing option and select the desired option from the list.

Axis Type

The *Axis Type* is *Linear* or *Logarithmic*. The data must be greater than zero when using a *Logarithmic* axis. Values equal to and less than zero are ignored in the log when *Logarithmic* is selected. Logarithmic uses a log (base 10) scale for the horizontal axis. To change the axis type, click on the existing option and select the desired option from the list.

Data Range

The horizontal scale can be set manually or automatically with the *Data Range* option. The *Auto* option calculates a best-fit range of the data. The *User Defined* option activates the *Minimum Value* and *Maximum Value*, allowing manual control over the log's minimum and maximum values. To change the data range, click on the existing option and select the desired option from the list.

Minimum and Maximum Values

The *Minimum Value* and *Maximum Value* are only available if the *Data Range* is set to *User Defined*. The *Minimum Value* is the smallest value that should be displayed on the log. The *Maximum Value* is the largest value that should be displayed on the log. To change the minimum and maximum values, set the *Data Range* to *User Defined*. Then, highlight the existing value in *Minimum Value* or *Maximum Value* and type the desired value.

If the borehole is changed, the new data may or may not fit into the user-defined range. If the data does not fit inside the range, change the *Minimum Value* and *Maximum Value* to new values or set the *Data Range* to *Auto*.

Data Direction

The *Data Direction* is used to determine whether data should be displayed with low values on the left or right side of the log. Available options are *Low to High* and *High to Low*. *Low to High* creates a log with the minimum data value on the left and the maximum data value on the right. *High to Low* creates the log with the minimum data value on the right and the maximum data value on the left. To change the direction, click on the existing option and select the desired option from the list.

Bar Size Method

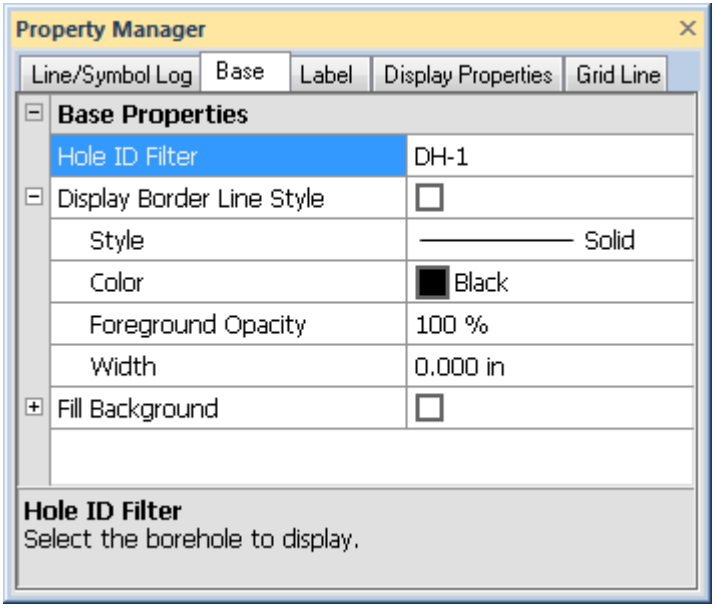
The *Bar Size Method* determines how the thickness of the bars is set. Available options are *Default Sizing* and *User Defined*. Select *Default Sizing* from the *Bar Size Method* to have the bars automatically sized. For depth data, default height is the mid-point between the current depth and the previous depth to the mid-point of the current depth to the next depth. For interval data, the height is simply the *From* and *To* depths. Select *User Defined* to manually set the bar height. If *User Defined* is selected, the *Bar Size* option becomes available. To change the bar size method, click on the existing option and select the desired option from the list.

Bar Size

The *Bar Size* sets the thickness of the bars when the *Bar Size Method* is set to *User Defined.* All bars are the thickness listed, regardless of whether the bars overlap. The bar is horizontally centered on the depth or the midpoint of the depth interval. The bar size is in page units and varies from zero to 2 inches. To change the bar size, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the bar size.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box

that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

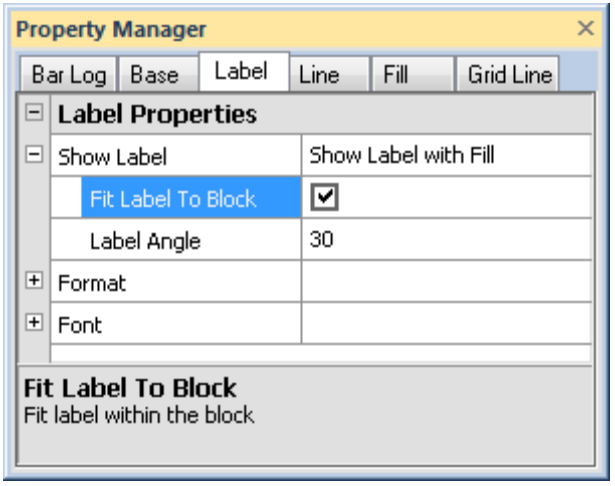
Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

Label properties change the appearance of labels on bar logs. Click on the **Label** tab in the **Property Manager** to edit label properties for bar logs.



*Set label properties on the **Label** tab in the **Property Manager**.*

Show Label

The *Show Label* option determines whether labels are displayed on the bar log. Available options are *No Label, Show Label With Fill*, and *Show Label Without Fill*.

- *Show Label* to *No Label* turns off display of labels for the log.
- *Show Label With Fill* turns on the display of labels on the log. The fill property, as set in the scheme or on the **Fill** tab, continues to display.

- *Show Label Without Fill* turns on the display of the labels on the log, but disables the fill properties.

To change the label display setting, click on the existing option and select the desired option from the list.

Fit Label To Block

The *Fit Label To Block* option determines the size of the label for each bar in the log. Check the box to automatically fit the label inside the bar. The label size will become smaller if the label is long so that the entire label fits in the width of the bar. Uncheck the box for all labels to be the same size, regardless of whether the label will fit in the width of the log. When this option is unchecked, the size is reported in the *Font* section. When this option is checked, the maximum size for the font is reported in the *Font* section.

Label Angle

The *Label Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Format

Click the ⊞ next to *Format* to set the label format properties.

Font

Click the ⊞ next to *Font* to set the label font properties.

If the options in the *Font* section are not available, a scheme is likely being used. Uncheck the *Use Range Scheme* option on the Bar Log tab to turn off the display of the scheme properties and set the font properties in the *Font* section.

Line Properties

Use line properties to change line properties for selected lines in the view. To edit the line properties, click on the object in the **Object Manager** or plot window to select it. The properties are listed in the **Property Manager**. Default line properties are set in the **Tools | Options** dialog on the **Line** page.

If the options on the **Line** tab are not available, a scheme is likely being used. Uncheck the *Use Range Scheme* option to turn off the display of the scheme properties and set the line properties on the **Line** tab.

Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

Fill Properties

Fill properties can be changed for selected objects. To edit the fill properties, click on the object in the **Object Manager** or plot window. The properties are listed in the **Property Manager**. Default fill properties are set in the **Tools | Options** dialog by clicking on the **Fill** page.

If the options on the **Fill** tab are not available, a scheme is likely being used. Uncheck the *Use Range Scheme* option to turn off the display of the scheme properties and set the fill properties on the **Fill** tab.

Refer to *Chapter 22 – Drawing Objects* for additional information about fill properties.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

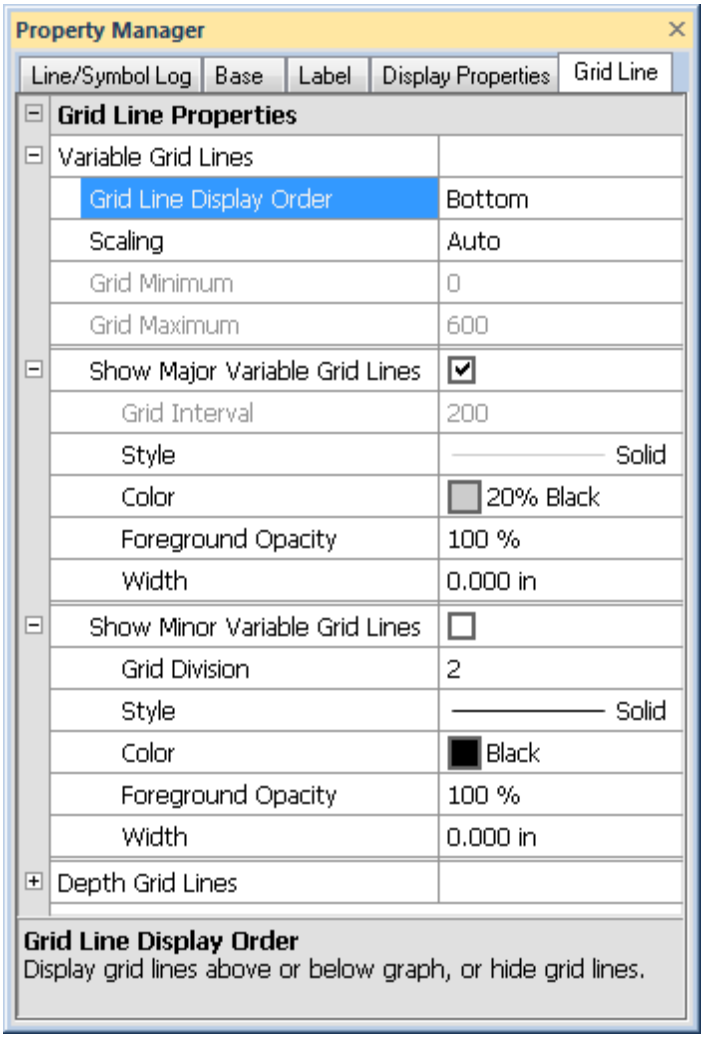
To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.

Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

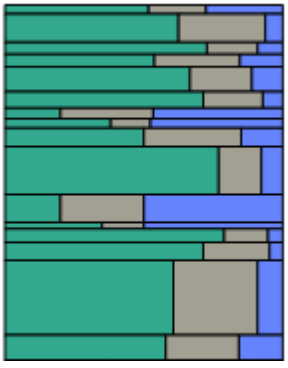
Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Chapter 13

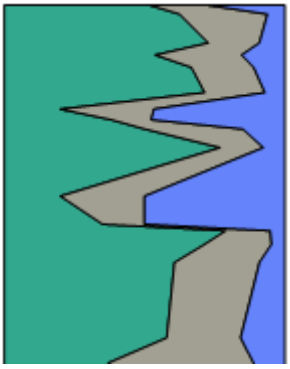
Percentage Logs

Percentage Logs

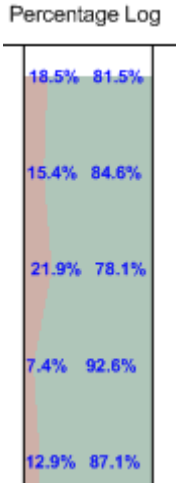
Click the **Log | Percentage** command or click the  button to create a log that is used to display multiple data columns as different length bars, based on the relative percentages. The percentage log is commonly used to show the different percentage of alterations in a sample; the amounts of sand, clay, gravel, silt, etc. relative to each other. The percentage log uses data columns to create a series of blocks (interval data) or polygons (depth data).



Percentage logs can display bars.



Percentage logs can display lines.



You can add labels, indicating the percentages.

Data Requirements

Percentage logs use depth or interval data tables. In the data table, there are at least three required columns. The required columns are *Hole ID, Depth,* and the data column(s) being displayed. Bars are displayed for interval tables, with the center of the bar positioned at the center of the interval. Lines are displayed for depth tables, with each point displayed at the depth value.

Any number of numerical columns can be used from the table. If you select five columns, five different blocks or lines are created for each row. You do not need to input normalized data. If the data are normalized, **Strater** still calculates the values. The data for each row automatically add to 100 percent, so the data in each row's column can be any value because the 100% is based on the data in each row.

For example, there are three columns with gold, silver, and copper concentrations in the data. The gold value is 22 ppb, the silver value is 33 ppb, and the copper value is 66 ppb. **Strater** automatically adds all the values together for a total of 121. Each component is then divided by this amount to determine the percentage of the block should be created for this component. Gold would represent 18 percent of this total, silver 27 percent, and copper 55 percent.

	A Hole ID	B From	C To	D Cu %	E Mo %
1	DH-1	0	2	0.36	0.005
2	DH-1	2	4	0.37	0.002
3	DH-1	4	6	0.33	0.001
4	DH-1	6	8	0.27	0
5	DH-1	8	10	0.37	0
6	DH-1	10	12	0.27	0

The Hole ID, Depth *(or* From *and* To*), and at least two columns of data are required for a percentage log.*

Creating a Percentage Log

To create a percentage log:

1. Click the **Log | Percentage** command or click the  button.
2. Click inside the log pane where you want the percentage log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a percentage log is created using the default properties. If you are in design mode, a percentage log graphic is displayed as a place holder after step 2.

Editing Percentage Log Properties

To change the features of a percentage log, including the data columns used to create the log, click on the percentage log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Percentage Log**, **Base**, **Label**, **Line**, and **Depth Grid Line**.

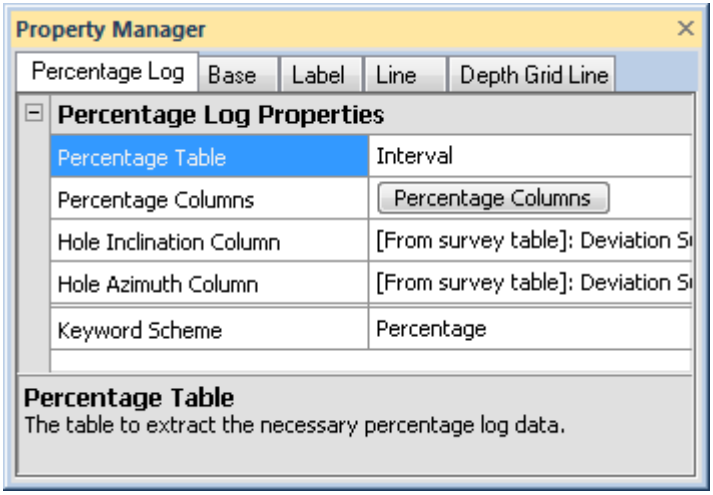
To change the columns associated with the percentage log, click on the Percentage Log tab in the **Property Manager**. Click the *Percentage Columns* button and select the columns in the dialog.

Percentage Log Properties

The **Percentage Log** page in the **Property Manager** includes options for defining data and keyword schemes for percentage logs. To view and edit percentage log properties, click on the percentage log in the view window or **Object Manager** to select the log. Then, click on the **Percentage Log** tab in the **Property Manager**.

Percentage Table

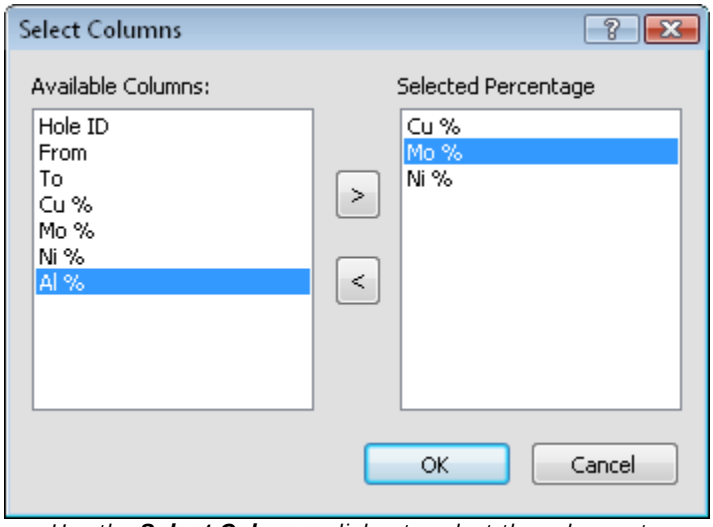
Use the *Percentage Table* to define the data table for the percentage log. The table type can be an interval table or a depth table. If the table is a depth table, the values from each column are plotted as a line at the depth listed in the table. If the table type is an interval type table, the values are plotted as bars with the depth determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.



*Edit percentage log properties on the **Percentage Log** tab in the **Property Manager**.*

Percentage Columns

The *Percentage Columns* are the columns in the selected *Percentage Table* that are being displayed by the percentage log. When the *Percentage Table* is changed to another table, the *Percentage Columns* list automatically updates to display the column names in the newly selected table. To change the columns, click on the Percentage Columns button. The **Select Columns** dialog opens.



*Use the **Select Columns** dialog to select the columns to appear in the percentage log. The order in which the columns are displayed in* Selected Percentage Columns *is the order the columns are displayed in the log.*

Use the **Select Columns** dialog to not only determine the columns that appear in the percentage log but to determine the order in which you want the individual components in a row to appear. You should determine the order in which you want the components to display before using this dialog.

The left side of the dialog has all *Available Columns* that are in the table that can be used for the percentage log. The right side of the dialog has the *Selected Percentage* columns. The column order from top to bottom is the order of the percentage bars or lines.

To add columns to the percentage log, click on the column name in the *Available Columns* list. Place the cursor in the desired location on the right side in the *Selected*

Percentage list. Click the  button. The selected column name appears in the *Selected Percentage* section below the previously highlighted column name. In the dialog above, the Al % would be added below the Mo% column.

To remove columns from the percentage log, click on the column name in the *Selected Percentage* list. Click the  button. The name is removed from the *Selected Percentage* list.

If a column is in an incorrect order, click on the column name in the *Selected Percentage* list and click the  button. Click on the item name in the *Selected Percentage* list before where the item should be placed. Click on the column name in the *Available Columns* list and click the  button.

Click *OK* to close the **Select Columns** dialog and update the percentage log. Click *Cancel* to not make any changes to the columns.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Percentage Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Keyword Scheme

The *Keyword Scheme* is the scheme that determines the font and fill properties for each column in the percentage log. The line properties are determined by the options on the **Line** page, not by the keyword scheme, unless the *Use Keyword Scheme For Line* option is checked on the **Line** tab. The selected keyword scheme should match the column names that appear in the *Percentage Columns*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the  next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Base Properties

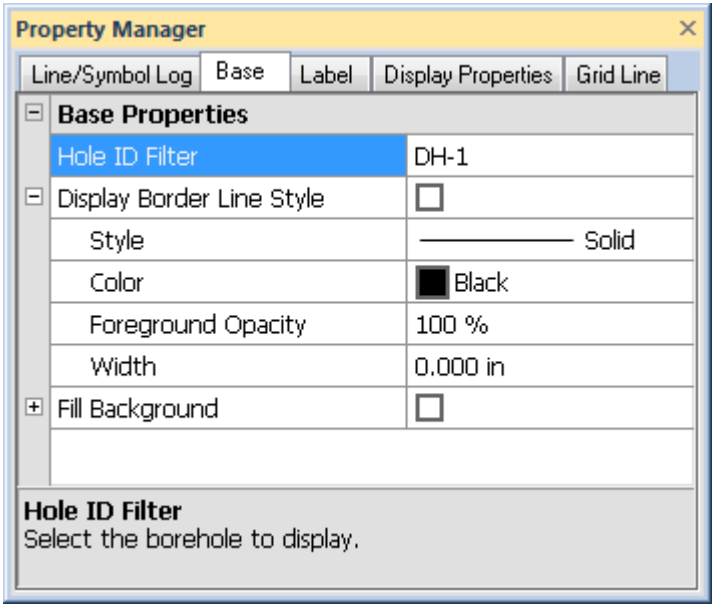
Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

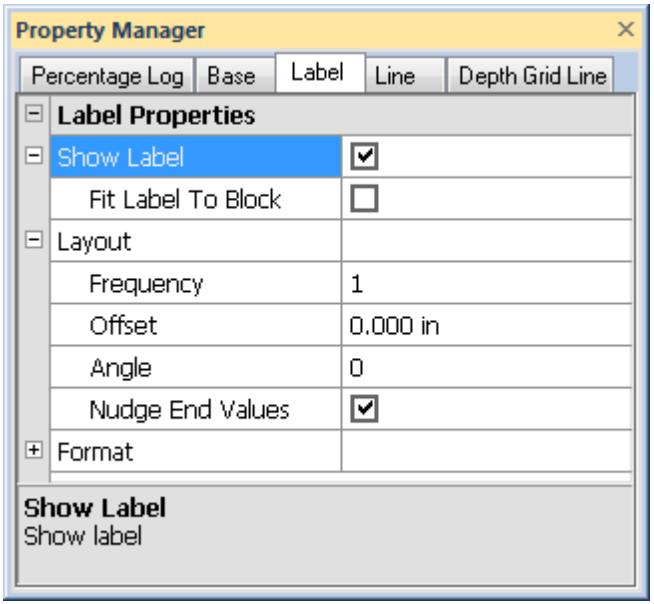
Label properties change the appearance of labels on percentage logs. Click on the **Label** tab in the **Property Manager** to edit label properties for percentage logs.

Show Label

Check the box next to *Show Label* to display labels on the log or map axis.

Fit Label To Block

The *Fit Label To Block* option determines the size of the label for each bar in the log. Check the box to automatically fit the label inside the bar when interval data is used. The label size will become smaller if the label is long so that the entire label fits in the width of the log. Uncheck the box for all labels to be the size specified by the scheme on the Percentage Log tab, regardless of whether the label will fit in the width of the log. When this option is checked, the maximum size for the font is reported in the scheme.



*Set label properties on the **Label** tab in the Property Manager.*

The *Fit Label To Block* option is not available for percentage logs created from depth tables.

Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many labels appear on the log. Setting the value to zero displays no labels on the log. Setting the value to one displays a label at all values. Change the *Frequency* to two to display a label at every other data value or three to display a label at every third value. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press

ENTER on the keyboard to make the change. Alternatively, click on the  to increase or decrease the value.

Offset

The *Offset* field moves the label number to the right (positive offset) or left (negative offset) by the number entered, in inches.

Angle

The *Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change. Check the box next to *Nudge End Values* to move the labels. Uncheck the box to keep the labels in the depth location specified.

Format

Click the ⊞ next to *Fornat* to set the format properties for the labels.

Line Properties

Use line properties to change line properties for selected lines in the view. To edit the line properties, click on the object in the **Object Manager** or plot window to select it. The properties are listed in the **Property Manager**. Default line properties are set in the **Tools | Options** dialog on the **Line** page.

Use Keyword Scheme For Line

In addition to the line properties available on the **Line** tab, the percentage log has a *Use Keyword Scheme For Line* option. If the options on the **Line** tab in the *Line Properties* section are not available, a scheme is likely being used. Uncheck the *Use*

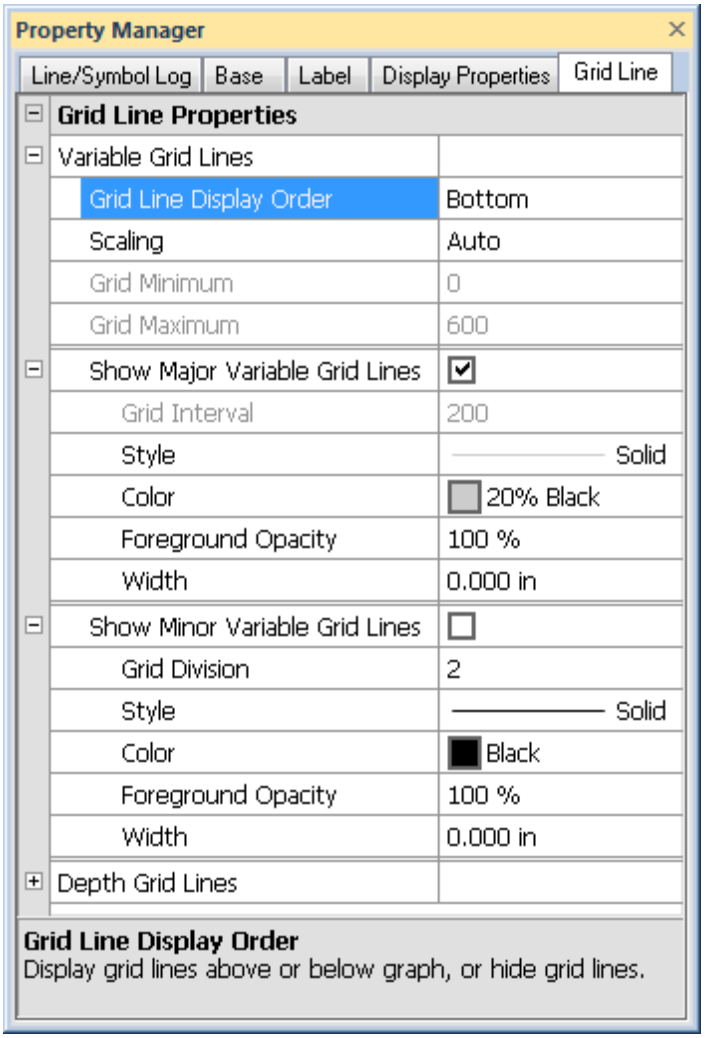
Keyword Scheme For Line option to turn off the display of the scheme properties and set the line properties on the **Line** tab in the *Line Properties* section.

Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log

(*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

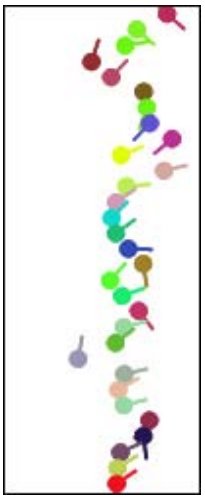
Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Chapter 14

Tadpole Logs

Tadpole Logs

Click the **Log | Tadpole** command or click the  button to create a tadpole log. Tadpole logs plot symbols representing dip and dip direction as a function of depth. This gives an indication of strike and dip of the bedding planes, fractures, or any other structure along the depth of the borehole.



The tadpole plot displays symbols, representing dip and dip direction.

Data Requirements

In the data table, there are four required columns and an optional type column. The required columns are *Hole ID, Depth, Dip,* and *Dip Direction*. Dip is measured from zero to 90 degrees. Dip direction is measured from zero to 360 degrees. The symbol is plotted along the horizontal axis at the dip value. The dip direction is indicated by the direction the tail on the symbol is pointing. Zero degrees is directly up. Positive angles increase in a clockwise direction. The optional *Type* column can include the type or structure class of the measurement (a keyword) and can be used to create a keyword scheme, to color the symbols or use a different shaped symbol for each type.

	A Hole ID	B Depth	C Dip	D Dip Direction	E Type
1	BH-05	9.6	49.347	254.482	fault
2	BH-05	10.1	16.201	265.355	fault
3	BH-05	10.6	0.921	50.006	fracture
4	BH-05	11.1	1.072	94.164	fracture
5	BH-05	11.6	2.324	55.3	fracture
6	BH-05	12.1	2.804	154.495	fracture

The Hole ID, Depth, Dip, *and* Dip Direction *are required columns for a tadpole log.*

Creating a Tadpole Log

To create a tadpole log:

1. Click the **Log | Tadpole** command or click the  button.
2. Click inside the log pane where you want the tadpole log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a tadpole log is created using the default properties. If you are in design mode, a tadpole log graphic is displayed as a place holder after step 2.

Editing Tadpole Log Properties

To change the features of a tadpole log, including the symbol properties, click on the tadpole log in the **Object Manager**. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Tadpole Log**, **Base**, **Label**, **Symbol**, and **Grid Line**.

Tadpole Log Properties

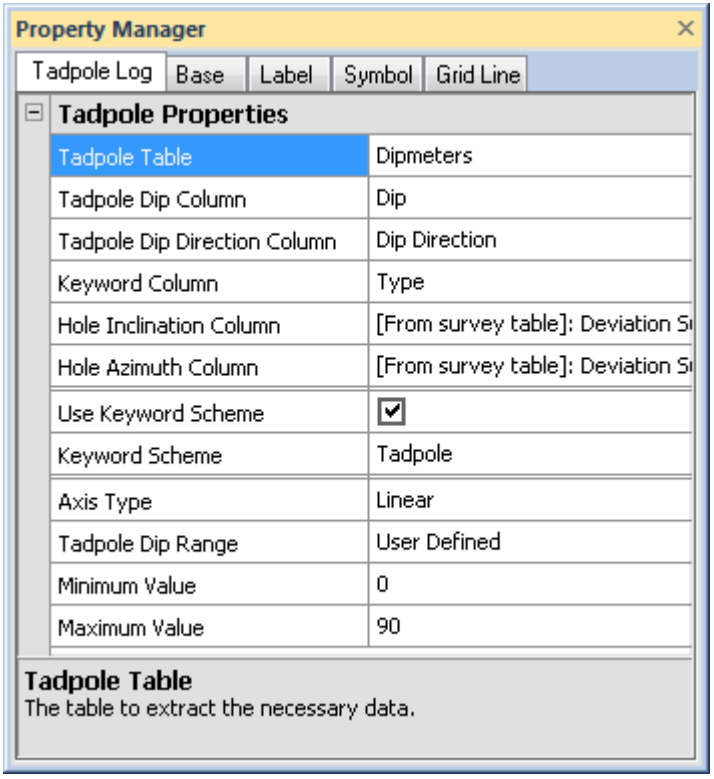
The **Tadpole Log** page in the **Property Manager** includes options for defining dip column, dip direction column, dip range, and keyword column for a tadpole log. To view and edit tadpole log properties, click on the tadpole log in the view window or **Object Manager** to select the log. Then, click on the **Tadpole Log** tab in the **Property Manager**.

Tadpole Table

Use the *Tadpole Table* to define the data table for the tadpole log. The table type can be an interval table or a depth table. If the table is a depth table, the points are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Tadpole Dip Column

The *Tadpole Dip Column* is the column in the selected *Tadpole Table* that is being displayed by the tadpole log. The *Tadpole Dip Column* determines the location of the symbol horizontally. When the *Tadpole Table* is changed to another table, the *Tadpole Dip Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Tadpole Dip Column* and select the desired column from the list.



*Set the tadpole properties on the **Tadpole Log** tab in the **Property Manager**.*

Tadpole Dip Direction Column

The *Tadpole Dip Direction Column* is the column in the selected *Tadpole Table* that determines the angle that the symbol in the tadpole log is pointing. When the *Tadpole Table* is changed to another table, the *Tadpole Dip Direction Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Tadpole Dip Direction Column* and select the desired column from the list.

Keyword Column

The *Keyword Column* is the column in the selected *Tadpole Table* that specifies the type of measurement or structural class of the data, and is used to set the properties of the symbol in the tadpole log. When the *Tadpole Table* is changed to another table, the *Keyword Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Keyword Column* and select the desired column from the list.

The *Keyword Column* is used for keyword matching. If you do not want to use a keyword scheme and simply want to plot intervals of data, uncheck the box next to the *Use Keyword Scheme* option and all symbols will have the same properties, as set on the **Symbol** tab.

If the options on the **Symbol** tab and the *Font* section on the **Label** tab are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option to turn off the display of the scheme properties and set the line properties on the **Line** tab and the font properties on the **Label** tab.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Tadpole Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Use Keyword Scheme

The *Use Keyword Scheme* option sets whether the symbol properties should be based on a keyword scheme or all symbols should use the same properties. To use a keyword scheme, check the box next to the *Use Keyword Scheme* option. To use the same properties for all symbols on the tadpole log, uncheck the box next to the *Use Keyword Scheme* option. The keyword scheme should match the text that appears in the *Keyword Column*.

Keyword Scheme

The *Keyword Scheme* is the scheme that determines the symbol properties when the box next to the *Use Keyword Scheme* option is checked. The selected scheme should match the text that appears in the *Keyword Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the  next to the scheme name to open the Scheme Editor, where the scheme can be created or edited.

Axis Type

The *Axis Type* is *Linear* or *Logarithmic*. The data must be greater than zero when using a *Logarithmic* axis. Values equal to and less than zero are ignored in the log when *Logarithmic* is selected. Logarithmic uses a log (base 10) scale for the horizontal axis. To change the axis type, click on the existing option and select the desired option from the list.

Tadpole Dip Range

The horizontal scale can be set manually or automatically with the *Tadpole Dip Range* option. The *Auto* option calculates a best-fit range of the data. The *User Defined* option activates the *Minimum Value* and *Maximum Value*, allowing manual control over the log's minimum and maximum values. To change the data range, click on the existing option and select the desired option from the list.

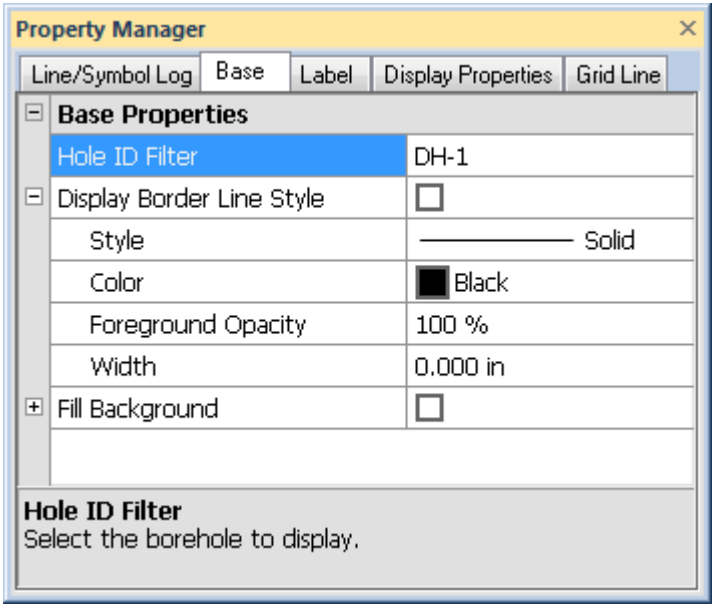
Minimum and Maximum Values

The *Minimum Value* and *Maximum Value* are only available if the *Tadpole Dip Range* is set to *User Defined.* The *Minimum Value* is the smallest value that should be displayed on the log. The *Maximum Value* is the largest value that should be displayed on the log. To change the minimum and maximum values, set the *Tadpole Dip Range* to *User Defined*. Then, highlight the existing value in *Minimum Value* or *Maximum Value* and type the desired value.

If the borehole is changed, the new data may or may not fit into the user-defined range. If the data does not fit inside the range, change the *Minimum Value* and *Maximum Value* to new values or set the *Tadpole Dip Range* to *Auto*.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

Label properties change the appearance of labels on tadpole logs. Click on the **Label** tab in the **Property Manager** to edit label properties.

Show Label

Check the box next to *Show Label* to display labels at the point locations on the log or at tick mark locations on the map axis.

Label Column

The *Label Column* is the column that is displayed next to the tadpole symbol. To change the column, click on the current option and select the desired column from the list. All columns from the *Tadpole Table* are listed.

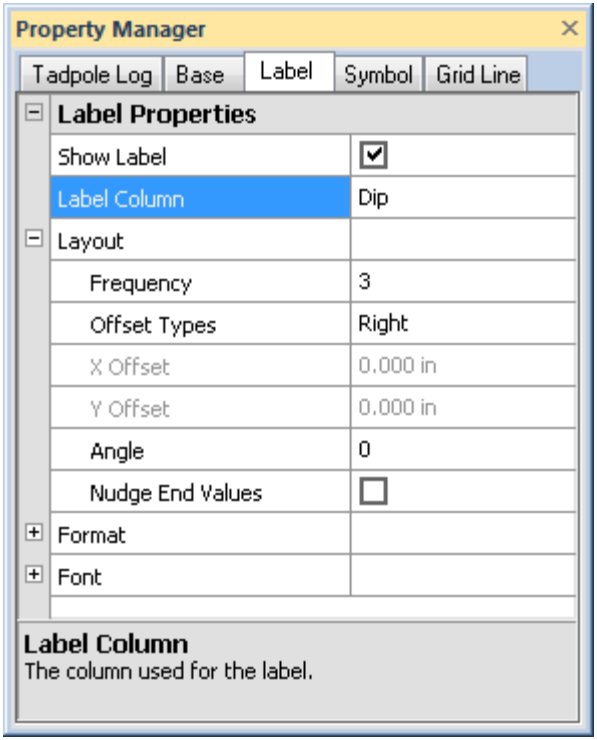
Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many labels appear on the log. Setting the value to zero displays no labels on the log. Setting the value to one displays a label at all values. Change the *Frequency* to two to display a label at every other data value or three to display a label at every third value. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press ENTER on the keyboard to make the change.

Alternatively, click on the  to increase or decrease the value.



*Set label properties on the **Label** tab in the **Property Manager**.*

Offset Types

The *Offset Types* determines the location of the label relative to the symbol. To change the location, click on the existing option and select the desired option from the list. Available options are *Center, Left, Top, Right, Bottom,* and *User Defined*.

X Offset

The *X Offset* field is active only when the *Offset Type* is set to *User Defined*. The *X Offset* moves the label number to the right (positive offset) or left (negative offset) by the number entered, in inches.

Y Offset

The *Y Offset* field is active only when the selected offset type is *User Defined*. The *Y Offset* moves the label numbers up (positive offset) or down (negative offset) by the number entered, in inches.

Angle

The *Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change. Check the box next to *Nudge End Values* to move the labels. Uncheck the box to keep the labels in the depth location specified.

Format

Click the ⊞ next to *Format* to set the numeric format options for the labels.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

If the options in the *Font* section are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option on the Tadpole Log tab to turn off the display of the scheme properties and set the font properties in the *Font* section.

Symbol Properties

Symbol properties can be changed for selected objects in the borehole, map view, or cross section view windows. Default symbol properties are set by clicking the **Tools | Options** command.

Custom symbols can be created using a third party TrueType font editing software.

If the options on the **Symbol** tab are not available, a scheme is likely being used. Uncheck the appropriate *Use Keyword Scheme, Use Range Scheme,* or *Use Indent Keyword Scheme* option to turn off the display of the scheme properties and set the symbol properties on the **Symbol** tab.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

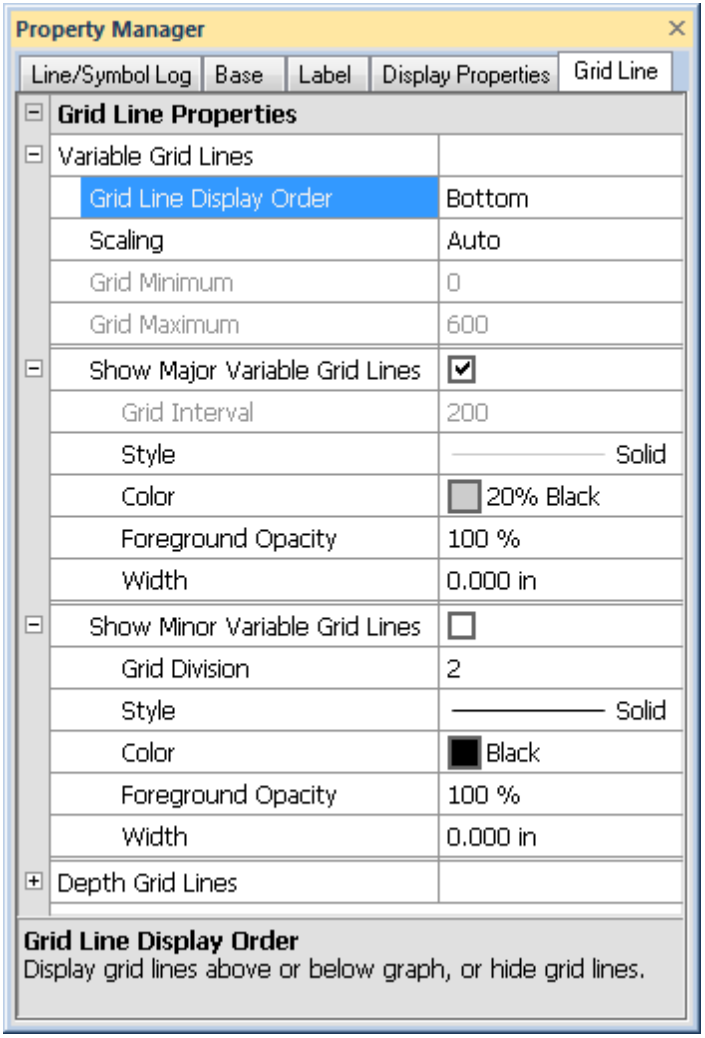
To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.

Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor depth line properties with the *Style*, *Color*, *Foreground Opacity*, and *Width* options.

Chapter 15

Post Logs

Post Logs

Click the **Log | Post** command or click the  button to create a post log. Post logs are used to display symbol position and text. The symbols can represent sample locations at depth or intervals, and in the case of monitoring wells, the depth to water, contamination, etc. You can use a keyword scheme to define the symbols, or use the default symbol. The log also allows placing text at one of five positions relative to the symbol position.



Post logs are used to show position and text.

Data Requirements

Post logs use depth or interval data tables. In the data table, there are two required columns. The required columns are *Hole ID* and *Depth*. If you wish to base the symbol properties on a keyword scheme, then a data column is also required. Symbols are plotted at the center of the post log width. Symbols are plotted at the depth recorded in the depth column for each row.

Interval table types can be used. When an interval table type is used, the symbol is plotted at the center point of the interval. For instance, if the interval goes *From* 1 *To* 4, the symbol is plotted at 2.5 on the depth axis.

	A Hole ID	B Depth	C Au (ppb)
1	DH-1	2	56
2	DH-1	4	6
3	DH-1	6	1
4	DH-1	8	8
5	DH-1	10	1
6	DH-1	12	1

The Hole ID and Depth *are required for a post log. If symbol properties are based on a keyword scheme, a data column is also required.*

Creating a Post Log

To create a post log:

1. Click the **Log | Post** command or click the  button.
2. Click inside the log pane where you want the post log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a post log is created using the default properties. If you are in design mode, a post log graphic is displayed as a place holder after step 2.

Editing Post Log Properties

To change the features of a post log, including the data column used to create the log, click on the post log in **Object Manager** or view window and edit its properties in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Post Log**, **Base**, **Label**, **Symbol**, and **Depth Grid Line**.

Post Log Properties

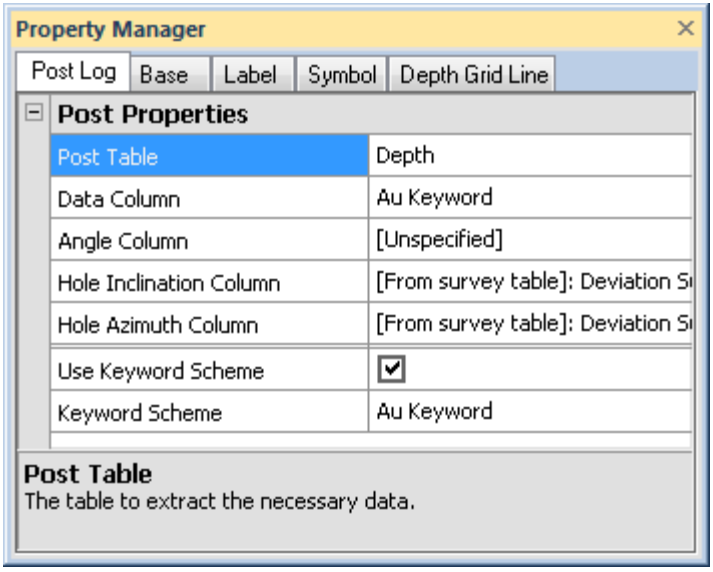
The **Post Log** page in the **Property Manager** includes options for defining data and keyword schemes for post logs. To view and edit post log properties, click on the post log in the view window or **Object Manager** to select the log. Then, click on the **Post Log** tab in the **Property Manager**.

Post Table

Use the *Post Table* to define the data table for the post log. The table type can be an interval table or a depth table. If the table is a depth table, the symbols are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Post Table* that is being displayed by the post log. When the *Post Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.



Edit lpost log properties on the ***Post Log*** *tab in the* ***Property Manager****.*

The *Data Column* is used for keyword matching. If you do not want to use a keyword scheme and simply want to plot symbols at depth, you can select any data column and use the settings on the **Symbol** tab to specify the symbol properties for the entire log.

Angle Column

The *Angle Column* is the column in the selected *Post Table* that determines the angle that the symbol in the post log is pointing. When the *Post Table* is changed to another table, the *Angle Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Angle Column* and select the desired column from the list. The *Angle Column* should contain rotation in degrees with a range of zero to 360. 0 and 360 are vertical pointing up. Angles increase in a clockwise rotation. **Strater** automatically resets values above 360. If a data cell contains a null or text, the rotation is set to zero. If there are no rotation values in the data, select *[Unspecified]*.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Post Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Use Keyword Scheme

The *Use Keyword Scheme* option sets whether the symbol properties should be based on a keyword scheme or all symbols should use the same properties. To use a keyword scheme, check the box next to the *Use Keyword Scheme* option. To use the same properties for all symbols on the post log, uncheck the box next to the *Use Keyword Scheme* option. The keyword scheme should contain items that match the keyword text in the *Data Column*.

If the options on the **Symbol** tab or the *Font* properties on the **Label** tab are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option to turn off the display of the scheme properties and set the symbol and font properties on the **Symbol** and **Label** tabs.

Keyword Scheme

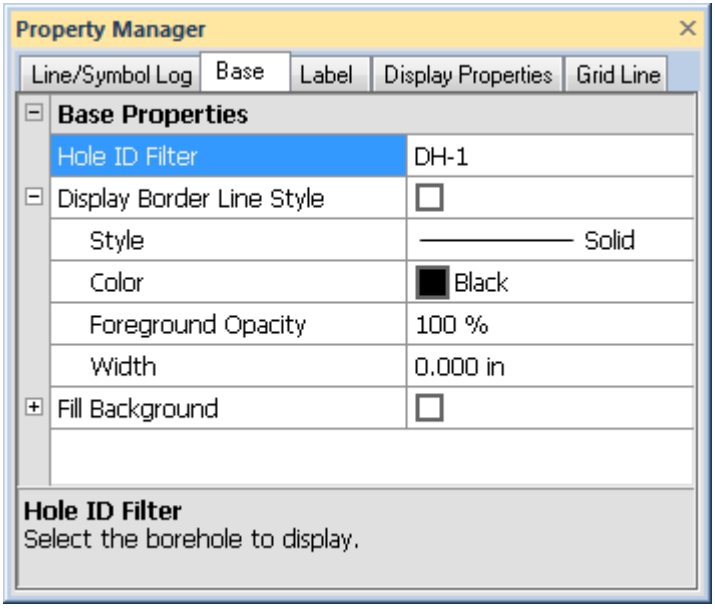
The *Keyword Scheme* is the scheme that determines the symbol properties when the box next to the *Use Keyword Scheme* option is checked. The selected scheme should contain items that match the keyword text in the *Data Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the ... next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

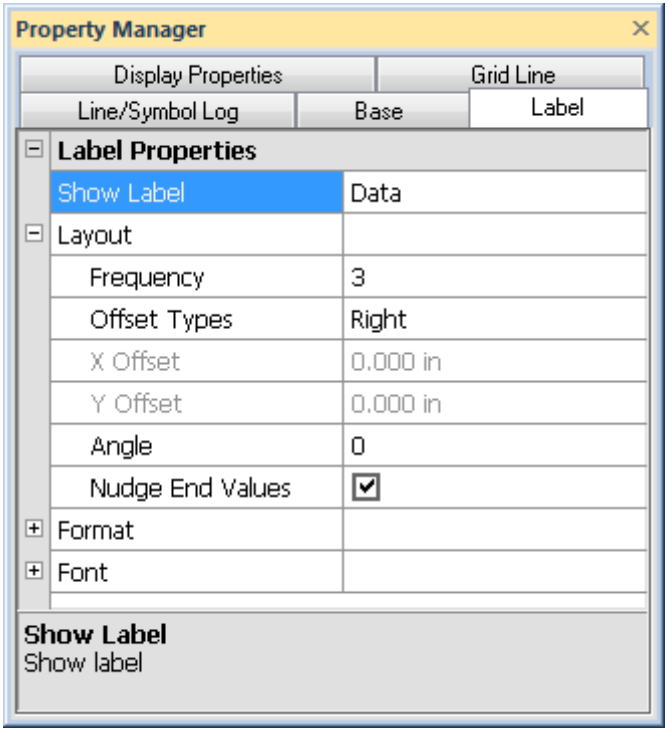
Label properties change the appearance of labels on line/symbol, post, and classed post logs. Click on the **Label** tab in the **Property Manager** to edit label properties.

Show Label

The *Show Label* option determines if labels are displayed at the point locations on the log. For classed post and post logs, check the box next to *Show Label* to show the labels. Data values are displayed at each point along the log.

For line/symbol logs, click on the existing option and select the desired option from the list. Available label types are *None* and *Data* for borehole views. Available label types are *None, Data, Layer Mark,* and *Data and Layer Mark* for cross section views. *None*

turns off label display. *Data* displays only the data value from the column for each point. *Layer Mark* displays only the layer mark names. *Data and Layer Mark* displays all data points and layer marks for the entire line/symbol log.



*Set label properties on the **Label** tab in the **Property Manager**.*

Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many labels appear on the log. Setting the value to zero displays no labels on the log. Setting the value to one displays a label at all values. Change the *Frequency* to two to display a label at every other data value or three to display a label at every third value. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press ENTER on the keyboard to make the change. Alternatively, click on the  to increase or decrease the value.

Offset Types

The *Offset Types* determines the location of the label relative to the symbol. To change the location, click on the existing option and select the desired option from the list. Available options are *Center, Left, Top, Right, Bottom,* and *User Defined*.

X Offset

The *X Offset* field is active only when the *Offset Type* is set to *User Defined*. The *X Offset* moves the label number to the right (positive offset) or left (negative offset) by the number entered, in inches.

Y Offset

The *Y Offset* field is active only when the selected offset type is *User Defined*. The *Y Offset* moves the label numbers up (positive offset) or down (negative offset) by the number entered, in inches.

Angle

The *Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change. Check the box next to *Nudge End Values* to move the labels. Uncheck the box to keep the labels in the depth location specified.

Format

Click the ⊞ next to *Format* to set the numeric format options for the labels.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

If the options in the *Font* section are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option on the Post Log tab to turn off the display of the scheme properties and set the font properties in the *Font* section.

Symbol Properties

Symbol properties can be changed for selected objects in the borehole, map view, or cross section view windows. Default symbol properties are set by clicking the **Tools | Options** command.

Custom symbols can be created using a third party TrueType font editing software.

If the options on the **Symbol** tab are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option to turn off the display of the scheme properties and set the symbol properties on the **Symbol** tab.

Depth Grid Line Properties

Depth grid lines are used to show depth increments on individual log items. To edit the depth grid line properties, select a log item. Click on the **Depth Grid Line** tab in the **Property Manager**.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or the *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

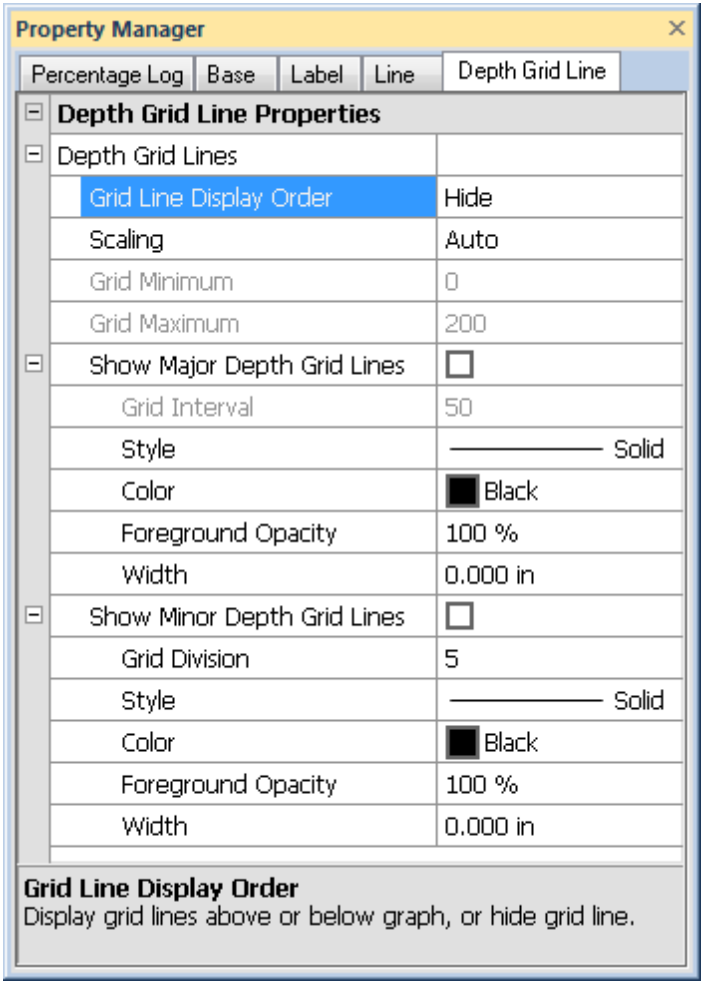
If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.



*Set the line properties for the grid lines on the **Depth Grid Line** tab in the **Property Manager**.*

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

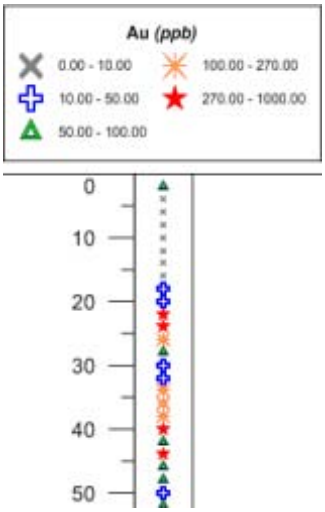
Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Chapter 16

Classed Post Logs

Classed Post Logs

Click the **Log | Classed Post** command or click the  button to create a classed post log. Classed post logs are similar to the post logs, except that class post logs can use range schemes and numerical values to determine symbol properties.



Select from several hundred different symbols to customize the scheme for your classed post log.

Data Requirements

Classed post logs use depth or interval data tables. In the data table, there are three required columns. The required columns are *Hole ID, Depth,* and the data column being displayed. Symbols are plotted at the center of the horizontal width of the classed post log. Symbols are plotted at the depth recorded in the depth column for each row.

Interval table types can be used. When an interval table type is used, the symbol is plotted at the center point of the interval. For instance, if the interval goes *From* 1 *To* 4, the symbol is plotted at 2.5 on the depth axis.

	A Hole ID	B Depth	C Au (ppb)
1	DH-1	2	56
2	DH-1	4	6
3	DH-1	6	1
4	DH-1	8	8
5	DH-1	10	1
6	DH-1	12	1

The Hole ID, Depth, *and one column of data are required for a classed post log.*

Creating a Classed Post Log

To create a classed post log:

1. Click the **Log | Classed Post** command or click the  button.
2. Click inside the log pane where you want the classed post log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a classed post log is created using the default properties. If you are in design mode, a classed post log graphic is displayed as a place holder after step 2.

Editing Classed Post Log Properties

To change the features of a classed post log, including the data column used to create the log, select the classed post log in the log pane and edit its properties in the **Property Manager**.

Classed Post Properties

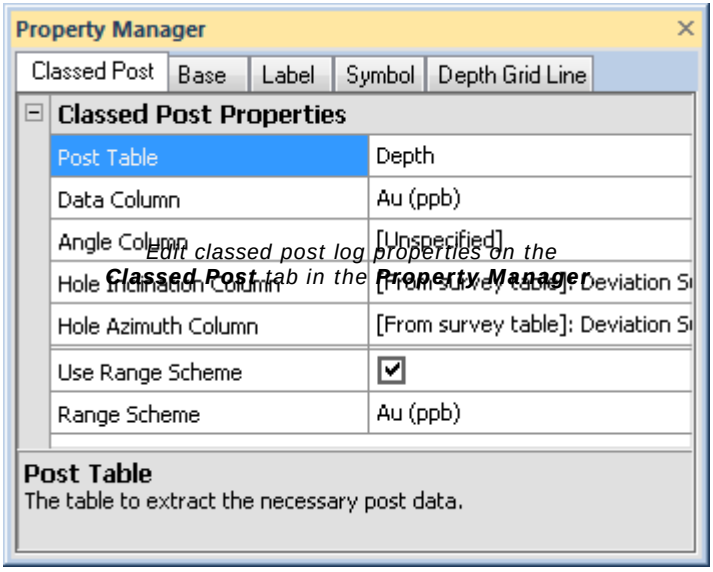
The **Classed Post** page in the **Property Manager** includes options for defining data and range schemes for classed post logs. To view and edit classed post log properties, click on the classed post log in the view window or **Object Manager** to select the log. Then, click on the **Classed Post** tab in the **Property Manager**.

Post Table

Use the *Post Table* to define the data table for the classed post log. The table type can be an interval table or a depth table. If the table is a depth table, the symbols are plotted at the depth listed in the table. If the table type is an interval type table, the depth is determined by calculating the mid-point position between the *To* and *From* columns in the corresponding table. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Post Table* that is being displayed by the classed post log. When the *Post Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.



Edit classed post log properties on the ***Classed Post*** *tab in the* ***Property Manager.***

The *Data Column* is used for placing the symbol in a range, so the *Data Column* should contain numeric values, not text.

Angle Column

The *Angle Column* is the column in the selected *Post Table* that determines the angle that the symbol in the classed post log is pointing. When the *Post Table* is changed to another table, the *Angle Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Angle Column* and select the desired column from the list. The *Angle Column* should contain rotation in degrees with a range of zero to 360. 0 and 360 are vertical pointing up. Angles increment in a clockwise rotation. **Strater** automatically resets values above 360. If a data cell contains a null or text, the rotation is set to zero. If there are no rotation values in the data, select *[Unspecified]*.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Post Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Use Range Scheme

The *Use Range Scheme* option sets whether the symbol properties should be based on a range scheme or all symbols should use the same properties. To use a range scheme, check the box next to the *Use Range Scheme* option. To use the same properties for all symbols on the classed post log, uncheck the box next to the *Use Range Scheme* option. The contents of the *Data Column* are used to determine the properties, as set by the range scheme.

If you do not want to use a range scheme and simply want to plot all symbols with the same properties, uncheck the *Use Range Scheme* option and use the settings on the **Symbol** tab to specify the symbol properties for the entire log.

If the *Use Range Scheme* option is checked, the options on the **Symbol** tab and *Font* section on the **Label** tab are not available because a scheme is in use. Uncheck the *Use Range Scheme* option to turn off the display of the scheme properties and set the symbol and font properties on the **Symbol** and **Label** tabs.

Range Scheme

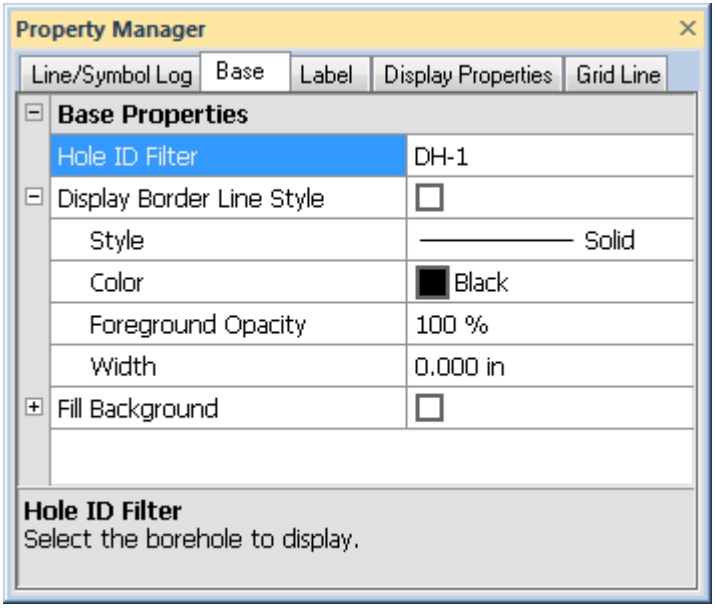
The *Range Scheme* is the scheme that determines the symbol properties when the box next to the *Use Range Scheme* option is checked. The selected scheme should contain ranges that match the values that appear in the *Data Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the ... next to the scheme name to open the Scheme Editor, where the scheme can be created or edited.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

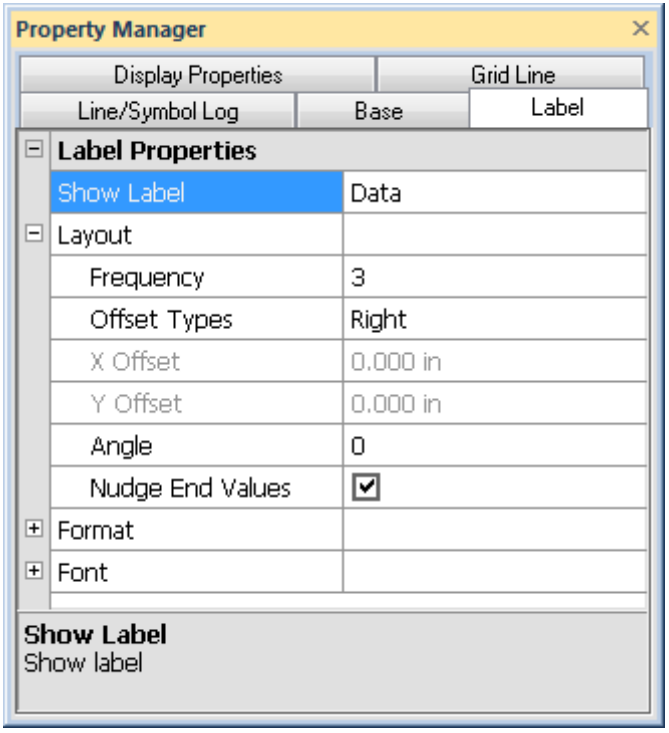
Label properties change the appearance of labels on line/symbol, post, and classed post logs. Click on the **Label** tab in the **Property Manager** to edit label properties.

Show Label

The *Show Label* option determines if labels are displayed at the point locations on the log. For classed post and post logs, check the box next to *Show Label* to show the labels. Data values are displayed at each point along the log.

For line/symbol logs, click on the existing option and select the desired option from the list. Available label types are *None* and *Data* for borehole views. Available label types are *None, Data, Layer Mark,* and *Data and Layer Mark* for cross section views. *None*

turns off label display. *Data* displays only the data value from the column for each point. *Layer Mark* displays only the layer mark names. *Data and Layer Mark* displays all data points and layer marks for the entire line/symbol log.



*Set label properties on the **Label** tab in the **Property Manager**.*

Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many labels appear on the log. Setting the value to zero displays no labels on the log. Setting the value to one displays a label at all values. Change the *Frequency* to two to display a label at every other data value or three to display a label at every third value. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press ENTER on the keyboard to make the change. Alternatively, click on the  to increase or decrease the value.

Offset Types

The *Offset Types* determines the location of the label relative to the symbol. To change the location, click on the existing option and select the desired option from the list. Available options are *Center, Left, Top, Right, Bottom,* and *User Defined*.

X Offset

The *X Offset* field is active only when the *Offset Type* is set to *User Defined*. The *X Offset* moves the label number to the right (positive offset) or left (negative offset) by the number entered, in inches.

Y Offset

The *Y Offset* field is active only when the selected offset type is *User Defined*. The *Y Offset* moves the label numbers up (positive offset) or down (negative offset) by the number entered, in inches.

Angle

The *Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change. Check the box next to *Nudge End Values* to move the labels. Uncheck the box to keep the labels in the depth location specified.

Format

Click the ⊞ next to *Format* to set the numeric format options for the labels.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

If the options in the *Font* section are not available, a scheme is likely being used. Uncheck the *Use Keyword Scheme* option on the **Post Log** tab to turn off the display of the scheme properties and set the font properties in the *Font* section.

Symbol Properties

Symbol properties can be changed for selected objects in the borehole, map view, or cross section view windows. Default symbol properties are set by clicking the **Tools | Options** command.

Custom symbols can be created using a third party TrueType font editing software.

If the options on the **Symbol** tab are not available, a scheme is likely being used. Uncheck the *Use Range Scheme* option to turn off the display of the scheme properties and set the symbol properties on the **Symbol** tab.

Refer to *Chapter 22 – Drawing Objects* for additional information about symbol properties.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.

Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

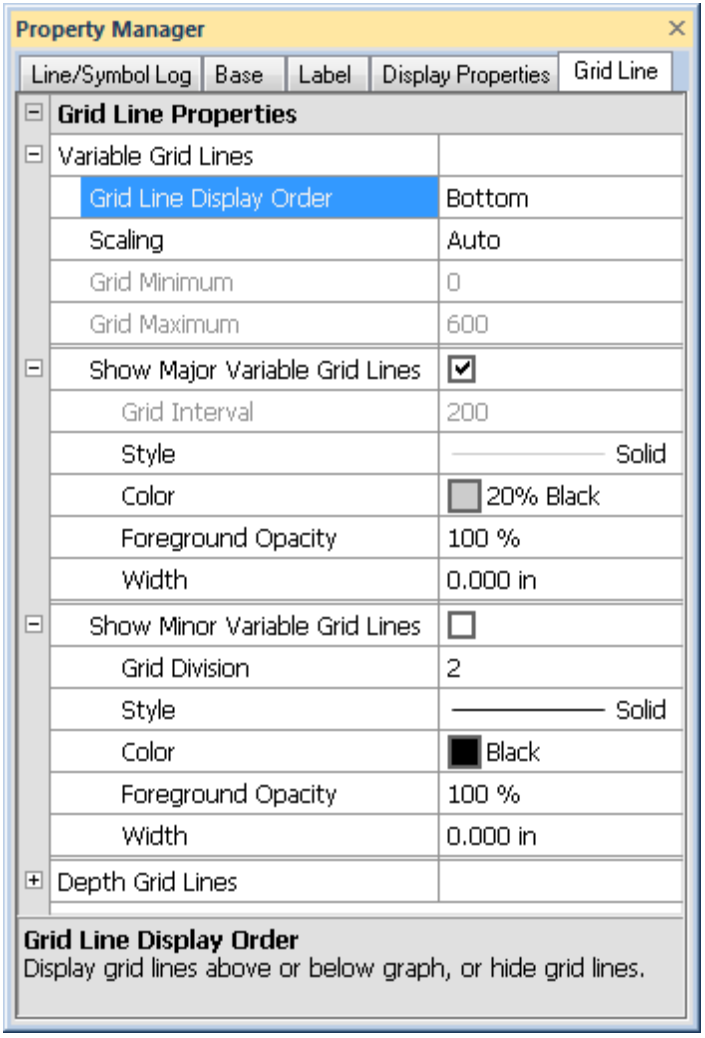
Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Chapter 17

Complex Text Logs

Complex Text Logs

Click the **Log | Complex Text** command or click the  button to create a complex text log. Complex text logs are generally used for rock descriptions, alteration descriptions, and any general text that represents interval data. The text is usually more complex than one or two words; it is often a sentence or series of sentences. The long sentences are wrapped to fit within the bounds specified for the log item, and there are special separator styles for long descriptions. Each text block can be individually edited. The text properties as well as the text block contents can be edited. Edited blocks can also be set back to the default values.

grey fine-grained andesitic lapilli tuff with Kspar, tm, and ep alteration.
porphyritic basalt flow with chl-mag-sericite alteration.
grey fine-grained andesitic lapilli tuff with Kspar, tm, and ep alteration.
felsic intrusive with Kspar, qtz, ep, and tm veins.
grey fine-grained andesitic lapilli tuff with qtz eyes and Kspar and ep alteration.

Complex text is not limited by length, so text entries can be of sufficient length to provide a necessary description.

Data Requirements

Complex text logs are created from interval or depth data tables.

In the interval data table, there are four required columns. The required columns are *Hole ID, From,* and *To* and the data column being displayed. Text from the data column is displayed in the From-To interval on the log.

	A Hole ID	B From	C To	Lithology Description
1	DH-1	0	40	massive silica cut by tm
2	DH-1	40	80	felsic intrusive with veins
3	DH-1	80	95	grey fine-grained andesiti
4	DH-1	95	102	porphyritic basalt flow wit
5	DH-1	102	115	grey fine-grained andesiti
6	DH-1	115	125	felsic intrusive with Kspar

The Hole ID, From, To, *and one column of text are required for a complex text log.*

In the depth data table, there are three required columns: *Hole ID, Depth*, and the data column being displayed. Text from the data column is displayed at the *Depth* value. If the text spans several lines, the text is vertically centered at the depth value. If the text spans several lines and is too long to display before the next depth value, the next text block will be moved down. When using a depth data table, it is recommended that separator and bracket line styles be set to *Invisible*.

	A Hole ID	B Depth	C Description
1	DH-1	2	massive silica cut
2	DH-1	45	felsic intrusive wit
3	DH-1	85	grey fine-grained a
4	DH-1	97	porphyritic basalt
5	DH-1	105	grey fine-grained a
6	DH-1	117	felsic intrusive wit

The Hole ID, Depth, *and one column of text are required for a complex text log created from a depth table.*

Creating a Complex Text Log

To create a complex text log:

1. Click the **Log | Complex Text** command or click the  button.
2. Click inside the log pane where you want the complex text log to appear.
3. In the **Open** dialog, click on the data file. If the data was already opened, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions d**ialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

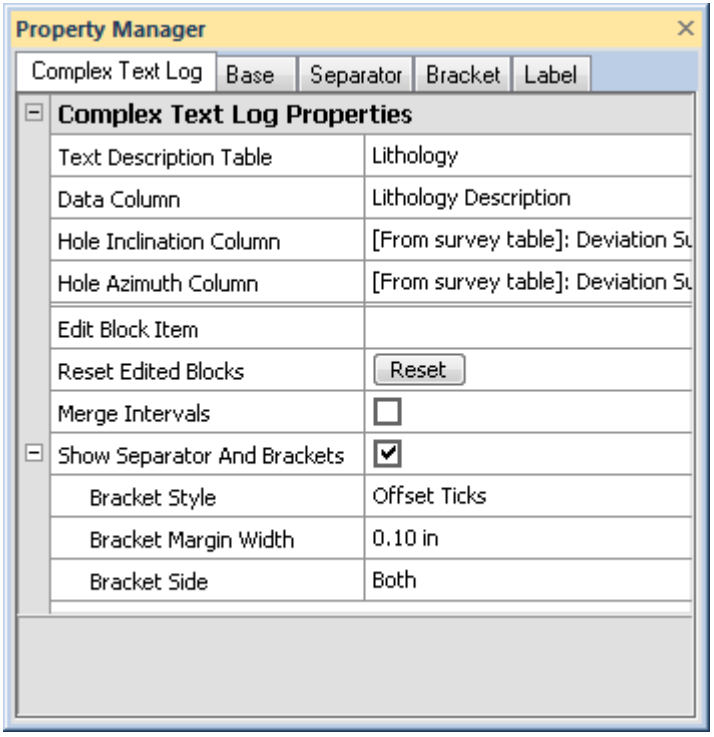
If you are in active mode a complex text log is created using the default properties. If you are in design mode, a complex text log graphic is displayed as a place holder after step 2.

Editing Complex Text Log Properties

To change the features of a complex text log, including the data column used to create the log, click on the complex text log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Complex Text Log**, **Base**, **Separator**, **Bracket**, and **Label**.

Complex Text Log Properties

The **Complex Text Log** page in the **Property Manager** includes options for defining the text data table and column, separator style and margin width for complex text logs. To view and edit complex text log properties, click on the complex text log in the view window or **Object Manager** to select the log. Then, click on the **Complex Text Log** tab in the **Property Manager**.



*Edit complex text log properties on the **Complex Text Log** tab in the **Property Manager**.*

Text Description Table

Use the *Text Description Table* to define the data table for the complex text log. The table type must be an interval or depth data table type. To change the table, click on the existing table name and select the desired table from the list.

Data Column

The *Data Column* is the column in the selected *Text Description Table* that is being displayed by the complex text log. When the *Text Description Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Data Column* and select the desired column from the list.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Data Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Edit Block Item

Use the *Edit Block Items* option to open a list of all text objects in the complex text log. The text of a block is displayed as it appears in the borehole view. The list contains data intervals on the left and the beginning of the text block to the right. Select a block of text to edit in the list and the **Edit Block Item** dialog opens. In the dialog, make any edits to the text and click *OK*.

Making any changes to the text in this field does not change the text in the actual data table and only modifies the text for use in this log. If you want to make permanent text changes to the data table they must be made inside the data table itself. It is more common to use the *Edit Block Items* option to change the style and format (color, font, size, etc.) of text.

Once the text or text properties have been changed with the *Edit Block Item*, the font properties set on the Font tab do not apply to the edited block. The text properties for this text block must be edited in the **Edit Block Item** dialog by selecting the block in the *Edit Block Item* option.

Reset Edited Blocks

Click the *Reset* button next to *Reset Edited Blocks* to reset all edited blocks back to the text from the data table. This resets all edited blocks.

Merge Intervals

The *Merge Intervals* option merges consecutive intervals that contain the same text. Check the box next to the *Merge Intervals* option to merge consecutive intervals that are the same. Uncheck the box next to the *Merge Intervals* option to keep all intervals separate.

Show Separator And Brackets

Check the box next to the *Show Separator and Brackets* option to show separator lines. Uncheck the box to hide separator lines. Click the ⊞ next to *Show Separator and Brackets* to make the next three options visible. To change the behavior, click on the existing option and select the desired option from the list. Set the separator line properties on the **Separator** page. Set the bracket line properties on the **Bracket** page.

Bracket Style

The *Bracket Style* list determines how brackets are drawn between intervals along the sides of the log. Available options are *Offset Ticks*, *Arrows*, and *Brackets*. To change the bracket style, click on the existing option and select the desired option from the list. Set the bracket line properties on the **Bracket** tab.

Bracket Margin Width

The *Bracket Margin Width* adjusts the width of the bracket style. This is the spacing between the edge of the log item and the bounding rectangle of each text block. The margin can be between 0 and 0.5 inches (1.27 centimeters) wide. The margins are set

on the left and right edges of the log. To change the width, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Alternatively, click the  to increase or decrease the width.

Bracket Side

The *Bracket Side* option determines where brackets are located relative to the intervals. Available options are *Left*, *Right*, or *Both* sides of the log. To change the bracket side, click on the existing option and select the desired option from the list.

Editing Complex Text Log Items

The individual text blocks in a complex text log can be modified in several ways:

- Modify the text block contents in the data table itself. The complex text log contents automatically update if *Auto Update Table Changes* is checked on the **General** page of the **Tools | Options** dialog. If this option is not checked, use **Edit | Update Borehole Data** to show the data change in the view window. Note that any previous formatting changes are lost when making changes in the data table.
- Modify the text block font or add symbols (including math symbols) in the data table using Math Text commands. When math text is applied it changes the appearance of the data table text in every log where the text is visible.
- Select the appropriate text entry using the *Edit Block Item* option in the **Property Manager**. The list contains the data intervals on the left and the beginning of the text block to the right. When a text block is selected, make text content and format changes in the Edit Block Item dialog. NOTE: If the text content is changed in the **Text Editor**, these changes are not written to **Strater's** data tables.

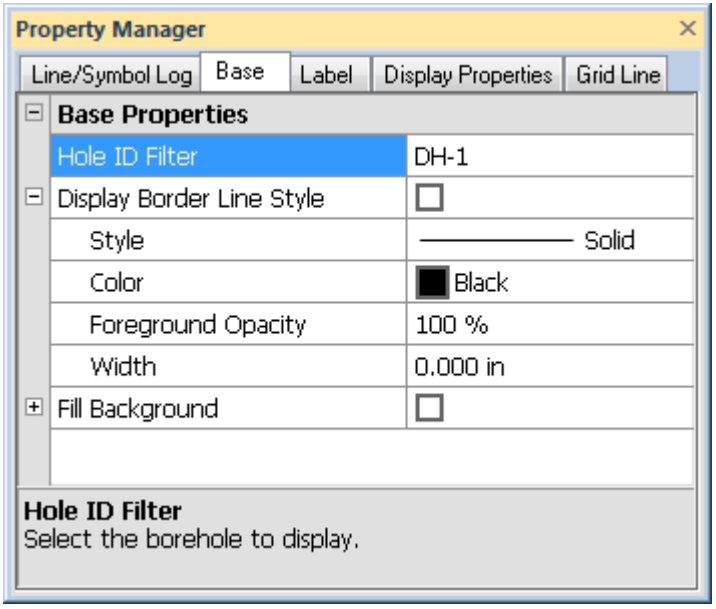
Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the

box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

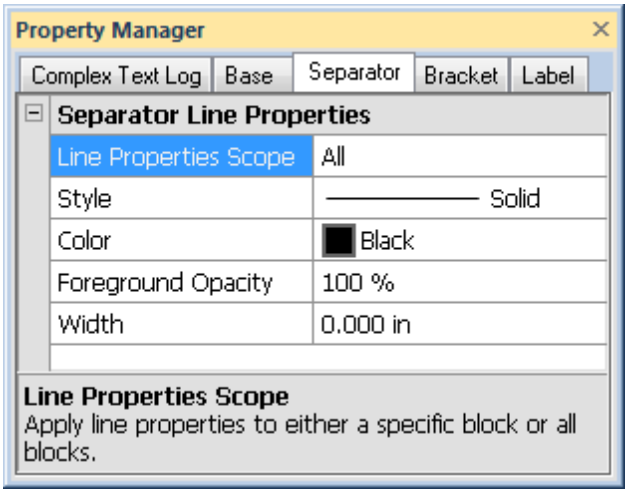
When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Separator Line Properties

Use **Separator** properties to change the separator line properties for a complex text log. The separator line is displayed by checking the box next to the *Show Separator And Brackets* option on the **Complex Text Log** tab. When using a depth data table, it is recommended that separator and bracket line styles be set to *Invisible*.

Line Properties Scope

The *Line Properties Scope* change the separator line properties for *All* text blocks or only from the specified text block. For all separator line properties to be the same, set the *Line Properties Scope* to *All* and then change the line properties. The properties are applied to all separator lines. To have a different line style for one text block, click on the current option and select that text block from the list before changing the line properties. The properties are applied only to the separator below the selected text block. To change the *Line Properties Scope*, click on the existing option and select the desired option from the list.



*Set the separator line properties for a complex text log on the **Separator** tab in the **Property Manager**.*

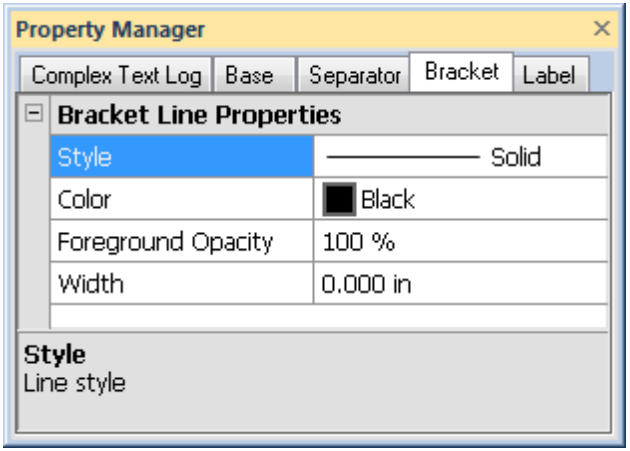
Line Properties

Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.

Bracket Properties

Use **Bracket** properties to change the bracket line properties for a complex text log. The bracket line is displayed by checking the box next to the *Show Separator And Brackets* option on the **Complex Text Log** tab. When using a depth data table, it is recommended that separator and bracket line styles be set to *Invisible*.

Refer to *Chapter 22 – Drawing Objects* for additional information about line properties.



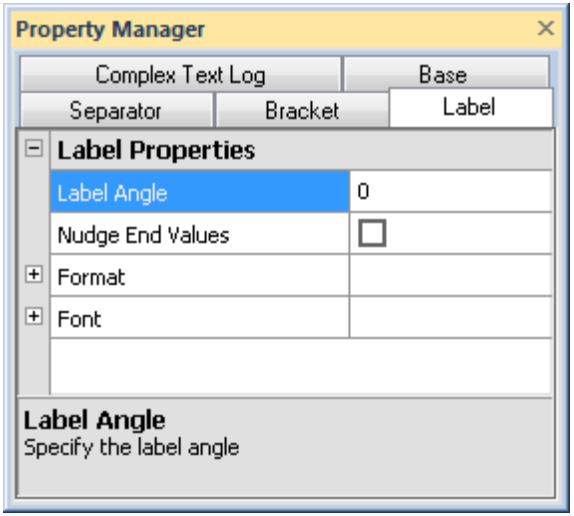
*Set the bracket line properties for a complex text log on the **Bracket** tab in the **Property Manager**.*

Label Properties

Label properties change the appearance of labels on complex text logs. Click on the **Label** tab in the **Property Manager** to edit label properties.

Label Angle

The *Label Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.



*Set label properties on the **Label** tab in the **Property Manager**.*

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change. Check the box next to *Nudge End Values* to move the labels. Uncheck the box to keep the labels in the depth location specified.

Format

Click the ⊞ next to *Format* to set the numeric format options for the labels.

Font

Click the ⊞ next to *Font* to set the font properties for the labels.

Chapter 18

Graphic Logs

Graphic Logs

Click the **Log | Graphic** command or click the  button to create a graphic log. The graphic log allows you to specify and show images of rocks, minerals, etc. at appropriate intervals. This is useful in displaying photos of the core, rock type, alteration, etc.



Graphic logs use images to display log data. You can use any image to represent each layer.

Data Requirements

Graphic logs use interval data tables. In the data table, there are four required columns. The required columns are *Hole ID, From, To,* and the data column being displayed. The data column should contain the full path and file name for the image file being displayed in the interval. Use **Table | Get Image File Name** command to browse for image files and insert the path and file name into the graphic name field. Alternatively, you can manually type the file name and path into a cell, for example:

c:\temp\granite.jpg

	A Hole ID	B From	C To	D File Path
1	DH-1	0	20	C:\Program Files\Golden Software\Strater 3\Samples\Andesite.JPG
2	DH-1	20	40	C:\Program Files\Golden Software\Strater 3\Samples\Andesite.JPG
3	DH-1	40	50	C:\Program Files\Golden Software\Strater 3\Samples\Gravel.JPG
4	DH-1	50	65	C:\Program Files\Golden Software\Strater 3\Samples\Gneiss.jpg
5	DH-1	65	80	C:\Program Files\Golden Software\Strater 3\Samples\Conglomerate.JPG
6	DH-1	80	95	C:\Program Files\Golden Software\Strater 3\Samples\Gneiss.jpg

The Hole ID, From, To, *and one column of data* containing the full path and file name *for the image being displayed are required for a graphic log.*

Creating a Graphic Log

To create a graphic log:

1. Click the **Log | Graphic** command or click the  button.
2. Click inside the log pane where you want the graphic log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a graphic log is created using the default properties. If you are in design mode, a graphic log graphic is displayed as a place holder after step 2.

Editing Graphic Log Properties

To change the features of a graphic log, including the data column used to create the log, click on the graphic log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Graphic Log**, **Base**, and **Depth Grid Line**.

Graphic Log Properties

The **Graphic Log** page in the **Property Manager** includes options for defining the data source and image sizing for graphic logs. To view and edit graphic log properties, click on the graphic log in the view window or **Object Manager** to select the log. Then, click on the **Graphic Log** tab in the **Property Manager**.

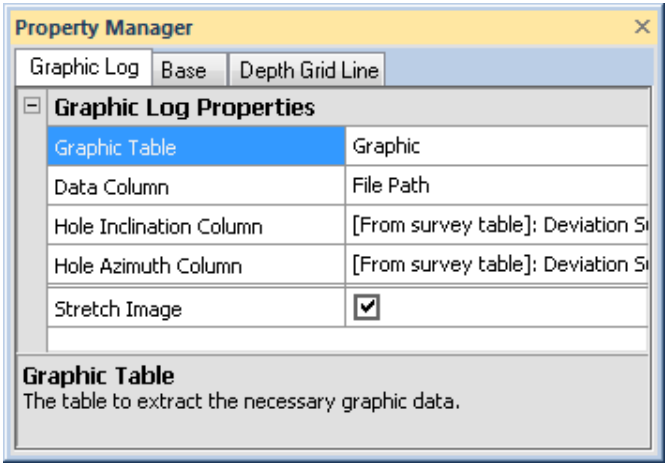
Graphic Table

Use the *Graphic Table* to define the data table for the graphic log. The table type must be an interval type table.

Data Column

The *Data Column* is the column in the selected *Graphic Table* that contains the full path and file name of the images being displayed by the graphic log. When the *Graphic Table* is changed to another table, the *Data Column* list is automatically updated to display the column names in the newly selected table. To change the

column, click on the existing column name next to *Data Column* and select the desired column from the list.



*Edit graphic log properties on the **Graphic Log** tab in the **Property Manager**.*

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

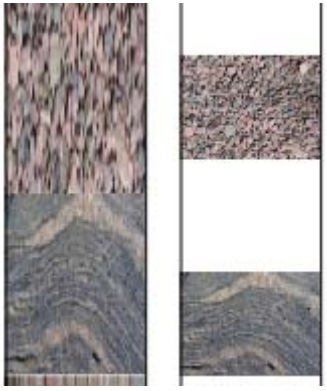
Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Graphic Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an

inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Stretch Image

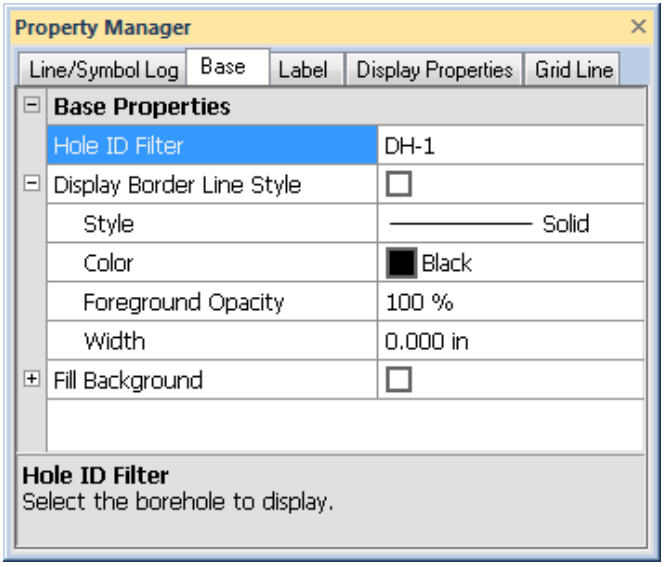
Use the *Stretch Image* field to determine if the images are stretched to fit the space available in a log block. To stretch the images to fit the whole extents of the log block, check the box next to *Stretch Image* To keep the images unstretched, uncheck the box. When the box is unchecked, the image is inserted with a "best fit" based on the aspect ratio of the image and log block. The image is centered in the log block. To change the stretching behavior, click on the existing option and select the desired option from the list.



This image shows the effect of the Stretch Image *option. The example on the left shows the graphic images stretched to fill the blocks in the log. The example on the right shows the images unstretched, in their original aspect ratio.*

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



Set the background, border line properties, and borehole ID on the ***Base*** *tab in the* ***Property Manager****.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Depth Grid Line Properties

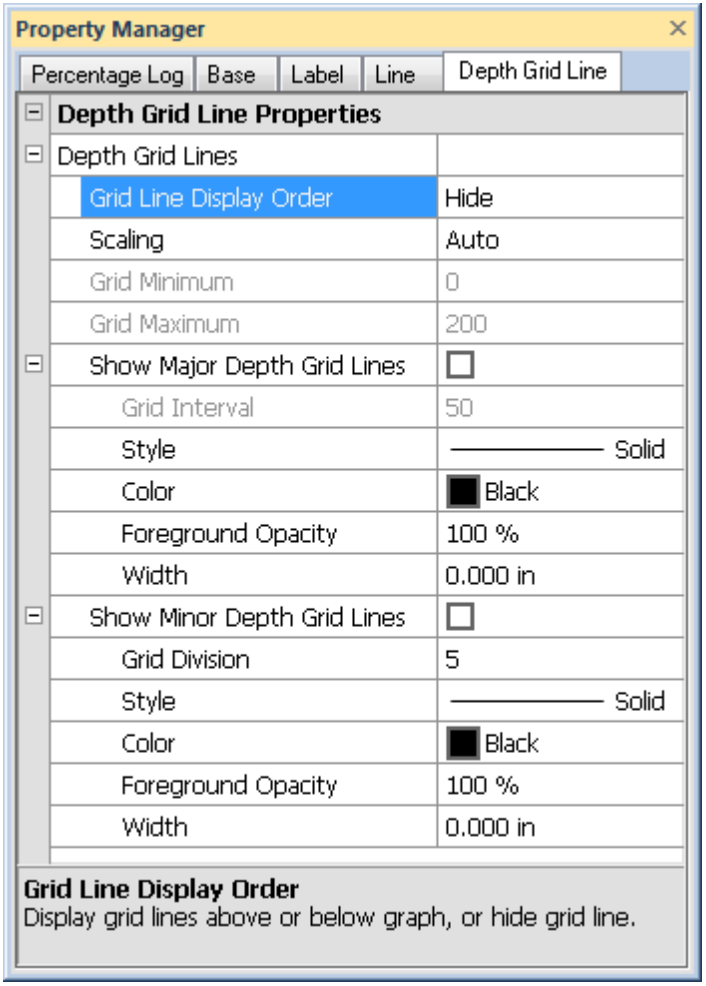
Depth grid lines are used to show depth increments on individual log items. To edit the depth grid line properties, select a log item. Click on the **Depth Grid Line** tab in the **Property Manager**.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.



*Set the line properties for the grid lines on the **Depth Grid Line** tab in the **Property Manager**.*

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or the *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

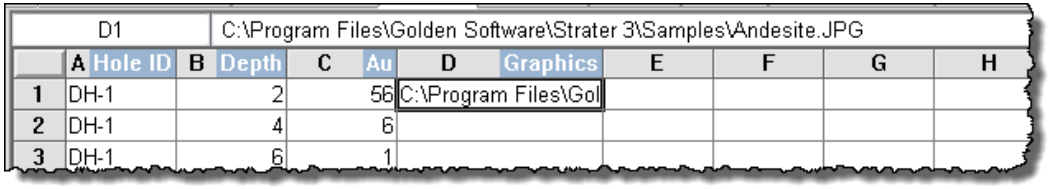
Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Get Image File Name

Click the **Table | Get Image File Name** command or right-click in a table and select *Get Image File Name* to select an image and input the full path and file name of the image in the table's currently active cell. This makes using images in graphic logs easier, as it removes the chance of a typo in the table column.

To insert a file path and name into the cell:

1. In the table, click on the cell you want to insert the file name and path. In this example, click on cell D1.
2. Click the **Table | Get Image File Name** command. The **Import** dialog opens.
3. Browse to the image file and click on the file to select it. In this example, click on the *Andesite.JPG* image in the C:\Program Files\Golden Software\Strater 4\Samples directory.
4. Click *Open* and the path and file name are inserted into the selected cell.



D1	C:\Program Files\Golden Software\Strater 3\Samples\Andesite.JPG								
	A Hole ID	B Depth	C Au	D Graphics	E	F	G	H	
1	DH-1	2	56	C:\Program Files\Gol					
2	DH-1	4	6						
3	DH-1	6	1						

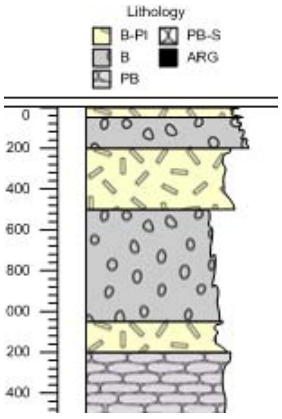
The full path and file name of the selected image appears in the selected cell.

Chapter 19

Lithology Logs

Lithology Logs

Click the **Log | Lithology** command or click the  button to create a lithology log. Most borehole plots include a lithology log, which is a way to show the various stratigraphic layers in the borehole. The display can be as simple as a filled block from the top to bottom, or the display can be more elaborate and show weathering patterns and line types. For additional information on how lithology logs relate to data, refer to the Lithology Data, Schemes, and Logs section.



This sample lithology log includes a legend based on its scheme and a scale bar.

Data Requirements

Lithology logs require a special type of interval data table, called a lithology table. In the data table, there are eight required columns. The required columns are *Hole ID, From, To,* and *Lithology Keyword, Indent Percentage, Indent Keyword,* and *Indent Line Scale*. The *Lithology Keyword* column should contain keyword text for each depth interval row. The text can be mapped to a lithology keyword scheme. Although the above columns are required (in that they are automatically created when you import data to make a lithology log and cannot be deleted) they do not have to hold any data when the lithology log is created. The columns need to be present in the data table.

	A Hole ID	B From	C To	D Lithology Keyword	E Lithology Description	Indent Percent...	Indent Key...	I. Indent Scale
1	DH-1	0	40	Jasperoid	massive silica cut by tm anc	90	Hard	90
2	DH-1	40	80	Granite	felsic intrusive with veins of k	75	Medium-Hard	75
3	DH-1	80	95	Andesite	grey fine-grained andesitic la	65	Medium-Soft	50
4	DH-1	95	102	Basalt	porphyritic basalt flow with c	45	Soft	25
5	DH-1	102	115	Andesite	grey fine-grained andesitic la	65	Medium-Soft	25
6	DH-1	115	125	Granite	felsic intrusive with Kspar, qt	75	Medium-Hard	50

The lithology log requires Hole ID, From, To, *and* Lithology Keyword *columns. The other columns are required, but filling them with data is optional.*

Creating a Lithology Log

To create a lithology log:

1. Click the **Log | Lithology** command or click the  button.
2. Click inside the log pane where you want the lithology log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a lithology log is created using the default properties. If you are in design mode, a lithology log graphic is displayed as a place holder after step 2.

Editing Lithology Log Properties

To change the features of a lithology log, including the data column used to create the log, click on the lithology log in the **Object Manager** or view window. The properties are listed in the **Property Manager**.

The following tabs are listed in the **Property Manager**: **Lithology Log**, **Base**, **Label**, and **Depth Grid Line**.

Lithology Log Properties

The **Lithology Log** page in the **Property Manager** includes options for defining the data, data direction and indents for a lithology log. To view and edit the lithology log properties, click on the lithology log in the view window or **Object Manager** to select the log. Then, click on the **Lithology Log** tab in the **Property Manager**.

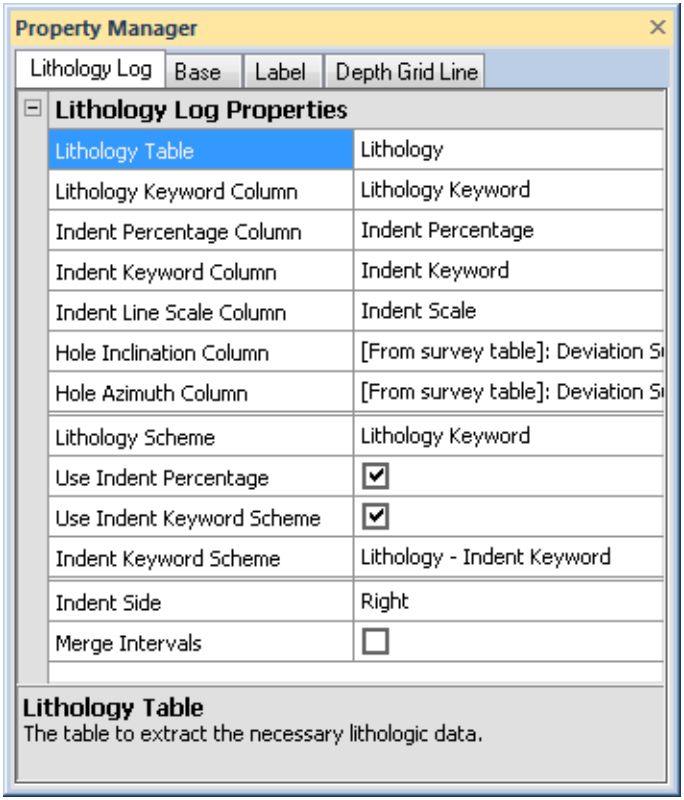
Lithology Table

Use the *Lithology Table* to define the data table for the lithology log. The table type must be an interval table. To change the table, click on the existing table name and select the desired table from the list.

Lithology Keyword Column

The *Lithology Keyword Column* is the column in the selected *Lithology Table* that is being displayed by the lithology log. When the *Lithology Table* is changed to another table, the *Lithology Keyword Column* list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Lithology Keyword Column* and select the desired column from the list.

The *Lithology Keyword Column* is required and is used for lithology keyword scheme matching to the *Lithology Scheme*. Select the column containing lithology keywords, which is usually the rock name. This column is used to create fill patterns, etc. for the various interval blocks in the log.



*The **Lithology Log** tab controls the display of the lithology log keyword, indent, and line scale columns.*

Indent Percentage Column

The *Indent Percentage Column* is the column in the *Lithology Table* where the indent percentages are stored. The value in the column determines how to display weathering resistance in a lithological unit. The more weathered the unit, the larger the indent percentage value. The value ranges from zero to 100. The weathered display percentage of the interval block is typically shown in the left-right direction. Zero percentage displays none of the block and is fully weathered. 100 percent displays the entire block and is fully resistant. The *Indent Percentage Column* is created in the table, but is optional in the log.

To set the indent percentage, click on the existing column name next to *Indent Percentage Column* and select the appropriate column from the list. Then, check the

box next to the *Use Indent Percentage* option. Select *[Unspecified]* in the indent percentage column if there is not an indent percentage column.

Indent Keyword Column

Use the *Indent Keyword Column* to select the data table column to match to the indent keyword scheme items. The *Indent Keyword Column* is optional. The indent keyword column determines the shape of the indent line on one side of the log.

To change the indent keyword column, click on the existing column name and select the desired column from the list. Then, check the box next to the *Use Indent Keyword Scheme* option. Select *[Unspecified]* if there is not an indent keyword column.



This lithology log contains different indent keyword items, as displayed by various indent line styles on the right side of the log.

Indent Line Scale Column

Use the *Indent Line Scale Column* to select the data table column that includes the indent scale values. The indent scale column controls the overall scaling of the lithology indent line. The range is zero to 100. A zero scale flattens the line to zero variation and a 100 scale sets the indentation of shape of the line to half the width of the lithology log. For example, if the lithology log is three inches wide the range of the lithology line is 1.5 inches. Use the *Indent Line Scale Column* in conjunction with the *Indent Percentage Column*. This is an optional column. To change the *Indent Line Scale Column*, click on the existing column name and select the desired column from the list. Select *[Unspecified]* if there is not an indent line scale column.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Lithology Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Lithology Scheme

The *Lithology Scheme* is the scheme that determines the fill and line properties for the lithology log item. The selected scheme should contain items that match the keyword text in the *Lithology Keyword Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the  next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Use Indent Percentage

The *Use Indent Percentage* option sets whether the *Indent Percentage Column* should be used to determine the width of each block in the lithology log. To use the indent percentages, check the box next to the *Use Indent Percentage* option. To use the same width for all intervals on the lithology log, uncheck the box next to the *Use Indent Percentage* option. Note that if the *Indent Percentage Column* is set to *[Unspecified]*, the *Use Indent Percentage* option is not available.

Use Indent Keyword Scheme

The *Use Indent Keyword Scheme* option sets whether the line shape on one side of the lithology log should be based on an indent keyword scheme or all intervals should use a vertical line. To use an indent keyword scheme, check the box next to the *Use*

Indent Keyword Scheme option. To use the same width for all intervals on the lithology log, uncheck the box next to the *Use Indent Keyword Scheme* option. The indent keyword scheme should contain items that match the keyword text in the *Indent Keyword Column*. Note that if the *Indent Keyword Column* is set to *[Unspecified]*, the *Use Indent Keyword Scheme* option is not available.

When the box is checked next to *Use Indent Keyword Scheme*, the line and fill settings on the Base tab are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties.

Indent Keyword Scheme

The *Indent Keyword Scheme* is the scheme that links the lithology indent line styles to the lithology log intervals when the box next to the *Use Indent Keyword Scheme* option is checked. The selected scheme should contain items that match the keyword text in the *Indent Keyword Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the  next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Indent Side

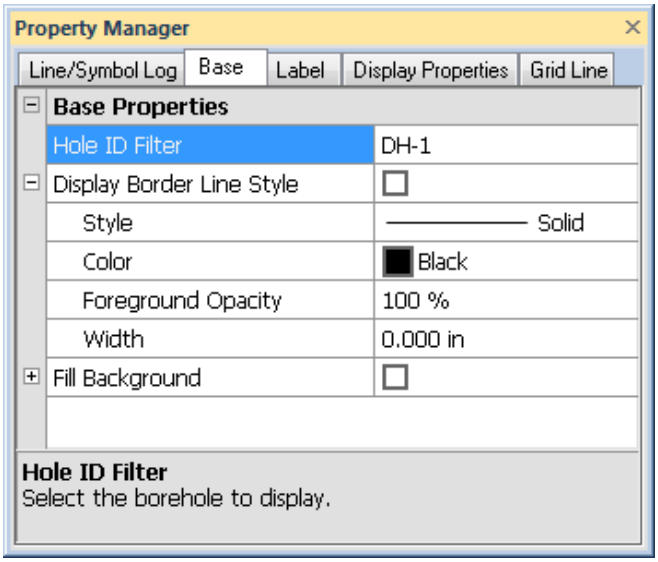
The *Indent Side* is the side of the lithology log that displays the indent line styles if the box next to the *Use Indent Keyword Scheme* option is checked. Available options are *Right* and *Left*. The default option is *Right,* which displays the indent lines on the right side of the log. To change the side, click on the existing option and select the desired option from the list.

Merge Intervals

The *Merge Intervals* option merges consecutive intervals that contain the same data. Check the box next to the *Merge Intervals* option to merge consecutive intervals that are the same. Uncheck the box next to the *Merge Intervals* option to keep all intervals separate.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a

rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

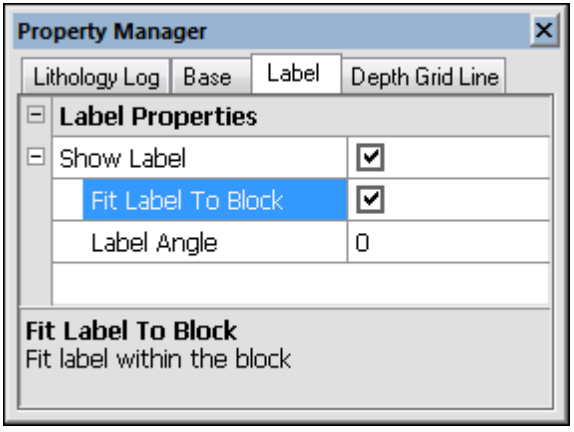
Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Label Properties

Label properties change the appearance of labels on lithology logs. Click on the **Label** tab in the **Property Manager** to edit label properties.



*Set label properties on the **Label** tab in the **Property Manager**.*

Show Label

Check the box next to *Show Label* to display labels on the lithology log.

Fit Label To Block

The *Fit Label To Block* option determines the size of the label for each interval block in the log. Check the box to automatically fit the label inside the interval block. The label size will become smaller if the label is long so that the entire label fits in the width of the log. Uncheck the box for all labels to use the font size defined in the keyword scheme, regardless of whether the label will fit in the width of the log. When this option is unchecked, the

size is set by the *Lithology Scheme* on the Lithology Log tab. When this option is checked, the maximum size for the font is the font size reported by the *Lithology Scheme*.

Label Angle

The *Label Angle* option sets the displayed labels at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down. To change the angle, highlight the existing option and type the desired angle. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the value. Angle values must be between zero and 360 degrees.

Grid Line Properties

Grid lines are used to show data increments on individual log items. There is a variable grid that represents the X axis data and another grid for depth or Y axis data. Most log items include a depth grid option but not all log items have variable grid options. The *Variable Grid Lines* and *Depth Grid Lines* sections have identical settings, but represent the settings for the different grids.

To edit the grid line properties, select a log item. Click on the **Grid Line** tab in the **Property Manager**.

Variable Grid Lines

Variable grid lines are vertical lines representing data values for a log. Click the ⊞ next to *Variable Grid Lines* to open the section.

Grid Line Display Order

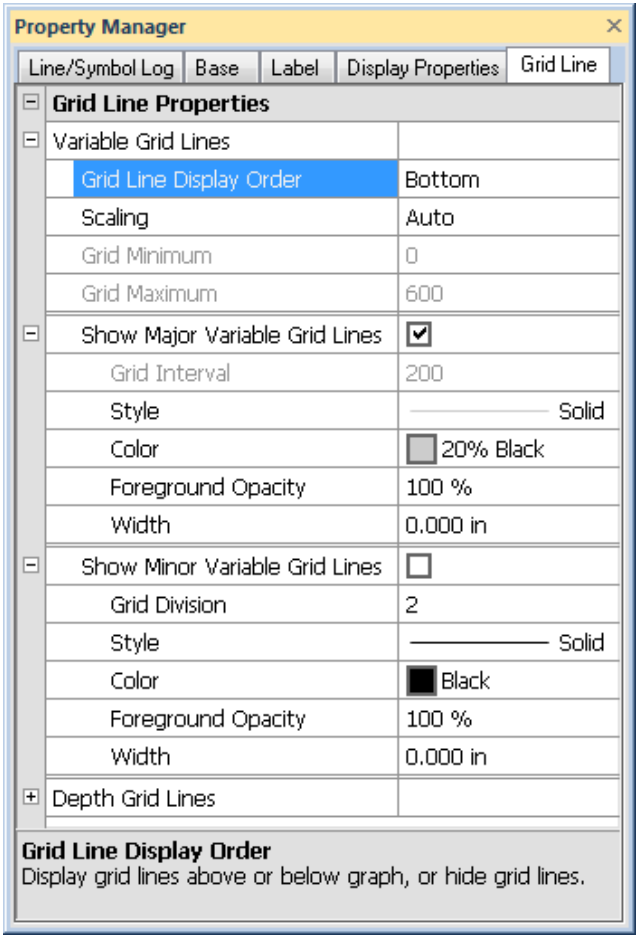
Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Variable Grid Lines* option or the *Show Minor Variable Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the variable grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.



*Set the line properties for the grid lines on the **Grid Line** tab in the **Property Manager**.*

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the variable grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the variable grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Variable Grid Lines

To show major variable grid lines, check the box next to the *Show Major Variable Grid Lines* option. To hide the major variable grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Variable Grid Lines

To show minor variable grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor variable grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor variable grid lines will appear. If the value is 2, one minor variable grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor variable line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Depth Grid Lines

Depth grid lines are horizontal lines representing depth values for a log. Click the ⊞ next to *Depth Grid Lines* to open the section.

Grid Line Display Order

Grid lines can be positioned above the log (*Top*), beneath the log (*Bottom*), or not displayed (*Hide*) with the *Grid Line Display Order* options. If *Top* is selected, the grid is the last item drawn for a specific log item. *Bottom* means the grid is under the log item, but above the fill background. *Hide* means do not show the grid. To change the *Grid Line Display Order*, click on the existing option and select the desired option from the list.

After setting the *Grid Line Display Order*, turn on the grid lines by checking the box next to the *Show Major Depth Grid Lines* option or *Show Minor Depth Grid Lines* option.

Scaling

The *Scaling* option controls the first and last grids shown for the depth grid lines. Available options are *Auto* or *User Defined*. *Auto* creates settings based upon the log's depth data. Select *User Defined* to manually set the grid's minimum and maximum values in the *Grid Minimum* and *Grid Maximum* settings. To change the scaling, click on the existing value option and select the desired option from the list.

If the borehole is changed, the new data may or may not fit into the user defined grid range so use caution in setting these values.

Grid Minimum

If *User Defined* is selected as the *Scaling* option, the *Grid Minimum* defines the minimum value of the depth grid. To change the minimum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Grid Maximum

If *User Defined* is selected as the *Scaling* option, the *Grid Maximum* defines the maximum value of the depth grid. To change the maximum grid line value, highlight the existing value and type a new value. Press ENTER on the keyboard and the grid lines update.

Show Major Depth Grid Lines

To show major depth grid lines, check the box next to the *Show Major Depth Grid Lines* option. To hide the major depth grid lines, uncheck the box.

Grid Interval

To change the *Grid Interval* the *Scaling* option must be set to *User Defined.* The *Grid Interval* is the spacing between the major grid lines.

Major Line Properties

Set the major depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Show Minor Depth Grid Lines

To show minor depth grid lines, check the box next to the *Show Minor Variable Grid Lines* option. To hide the minor depth grid lines, uncheck the box.

Grid Division

The *Grid Division* determines how many minor divisions (gaps) are between major tick marks. If the value is 1, no minor depth grid lines will appear. If the value is 2, one minor depth grid line will appear. To change the value, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Minor Line Properties

Set the minor depth line properties with the *Style, Color, Foreground Opacity,* and *Width* options.

Lithology Data, Schemes, and Logs

Lithology logs require interval type data, and at a minimum, a lithology keyword scheme. More complex lithologies can be created by using indent percentages, indent scales, and indent styles.

Data

To create a complex lithology log, the following data are necessary:

- *Interval data*, which are entered in *From* and *To* columns. This is typically depth data and displays the height of each block.
- *Lithology keywords*, which are text entries that indicate the line and fill properties of each block. These keywords are linked to scheme keywords to create the block properties. Usually these are the layer names of each block.
- *Indent percentages,* which show the width of each block. Zero percent indicates none of the block is displayed and 100 percent indicates the whole block is displayed.
- *Indent keywords* show the type of indent line for each block. These keywords are linked to a indent keyword scheme to create the indents on each block.
- *Indent line scale* to show the amount of exaggeration of the indent line.

Schemes

There are two schemes for lithology logs: *lithology keyword* and *indent keyword*. The lithology keyword scheme is required to create the log. Lithology keyword schemes

include the line, fill, and font properties for each block. The indent keyword scheme is optional and used to create line patterns on the left or right edge of each block.

Example Data

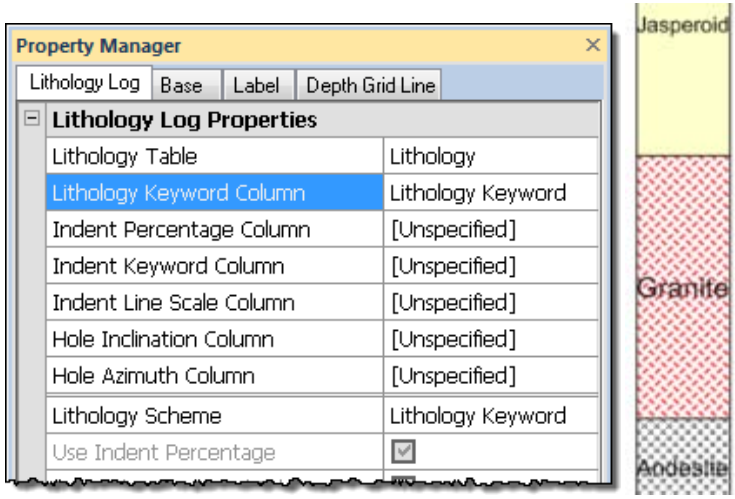
This is one example of log properties and their associated data.

	A Hole ID	B From	C To	D Lithology Keyword	E Lithology Description	Indent Percent...	Indent Key...	I. Indent Scale
1	DH-1	0	40	Jasperoid	massive silica cut by tm anc	90	Hard	90
2	DH-1	40	80	Granite	felsic intrusive with veins of l	75	Medium-Hard	75
3	DH-1	80	95	Andesite	grey fine-grained andesitic la	65	Medium-Soft	50
4	DH-1	95	102	Basalt	porphyritic basalt flow with c	45	Soft	25
5	DH-1	102	115	Andesite	grey fine-grained andesitic la	65	Medium-Soft	25
6	DH-1	115	125	Granite	felsic intrusive with Kspar, qt	75	Medium-Hard	50

This example file is used in the following properties and graphics. The red highlighted columns indicate columns that are required to contain data.

Lithology Keyword Column

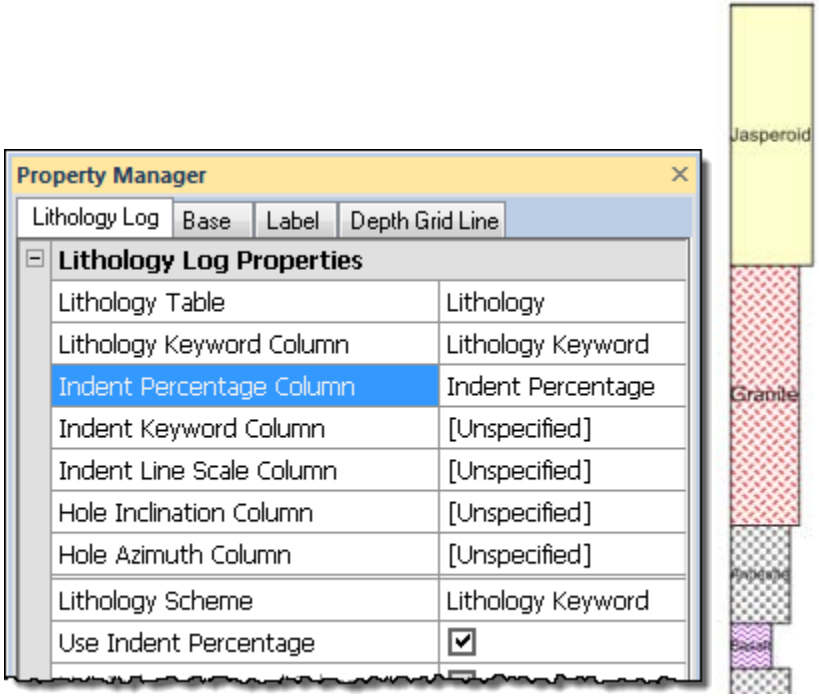
This lithology log displays *From*, *To*, and *Lithology Keyword* columns shown in the example data. This is the most basic lithology log you can construct. This log requires the *Lithology Table*, *Lithology Keyword Column*, and *Lithology Scheme* properties to be defined in the **Property Manager**. This lithology log uses a *lithology table* named *Lithology*, a *Lithology Keyword Column* named *Lithology Keyword*, and a *Lithology Scheme* named *Lithology Keyword*. The scheme is based on the *Lithology Keyword* column shown in the example data above. The log is filled based on the keyword scheme item properties for the interval. For example, the first interval (0 to 40) has a Jasperoid keyword, so the 0 to 40 interval is filled according the pattern and colors defined for the Jasperoid keyword in the *Lithology Keyword* scheme.



This is a simple lithology log.

Indent Percentage Column

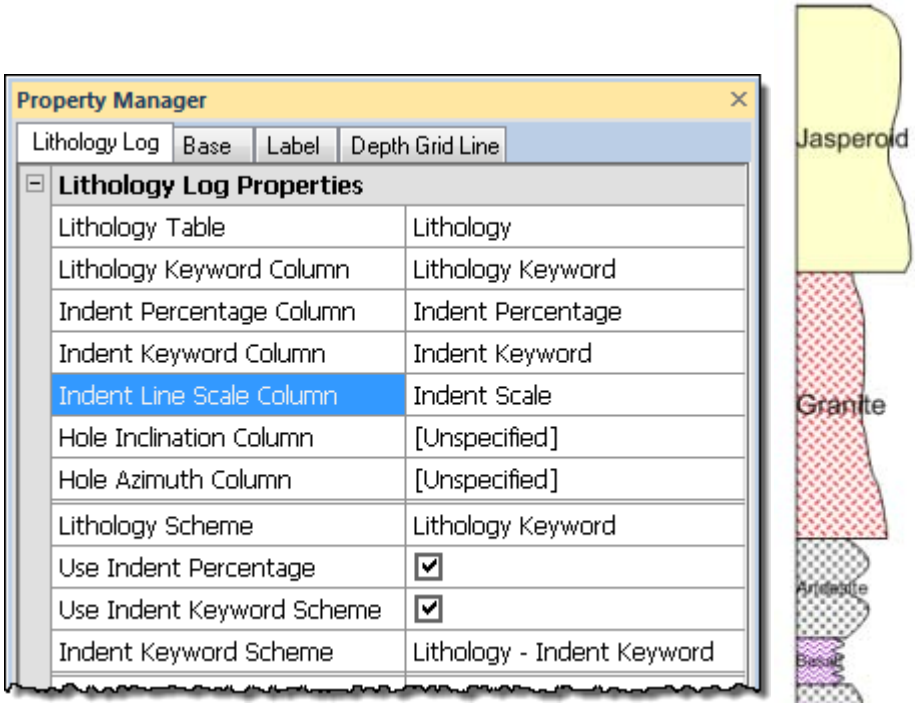
To show blocks with variable widths, an indent percentage column needs to be defined in the data. In the example data, this information is in the *Indent Percentage* column. Zero percent means that none of the block is displayed and 100 percent means the entire width of the block is displayed. This log requires the *Lithology Table*, *Lithology Keyword Column*, *Indent Percentage Column*, and *Lithology Scheme* properties to be defined. In addition, check the box next to the *Use Indent Percentage* option.



The Indent Percentage *column contains information on the block width. Set the* Indent Percentage Column *and* Use Indent Percentage *to create this log.*

Indent Keyword and Indent Scale Columns

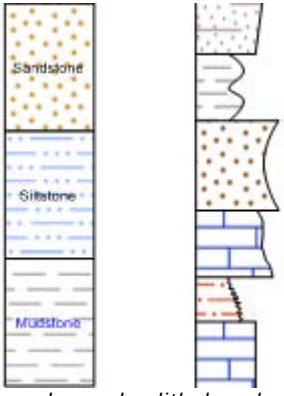
The *Indent Keyword Column* and *Indent Line Scale Column* are used to define the lines and line scales on the right side of the example log. The indent keyword scheme is for the display of line patterns as shown on the right side of the blocks. This log requires the *Lithology Table*, *Lithology Keyword Column*, *Indent Percentage Column*, *Indent Keyword Column*, *Indent Line Scale Column*, *Lithology Scheme*, and *Indent Keyword Scheme* properties to be defined. In addition, check the boxes next to the *Use Indent Percentage* and *Use Indent Keyword Scheme* options .



The Indent Keyword *and* Indent Scale *columns are used to define the patterns on the right side of the log.*

Displaying Lithology Data

There are two ways to display lithology data with logs. You can create a basic lithology log using a zone bar log, or you can create a detailed lithology log using the specific lithology log type. In most cases, a simple zone bar log is sufficient to display lithology data. However, when you want to show varying indent amounts for each lithology block, different line shapes for each lithology block, or varying contact information, a lithology log with the specific settings is required.



*Basic and complex lithology logs are easy to create in **Strater**.*

Basic Lithology Logs

To create a basic lithology log, you need four columns of data: *Hole ID* (well name), *From*, *To,* and *Keyword*. You can enter this data in Excel, Access, or another program and load the data file into **Strater**. Or, you can enter it directly into a table in **Strater**. In this example, we will type it in directly into the data table. To create the data table and zone bar log:

1. Click the **File | New | Table** or click the  button
2. In the **Create New Table** dialog,
    a. Type a *Table Name* such as *Basic Lithology*.
    b. Set the *Base Table Type* to *Interval Table*. This is because the blocks in a zone bar log are based on intervals and have *From* and *To* data.
    c. Click *Create* and the data table is created.
3. Type in a well name such as MW-1 for the first five rows in the *Hole ID* column (Column A). The *Hole ID* must be the same for all rows, indicating this data is for the same well.
4. Type in the *From* and *To* interval data for each row in Columns B and C. For example, type in 0, 10, 20, 30 and 40 for the *From* data and 10, 20, 30, 40, 50 for

the *To* data. This shows five intervals of data (or 5 lithologic units), with each interval 10 units thick. In general, lithologic units are not this uniform, but we can use this for example.

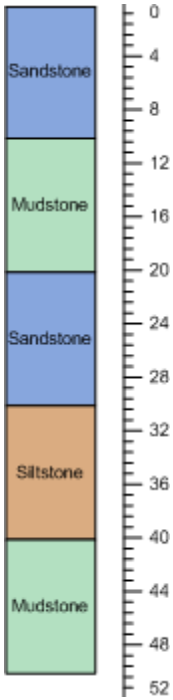
5. In the *Parameter 1* column (Column D), enter in a single keyword indicating the type of unit. The keyword could be any keyword identifying that interval, from the type of lithology to the formation name or age of the rock. For example, a combination of *Sandstone*, *Mudstone,* and *Siltstone* could be used as the keywords.

Borehole 1* | Project Settings | Basic Lithology*

A1	MW-1			
	A Hole ID	B From	C To	D Parameter 1
1	MW-1	0	10	Sandstone
2	MW-1	10	20	Mudstone
3	MW-1	20	30	Sandstone
4	MW-1	30	40	Siltstone
5	MW-1	40	50	Mudstone

The four columns of data will create a simple lithology log or zone bar log.

6. Click on the *Borehole 1* tab at the top of the window to open the borehole view.
7. Click the **Log | Zone Bar** command or click the  button.
8. Click in the log pane where you want the log to be placed.
9. In the **Open** dialog, make sure that the *Basic Lithology* table is selected in the *Use Current Table* list and in the *File name* box.
10. Click *Open* and the log is created.
11. Click once on the log to select it.
12. In the **Property Manager** click on the **Label** tab.
13. To display the keyword names on the log, click on the existing option next to *Show Label* and select *Show Label with Fill*.
14. To show the depths on the screen, click the **Log | Depth** command and click in the log pane next to the zone bar log.

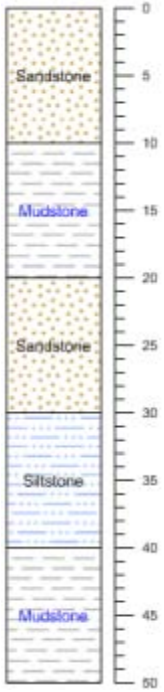


The zone bar log displays the basic lithologies.

The color fills were created automatically by **Strater**. When the log was created, **Strater** automatically created a scheme containing items for each of the keywords entered into the data table, and specific fill colors for each of those items. You can easily change them in the **Scheme Editor**.

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the ⊞ next to *Keyword* to see the keyword schemes.
3. Click the ⊞ next to *Basic Lithology:Parameter1*. There are three items in this keyword scheme because there were only three unique keywords in the *Parameter 1* column of the table. Each of these keywords has its own drawing properties.
4. Select the *Sandstone* item. The properties are displayed on the right side of the screen.
5. In the *Fill Properties* section, change the fill properties to be what you want for this keyword. For example, click on the existing *Pattern* and select a new pattern for the keyword. Click in the *Foreground* color and change it to Brown.
6. In the *Font Properties* section, change the font properties for the label text that is displayed on the log. For example, you can increase the font size by changing the *Points* or change the *Foreground Color*.

7. Select the next item in the scheme and repeat changing the fill pattern and color for that item.
8. Click *OK* when you are done and the changes are applied to the log.



*Edit the keyword scheme properties in the **Scheme Editor** to customize the fill and font properties.*

Detailed Lithology Logs

Lithology logs are more detailed versions of the zone bar log. To create a detailed lithology log, your data file should have 8 columns of data: *Hole ID* (well name), *From, To, Lithology Keyword, Lithology Description, Indent Percentage, Indent Keyword,* and *Indent Scale*. The first four data columns are the same as those for the zone bar log, you are defining the well name for the data, the interval for each unit, and giving that unit a keyword. The last four columns contain the data specific to the lithology log type and define the details for the log:

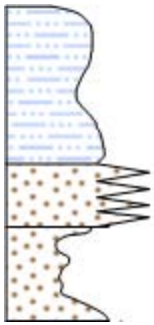
- The *Lithology Description* column contains full text descriptions, typically for the rock type, and can be used for complex text logs.
- The *Indent Percentage* column controls the width of the block. The range of values can be from zero to 100. None of the block is displayed with a zero percentage (it

has 0 width), and 100 percent displays the whole block (the width of the block is 100% of the log).

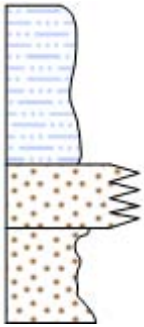
- The *Indent Keyword* column contains keywords for the lithology indent line scheme items. The right side of the block can have a different shape line (called the "indent line"). The shape of the indent line is defined in a scheme based on this keyword.
- The *Indent Scale* column is used to control the overall scaling width of the indent line. The range is zero to 100. A zero scale flattens the line and makes it appear vertical. A 100 scale sets the width of the indent line to half the width of the lithology log.



Indent Percentage *controls the width of the block. In this example, the top block has an* Indent Percentage *of 50, the middle is 100, and the bottom block is 75.*



Indent Keyword *specifies the keyword for the block. The keyword is used to determine the shape of the line on the right side of the block.*

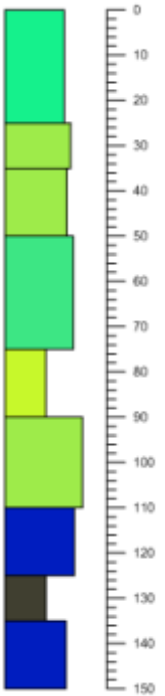


Indent Scale *controls the width of the indent line. In this example, the top and bottom blocks have an* Indent Scale *of 35 and the middle block is 50.*

You can enter this data in Excel, Access, or another program and load the data file into **Strater**. Or, you can enter it directly into a table in **Strater**. In this example, we will load the data from one of the sample XLS files included with **Strater**.

To create the lithology log:

1. Click the **File | New | Borehole View** command or click the  button.
2. Click the **Log | Lithology** command or click the .
3. Click in the log pane where you want the log to be placed.
4. In the **Open** dialog, select *Tutorial 2.xls* from the Samples directory and click *Open*.
5. In the **Specify Worksheet Column Definitions** dialog, accept the defaults and click *Next*.
6. In the **Specify Data Type and Column Positions** dialog, accept the defaults and click *Finish*. The log is created with default colors.
7. To show the depths on the screen, click the **Log | Depth** command and click in the log pane next to the zone bar log.
8. Click once on the lithology log to select it.
9. In the **Property Manager**, click on the **Lithology Log** tab.
10. Set the *Indent Percentage Column*, the *Indent Keyword Column* and the *Indent Line Scale Column* to the data columns with these names.
11. Check the box next to the *Use Indent Percentage* option.
12. Check the box next to *Use Indent Keyword Scheme* option.



The lithology log is created with the default fill colors and the indent percentage is visibly applied.

Now the indent percentage is visibly applied (the blocks are different widths), but the indent line shapes are not. This is because we do not have a lithology indent line scheme.

1. Click the **Draw | Scheme Editor** command or click the  button.
2. Click the  button at the bottom of the dialog to create a new scheme.
3. In the **New Scheme** dialog:
    a. Select *Base Scheme on Column Data*.
    b. Select *Lithology* as the *Table Name*.
    c. Select *Indent Keyword* as the *Column Name*.
    d. Type the *Scheme Name,* such as *Indent Lines*.
    e. Select *Indent Keyword* as the *Scheme Type*.

f. Click *OK* to create the scheme.

4. In the **Scheme Editor**,

a. Click the ⊞ to expand the *Indent Lines* scheme. There are nine items in this scheme because there are nine unique keywords in the *Indent Keyword* data column. Each of these keywords has its own drawing properties.

i. Select the *Wasatch* item in this scheme. The properties for that item are displayed on the right side of the screen.

ii. In the *Indent Keyword Properties* section, click on the existing option next to *Lithology Indent Lines* and select a different line shape, such as *Limestone*.

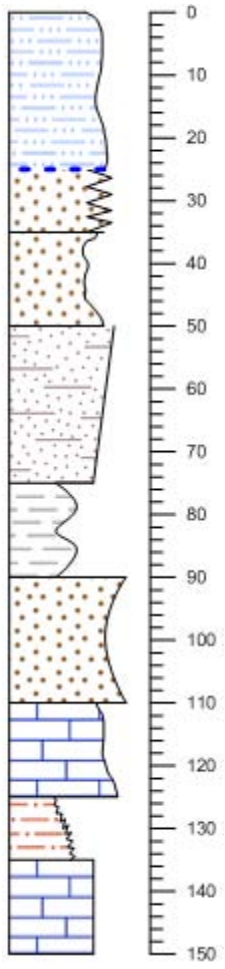
iii. Repeat for all items in the *Indent Lines* scheme.

b. Click the ⊞ to expand the *Lithology:Lithology Keyword* scheme. There are six items in this scheme because there are six unique keywords in the *Lithology Keyword* data column. Each of these keywords has its own drawing properties.

i. Select the *Silty Shale* item in this scheme. The properties for that item are displayed on the right side of the screen.

ii. In the *Fill Properties* section, change the fill properties to be what you want for this lithology unit. For example, click in the *Pattern* field and select a new pattern for the keyword. Click in the *Foreground* color and change it to *Baby Blue*.

iii. The *Contact Line Properties* section controls the contact line at the bottom of the blocks that have this keyword. In most cases, the default is fine. For this first example, change the *Style* to .1 in. dash, the *Color* to Blue, and the *Width* to 0.04.



Create and apply a lithology indent line scheme to define the line shape on the right side of the lithology blocks.

iv. Repeat changing the properties for all items in the *Lithology:Lithology Keyword* scheme.

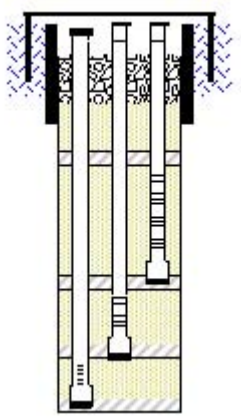
c. Click *OK* when you are done and the changes are applied to the log.

5. If the log does not show the indent line styles, click on the lithology log. In the **Property Manager**, click in the *Indent Keyword Scheme* option and select the *Indent Lines* scheme that was just created. The indent lines are now applied to the log.

Chapter 20

Well Construction Logs

Well Construction Logs



Well construction logs can display detailed representations of one or many wells.

Click the **Log | Well Construction** command or click the  button to create a well construction log. A well construction log is a visual representation of the well rather than a detailed engineering drawing to scale. It replicates what the well might look like and is generally used in the environmental industry. The well construction log shows how the monitoring well or piezometer was created and displays items such as screen, packing material, end caps, and covers. Well construction logs require extensive use of the **Scheme Editor**, because all the items to construct the log must be defined in a scheme.

Data Requirements

Well construction logs require a special type of interval data table, called a well construction table. In the data table, there are seven required columns. The required columns are *Hole ID, From, To, Outer Diameter, Inner Diameter, Offset,* and *Item*. These data interact with the well construction scheme to produce the log. For detailed information on the data, properties, and schemes see Well Construction Data, Schemes, and Logs.

	A Hole ID	B From	C To	D Outer Diameter	E Inner Diameter	F Offset	G Item
1	DH-1	0	5	8	0	0	Fill
2	DH-1	5	15	8	0	0	Cement
3	DH-1	15	25	8	0	0	Bentonite
4	DH-1	25	190	8	0	0	Sand
5	DH-1	190	200	8	0	0	Slough
6	DH-1	0.3	2	2	0	0	Cover
7	DH-1	2	27	2	0	0	Casing
8	DH-1	27	195	2	0	0	Screen
9	DH-1	195	200	2	0	0	End Cap

The well construction data table requires each item to have a From *and* To *depth that the determine the length of each interval. The* Outer Diameter, Inner Diameter, *and* Offset *determine the width of the item in the log.*

Creating a Well Construction Log

To create a well construction log:

1. Click the **Log | Well Construction** command or click the  button.
2. Click inside the log pane where you want the well construction log to appear.
3. In the **Open** dialog, click on the data file. If the data was already imported, click on the table name in the *Use Current Table* section. Click *Open*.
4. Set the data importing options in the **Specify Worksheet Column Definitions** dialog, if necessary, and click *Next*.
5. Finish the importing of data in the **Specify Data Type and Column Positions** dialog and click *Finish*.
6. The log appears in the borehole window.

If you are in active mode a well construction log is created using the default properties. If you are in design mode, a well construction log graphic is displayed as a place holder after step 2.

Editing Well Construction Log Properties

To change the features of a line/symbol log, including the data column used to create the log, click on the line/symbol log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Well Construction** and **Base**.

Well Construction Properties

The **Well Construction** page in the **Property Manager** includes options for defining the data table and well size for a well construction log. To view and edit well construction log properties, click on the well construction log in the view window or **Object Manager** to select the log. Then, click on the **Well Construction** tab in the **Property Manager**.

Well Table

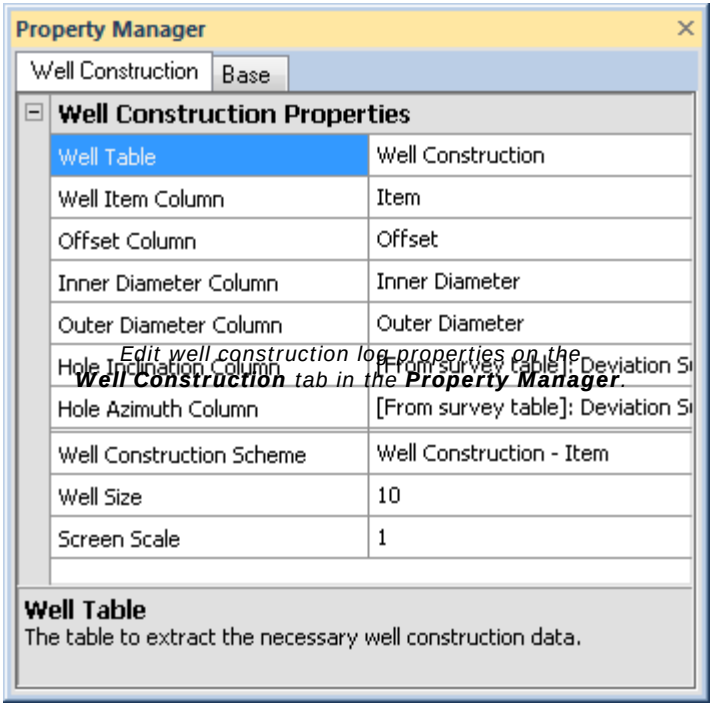
Use the *Well Table* to define the data table for the well construction log. The table type must be a well construction table type.

Well Item Column

The *Well Item Column* is the column in the selected *Well Table* that sets the well construction component. When the *Well Table* is changed to another table, the *Well*

Item Column list is automatically updated to display the column names in the newly selected table. To change the column, click on the existing column name next to *Well Item Column* and select the desired column from the list.

The *Well Item Column* is used for linking the table item name to the matching item in a well construction scheme. This column is used to define shapes, fill patterns, etc. for the various well construction components.



*Edit well construction log properties on the **Well Construction** tab in the **Property Manager**.*

Offset Column

Use the *Offset Column* to select the column in the well table that contains the horizontal offsets for the item within the well construction log. The width of the log is based on the *Well Size*, with zero at the center of the log. For example, if the *Well Size* is 20, an offset value of -5 places the well item 5 units to the left of center of the log. To change the offset column, click on the existing column name and select the desired column from the list.

Inner Diameter Column

Use the *Inner Diameter Column* to select the column in the well table that contains information to cut a section out of the middle of the items so that it is line- and fill-free. To change the inner diameter column, click on the existing column name and select the desired column from the list.

Outer Diameter Column

Use the *Outer Diameter Column* to select the column in the well table that contains the outer size (width) of the items. To change the outer diameter column, click on the existing column name and select the desired column from the list.

Hole Inclination, Hole Dip, and Azimuth Columns

The *Hole Inclination Column (*or *Hole Dip Column)* is used in combination with the *Hole Azimuth Column* to calculate the true vertical depth for the hole. Either *Hole Inclination Column* or *Hole Dip Column* is displayed. To control whether inclination or dip is used, click the **Tools | Options** command. In the **Options** dialog, check or uncheck the *Use Hole Dip Instead Of Inclination* option.

Inclination is the angle the borehole is oriented in degrees and varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. Negative and positive inclination values are treated the same.

Dip is an alternate method of calculating the angle the borehole is oriented. Dip is oriented in degrees and varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

Azimuth is the compass orientation of the well's deviation, in degrees and varies from 0 (true vertical north) to 360. Azimuth values are measured relative to true north (not grid north in the local coordinate system).

To set the *Hole Inclination Column* or *Hole Dip Column*, click on the existing option and select the desired option from the list. Available options are *[Unspecified], [From collars table:collars name], [From survey table: survey name],* or data columns in the existing *Well Table*. When one column is set to unspecified or survey table, the other column automatically changes to the same option. When recorded in a collars table, the inclination/dip and azimuth apply to the entire well length. When recorded in a survey table, the inclination/dip and azimuth apply from the depth to the next recorded depth. When set to one of the columns in the existing table, each log is updated independently from each other log using the information in the specific depth or interval tables. If the *Hole Inclination Column* for the log is set to *[Unspecified*], an inclination value of 0 is used for the calculations. No difference will be visible for the log when changing the *Depth Method* to *True Vertical Depth*.

Well Construction Scheme

The *Well Construction Scheme* is the scheme that determines the shape, fill, and line properties of each item in the well construction log. The selected scheme should contain items that match the keyword text in the *Well Item Column*. To change the scheme, click on the existing scheme name and select the desired scheme from the list. Click the  next to the scheme name to open the **Scheme Editor**, where the scheme can be created or edited.

Well Size

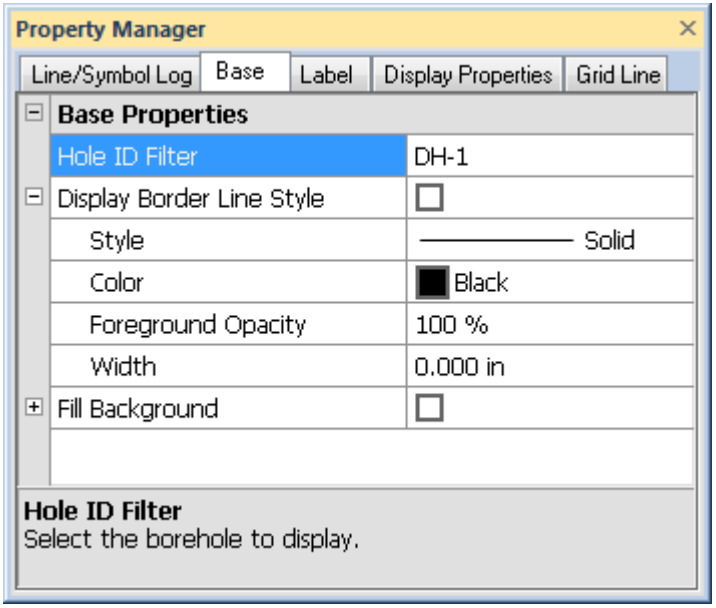
The *Well Size* is a scaling factor that defines the width of the log contents. **Strater** scales the widths of the well construction items based on this value. All diameter and offset values in the log are based on this dimension. Therefore, it is very important to specify an appropriate value here and it is also important to specify the appropriate diameters in the log data. For example, if the *Well Size* is set to 17, a diameter value of 8.5 in the data table would represent half the width of the log. To change the well size, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Screen Scale

The *Screen Scale* setting is used for the screen items. The *Screen Scale* controls the scaling offset and size of the pattern. The *Screen Scale* varies between 0.1 and 2.0 inches (0.254 and 5.08 centimeters.) For small wells, for example well construction logs only six inches long, the *Screen Scale* may require a smaller scale setting, around 0.5 to show enough lines in the screen zone. For longer well construction logs, a value of one or higher may be necessary to make the lines separate.

Base Properties

Base properties are used for associating a specific *Hole ID* to the log, outlining the log item, and creating background fill in the log. To edit the base properties for a log, click on the log in the **Object Manager** or view window to select it. In the **Property Manager**, click on the **Base** tab.



*Set the background, border line properties, and borehole ID on the **Base** tab in the **Property Manager**.*

Hole ID Filter

The *Hole ID Filter* is used to select the borehole to associate with this log. Only those Hole IDs that are currently associated with data tables in this project are listed. To change the *Hole ID Filter*, click on the existing Hole ID and select the desired Hole ID from the list. The log automatically updates to show the new borehole.

For a depth log, the *Hole ID Filter* is not available if the *Depth Scope* is set to *Overall Depth* and the *Orientation* is set to *Depth*. If the *Orientation* is set to *Elevation,* the *Hole ID Filter* is available. Select the Hole ID from which the depth log elevation values should be based. If the *Depth Scope* is set to *Hole Measured Depth* or *Hole True Vertical Depth*, the *Hole ID Filter* is available. Select the Hole ID from which the measured depth or true vertical depth values should be calculated.

When the *Logs* object is selected in a cross section view, the *Hole ID Filter* is not available. To set a specific log to a particular Hole ID, click on that individual log and set the *Hole ID Filter* to the appropriate log.

Display Border Linestyle

Click the ⊞ next to the *Display Border Linestyle* option to set the line properties for the border around the log. This section allows you to set the line properties for the box that goes around the log. If the box next to *Display Border Linestyle* is checked, a rectangle surrounds the log. If the box next to *Display Border Linestyle* is unchecked, no line is drawn. To change the display of the border, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the Lithology Log tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Fill Background

Click the ⊞ next to *Fill Background* to set the fill properties for the area behind the log. If the box next to *Fill Background* is checked, the background area is filled. If the box next to *Fill Background* is unchecked, the background is not filled. To change the *Fill Background*, check or uncheck the box.

When the box is checked next to *Use Indent Keyword Scheme* on the **Lithology Log** tab, the border line and background fill settings are unavailable. Uncheck the box next to *Use Indent Keyword Scheme* to set the border line and background fill properties on the **Base** tab.

Well Construction Data, Schemes, and Logs

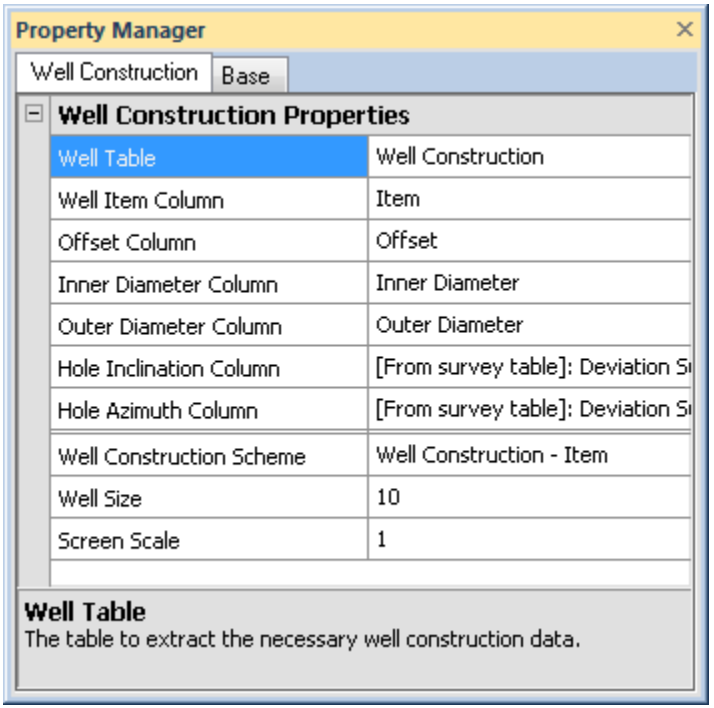
Well construction logs require specific data columns (From, To, Item, Offset, Inner Diameter, and Outer Diameter), a well construction scheme, and a well size. All of these pieces of information work together to create complex well construction logs.

Data

The following data and properties are used in this example.

Hole ID	From	To	Outer Diameter	Inner Diameter	Offset	Item
MW-5	0.5	-3	8	2	5	Concrete

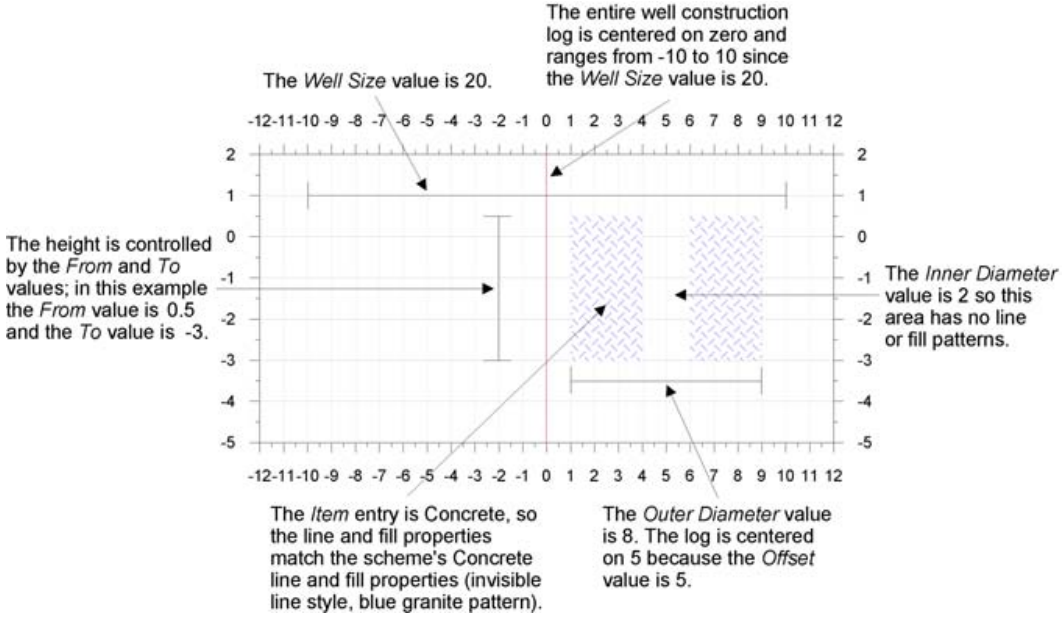
This example file is used in the following graphic.



Several table columns, a well construction scheme, and the Well Size *are needed to create a well construction log.*

Example

The following diagram explains the association between the data, scheme, well size, and log graphic by showing a well log object based on the above data.



Well Width and Well Object Positioning

The *Well Size* is set in the well construction log's Well Construction Properties in the **Property Manager**. This number can represent any units you wish. The *Well Size* and the width (as set in the Position/Size toolbar) provide a scaling mechanism for the log's objects. In this example, the *Well Size* is 20. If the *Width* of the log is set to 2.00 inches, this means one horizontal inch on the log equals 10 units. The object's *Outer Diameter* of 8 translates into 0.8 inches on the screen.

The *Well Size* is also important in determining the position of the objects within the well. The center of the log is zero. Since the *Well Size* in this example is 20, the numeric positioning range is -10 to 10. The *Offset* data field controls the horizontal positioning of objects relative to these numbers. In this example, the object's offset is 5, so the object is located 5 units right of center.

Well Object Height

Well construction logs require interval data. The interval's *From* and *To* columns control the height of the well object. In the diagram above, the object's height is 3.5 units since the *From* column value is 0.5 and the *To* column value is -3.

Well Object Width

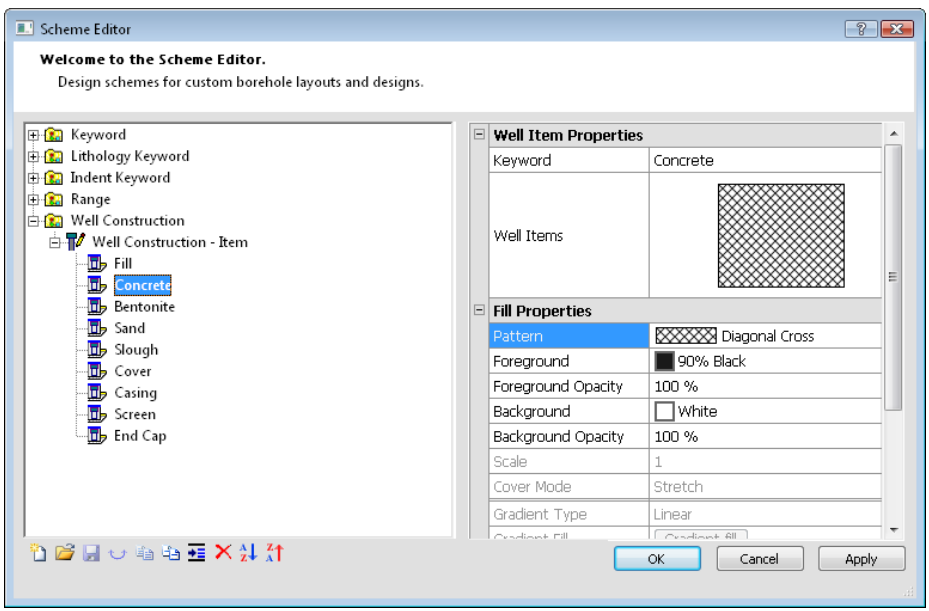
The well object width is controlled by the *Outer Diameter* column. In this example, the object's width is 8, so the object is displayed on the log as 8 units wide. Since the object has an *Offset* value of 5 (see the *Well Width and Well Object Positioning* section above), the item is centered on 5.

Well Object Fill and Line Properties

Some well objects need "cutouts" for proper display. The *Inner Diameter* column is a region where no line and fill properties exist for the object. In this example, the object's *Inner Diameter* is 2, so there is a gap in the fill pattern between 4 and 6 (since the item is centered on 5). The inner diameter is not used with all well property item types.

Schemes

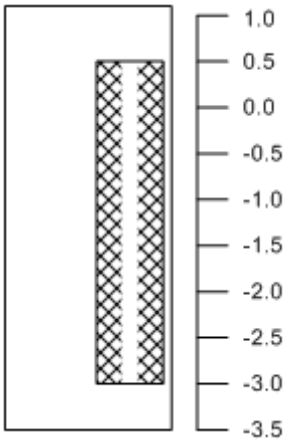
Well construction schemes control the shape, line properties, and fill properties of the well objects. In this example, the data column's Item entry is *Concrete*. This entry, called a keyword, matches a keyword in the well construction scheme. In the scheme, the *Well Cover* scheme item contains a "Standard" shape (filled rectangle), and a 90% Black Horizontal fill pattern.



The Well Construction *scheme is used to determine the well properties.*

When this information is combined you have all the data required to build a well construction log.

The simple well construction log is based on the data displayed above. Note the *From* and *To* levels of the log are aligned with 0.5 and -3.0 in the depth log that was added for greater clarity.



The final well construction log is based on scheme, ***Property Manager****, and data table information.*

Strater provides many customizable options for well construction logs, including scheme entries to customize screen, casing, cover, and cap styles.

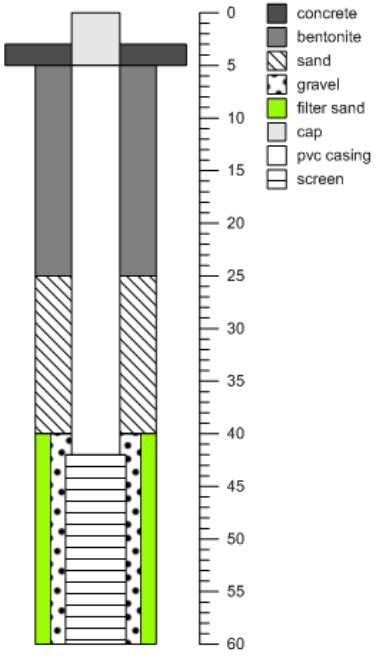
Creating a Well Construction Log

A well construction log is a visual representation of the well. It replicates a well construction diagram and is generally used in the environmental industry. The well construction log shows how the monitoring well or piezometer was created and displays items such as screen, packing material, end caps, and covers. The data for each part of the well are listed in the data table with specific information.

To begin, you need to have a clear idea of how you want the well diagram to look like, and what parts of the well need to be included. In this example we will walk through creating a well construction log that looks like the example to the right.

The first step is determining what items need to be included in the well construction log. You can determine this by looking at an existing diagram (one that is hand drawn, included in another report, or drawn by another program such as a CAD

program) or by envisioning the diagram and noting the components you will need. We will use the well construction image above as a template. You can see in the image that there are 8 items that need to be included: concrete, bentonite, sand, gravel, filter sand, cap, casing, and screen.

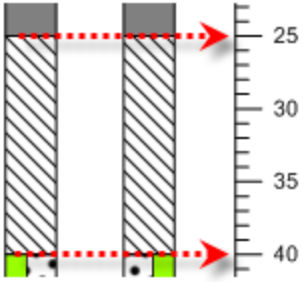


This article will walk through how to create a well construction log as shown above.

Understanding the Data Parts

The next step is creating a data table from which the well construction log will be drawn. Data for each of the well items need to be included in the data table. Well construction logs in **Strater** can be created from two table types: a Well Construction table or an Interval table. The columns of data that need to be present in the data table are: *Hole ID, From, To, Outer Diameter, Inner Diameter, Offset,* and *Item*. Before we create the data table, let's go over what these columns mean:

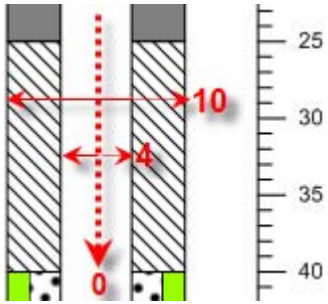
- The *Hole ID* column tells **Strater** which well the data refers to. In the data table, you can enter the well construction items for multiple holes. You can select which *Hole ID* to display in the log properties.
- The *From* and *To* columns specifies the vertical depth interval to display the item.



The item filled with the diagonal cross hatch has data From = 25 and To = 40.

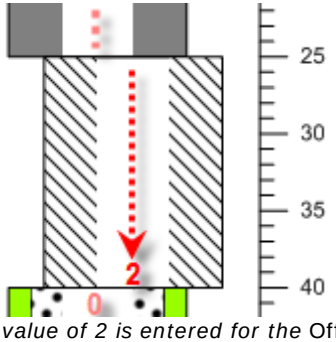
- The *Outer Diameter* and *Inner Diameter* columns tell **Strater** the width of the item. If you can imagine a line running down the center of the diagram, this is the "0" line. You can tell **Strater** how thick to draw the item on both sides of this 0 line. When you specify an inner or outer diameter, half that diameter will be on one side of the 0 line, and the other half of the diameter will be on the other side

of the 0 line. So, if you enter a diameter of 4, **Strater** will display the item from 2 units to the left to 2 units to the right of the center line. You can specify a solid item centered in the log (i.e. a pipe or casing in the center of the diagram, *Inner Diameter* = 0 and *Outer Diameter* is however thick you want it), or you can start the item some distance from the center 0 line so that it has a hole in the center (i.e. sand or filters, *Inner Diameter* is some number greater than 0, and *Outer Diameter* is a number greater than that).



The center solid white item has an Inner Diameter = *0 and an* Outer Diameter = *4. This creates a solid item in the center of the log. The item filled with the diagonal cross hatch has an* Inner Diameter = *4 and an* Outer Diameter = *10. This draws the item on either side of the center line with the center portion cut out.*

- The *Offset* value specifies any horizontal offset for a particular item. It shifts the center line for that item from 0 to whatever value is entered. A positive *Offset* value shifts the item to the right. A negative *Offset* value shifts the item to the left. The example we are working with does not have an offset to any of the items. If you do not have an offset, you still need to enter 0 for this column. If you do not enter an *Offset* value, then the well construction log is not drawn.



A positive value of 2 is entered for the Offset *of the item filled with the diagonal cross hatch pattern.*

- The *Item* gives **Strater** a keyword for that particular log item. This could be a simple name of what the item is, such as “sand”, “gravel” or “end cap”. This item keyword is used in the well construction scheme to apply fill and line properties to that item when the well construction log is drawn.

Creating the Data

To create a well construction table:

1. Click the **File | New | Table** command, click the  button, or press CTRL+W on the keyboard to create a new table.
2. In the **Create New Table** dialog, enter a *Table Name* such as *Well Construction*, set the *Base Table Type* to *Well Construction Table*, and click *Create*. The new table is displayed.
3. In the *Hole ID* column (Column A), type a hole ID such as *Sample* for the first 8 rows since there are 8 items in the well construction diagram.
4. **Strater** will draw the items on the well construction log in the order they are listed in the data table, from top down. The items at the bottom of the list are drawn last and on top of all the previous items. Entering the *Item* data next makes it easy to organize the items in the right order before filling in all the other data. We want to list the background items first so they are not drawn on top of all the other items and cover them up. Looking at the image at the top of this page as a guide, you can see that the concrete, bentonite, sand, gravel and filter sand are all in the “background”, and the cap, casing and screen are drawn “on top”. That means, I’m going to make sure the cap, casing, and screen items are entered last in my data table. In the *Item* column (Column G), put the fill names in this order: Row 1 = concrete, Row 2 = bentonite, Row 3 = sand, Row 4 = gravel, Row 5 = filter sand, Row 6 = cap, Row 7 = casing, and Row 8 = screen.
5. Enter data in the *From* and *To* columns (columns B and C) for each item. Using the depth values displayed on the image at the top of this article as a guide, enter: Row 1 = 3 to 5, Row 2 = 5 to 25, Row 3 = 25 to 40, Row 4 = 40 to 60, Row 5 = 40 to 60, Row 6 = 0 to 5, Row 7 = 5 to 42, and Row 8 = 42 to 60.
6. Since the items are not offset in this diagram, enter 0 for all rows in the *Offset* column (Column F).
7. To determine the diameter for each item, we need to define a maximum “width” for the log. This can be any number, as long as all the items in the well are proportional. Since the concrete is the widest item, we can choose an arbitrary number for it, such as 15. The *Outer Diameter* is entered in Column D. The *Inner Diameter* is entered in Column E.
    a. Row 1 = The concrete *Outer Diameter* = 15. The *Inner Diameter* for the concrete will be the same as the *Outer Diameter* for the cap. Again, this is an arbitrary value, such as 4. Enter 4 as the *Inner Diameter*.

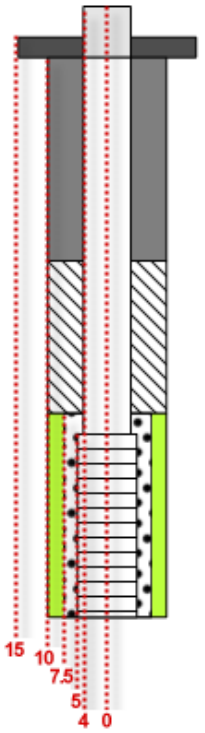
b. Row 6 and 7 = The cap and casing have the same width, and they are solid and centered. So the *Inner Diameter* = 0, and the *Outer Diameter* = 4.

c. Row 2 and 3 = The bentonite and sand have the same width. They are on the outside of the casing, so the *Inner Diameter* for these items is going to be the same as the *Outer Diameter* of the casing. Enter 4 for the *inner Diameter*. Since they are not quite as wide as the concrete, the *Outer Diameter* needs to be less than 15. Enter 10 as the *Outer Diameter*.

d. Row 5 = The filter sand has the same *Outer Diameter* as the sand and bentonite, so enter 10. But it is about half as wide as those items, so enter an *Inner Diameter* of 7.5 for this item.

e. Row 4 = The gravel has the *Outer Diameter* value as the filter sand's *Inner Diameter*. Enter 7.5 for the *Outer Diameter*. The *Inner Diameter* is the same as the *Outer Diameter* for the casing. Enter 4 for the *Inner Diameter*.

f. Row 8 = The screen is centered in the middle, so the *Inner Diameter* is 0. The *Outer Diameter* is slightly wider than the casing and cap. Since the casing and cap have an *Outer Diameter* of 4, enter 5 for the *Outer Diameter*.



Enter values for the outer and inner edges of each item in the Outer Diameter and Inner Diameter data columns.

8. Click **File | Save** to save the project now that the data is created. In the **Save As** dialog, type a name for the project, such as *Well Construction*.

Borehole 1* | Project Settings | Well Construction*

A1: Sample

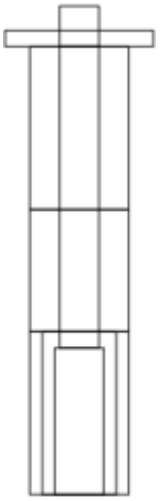
	A Hole ID	B From	C To	D Outer Diameter	E Inner Diameter	F Offset	G Item
1	Sample	3	5	15	4	0	concrete
2	Sample	5	25	10	4	0	bentonite
3	Sample	25	40	10	4	0	sand
4	Sample	40	60	7.5	4	0	gravel
5	Sample	40	60	10	7.5	0	filter sand
6	Sample	0	5	4	0	0	cap
7	Sample	5	42	4	0	0	casing
8	Sample	42	60	5	0	0	screen

Enter the data for each well item into the data table.

Creating the Log

Now that the data has been created, the well construction log can be created.

1. Click on *Borehole 1* tab at the top of the project window.
2. Click the **Log | Well Construction** command or click the  button.
3. Click in the log pane where you want the log to be placed.
4. In the **Open** dialog, make sure the *Well Construction* table is selected in the *Use Current Table* and in the *File name* boxes.
5. Click *Open* and the log is created using the existing data table and the default settings.
6. The default settings do not necessarily fit all cases. In this case, the well size we created should be 15. The default value is 10, so we need to change this. Click on the well construction log, if it is not already selected.
7. In the **Property Manager**, change the *Well Size* to 15. Now the entire log is displayed.



Set the Well Size *to include the maximum Outer Diameter entered in the data table to fully see all items.*

Creating the Well Construction Scheme

The well construction log is created, but the log items are not filled with any color or patterns. The line and fill properties are controlled by the well construction scheme. This scheme was automatically created when we created the log, so all you have to do is specify in the scheme which fill and line properties you want for each item. To edit the line and fill properties in the scheme:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the ⊞ next to *Well Construction*, if it is not already expanded.
3. Click the ⊞ next to *Well Construction: Well Construction* scheme name to see all of the items in the scheme.
4. When you select one of the items, the properties for that item will be displayed on the right side of the dialog. For example, select *concrete* on the left side and on the right side, change the *Foreground* color in the *Fill Properties* section to *70% Black*.
5. Set the line and fill patterns for all of the items. When all properties are set, click *OK* and the log is updated with the new line and fill settings.

Finalizing the Log

The well construction log is created and custom color and patterns are applied. You can now add other logs or customize your log design in other ways. In this example, we will add a depth log and a legend.

1. Click the **Log | Depth** command or click the  button.
2. Click in the log pane where you want the log to be placed.
3. You can make adjustments to the depth log properties in the **Property Manager**. For example, you can:
    a. Change the starting and ending depths for the ticks and the tick interval on the Ticks tab.
    b. Decrease the number of decimal digits shown and increase the font size on the Label tab.
4. You can also create a legend of the scheme items to help clarify the log. Click the **Draw | Legend** command or click the  button.
5. Click anywhere in the borehole view where you want the legend to be placed. You can place it in the header, footer or log panes.
6. You can make adjustments to the legend in the **Property Manager**. For example, you can:
    a. Change the number of columns used to display the legend items on the Legend tab.
    b. Change the legend title on the **Title** tab.

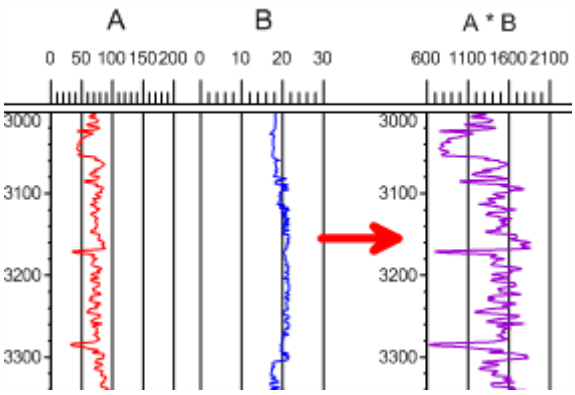
Other well construction log examples exist in the Samples directory.

Chapter 21

Function Logs

Function Logs

Click the **Log | Function** command or click the  button to create a function log. Function logs allow multiple log variables to be combined into a single log using a mathematical equation. The log variables being combined can contain different depth spacings and be from different tables. After the function is defined, a new data table is created and a line/symbol plot is displayed in the view window.



In this example, the log values in log A are multiplied by the log values in log B to create the purple function log.

Data Requirements

Function logs use existing line/symbol and bar logs to create the function log. No data table is initially required, beyond those used to create the line/symbol and bar logs. The data table that is created is a depth table that contains *Hole ID, Depth*, and the *Math Results* columns. See the Function Log dialog page for information on selecting the logs and functions.

Creating a Function Log

To create a function log:

1. Click the **Log | Function** command or click the  button.
2. Click inside the log pane where you want the function log to appear.

3. The **Function Log** dialog appears. Use the *Log Variables, Operator,* and *Functions* to create a *Function Expression* and click *OK*.
4. The new *Math Results* data table is created and the log appears in the view window.

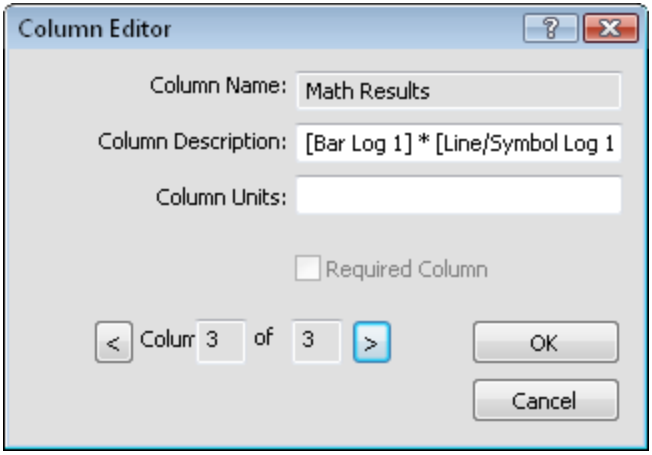
If you are in active mode a line/symbol log is created using the default properties. If you are in design mode, a line/symbol log graphic is displayed as a place holder after step 4.

Editing Function Log Properties

To change the features of a function log, click on the line/symbol log in the **Object Manager** or view window. The properties are listed in the **Property Manager**. The following tabs are listed in the **Property Manager**: **Line/Symbol Log**, **Base**, **Label**, **Display Properties**, and **Grid Line**. Refer to Chapter 9 - Line/Symbol Logs for information on changing the log properties.

Function Properties

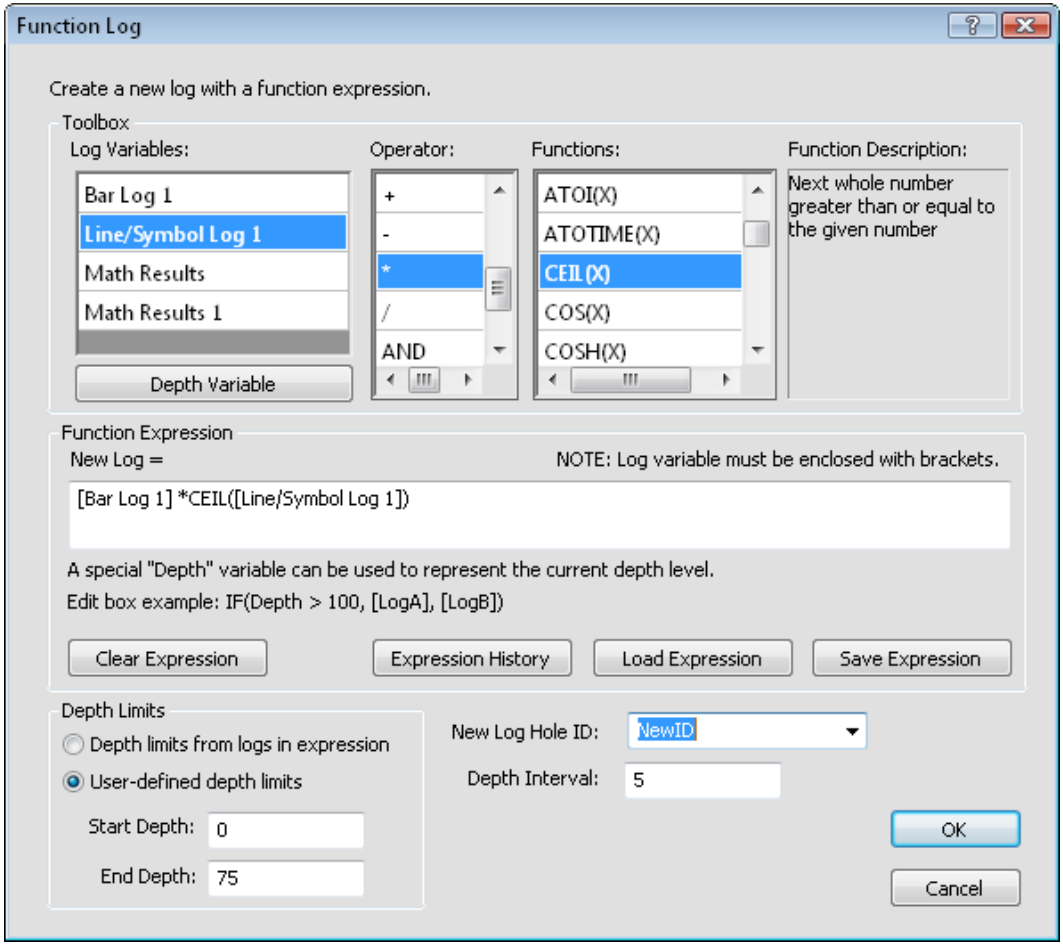
The actual function is not editable in the view window. The *Math Results* table that is created can be edited and the log will update, but the function is not editable. To see the function used to create a function log, click on the *Math Results* table. Click the **Table | Edit Column Properties** command. Click the  button twice, until column 3 is displayed. The function is listed in the *Column Description* option. This function could be copied and used to create a new function log.



The function used to create the log is displayed in the Column Description.

Function Log Dialog

The **Function Log** dialog contains the options needed to set the mathematical functions combining multiple line/symbol and bar logs in the view window.



Set the Log Variables, *the* Operator, *and the* Functions *in the* ***Function Log*** *dialog.*

Log Variables

The *Log Variables* section includes all of the line/symbol and bar logs included in the current view window. If logs exist in other view windows, the function log must be created in that window. To add a log to the expression, double-click on the log name in the *Log Variables* list. The log name is added at the cursor location in the *Function*

Expression. To use the depth value in the function, click the 

button. The *Depth* is added to the *Function Expression*.

If no logs are listed or if the data that you want to use is not in the *Log Variables* section, click *Cancel*. Create line/symbol or bar logs from the data that should be combined into the function log. Once all variables are defined as a line/symbol or bar log, click the **Log | Function** command again.

Each log can use a different borehole ID or a different table.

Operator

The *Operator* list contains the mathematical values that can be used in the *Function Expression*. To add an operator to the function, double-click on the symbol. The symbol is added to the *Function Expression* in the location where the cursor is located. Available operators are equal (=), not equal (<>), greater than (>), less than (<), greater than or equal to (>=), less than or equal to (<=), addition (+), subtraction (-), multiplication (*), division (/), and the logical operators AND, OR, and NOT. AND means that the result is true if the options on both sides of the AND are true. OR means that the result is true if the options on either side of the OR are true. NOT means that the if both sides of the NOT are true, the result is false.

Functions

The *Functions* list contains the list of mathematical functions that can be used in the *Function Expression*. To determine what a function does, click on the function name. The explanation is included in the *Function Description* section. To add a function to the expression, double click on the function. The function is added to the *Function Expression* in the location where the cursor is located.

The X, Y, and Z in the *Functions* should be changed to either a number of a log name in the *Function Expression*. For instance, if you want to take the base 10 logarithm of *Log A,* you would type LOG10([Log A]) in the *Function Expression*. Note that the log name needs to be enclosed in brackets.

Function Expression

The *Function Expression* is the location where the function being used to create the new log is displayed. Log variables must be enclosed in brackets in the *Function Expression*.

Rules for Function Expression

Some rules for function expressions may make it easier to input new functions:

- Log names must be included in brackets. For instance, if you are adding *Log A* and *Log B*, you would type the expression [Log A] + [Log B].
- When using the *Depth Variable*, the word *Depth* should not be included in brackets. For instance, if you are multiplying *Log A* times *Depth*, you would type the expression Depth*[Log A].
- IF functions can be used in the *Function Expression* with the format *IF(condition, if_true, if_false)*. For instance, if you want to use the *Log A* value for depths less than 50 feet and the *Log B* value for depths greater than 50 feet, you would type the expression IF(Depth < 50, [Log A], [Log B]).
- Depth values are interpolated at the *Depth Interval* specified for the new log.

Clear Expression

Click the *Clear Expression* button to remove all text from the *Function Expression* box.

Expression History

Click the *Expression History* button to open the **Expression History** dialog. This contains a list of the most recent expression functions that have been used. To reuse a function, double-click on the expression. Click *OK* or *Cancel* to close the **Expression History** dialog.

Load Expression

If an expression has been saved to a *Log Math Expression File (*.lme)*, it can be reloaded into the current function expression by clicking the *Load Expression* button. After clicking the *Load Expression* dialog, select the .LME file from the **Open** dialog and click *Open*. The equation appears in the *Function Expression* box.

Save Expression

To save an expression, type the expression into the *Function Expression* box. Click the *Save Expression* button. In the **Save As** dialog, type a *File name* and click *Save*. The file is saved for future use as a *Log Math Expression File (*.lme)*. The expression in the file can be used by loading the expression with the *Load Expression* button.

The .LME file is an ASCII file that contains the name of the expression and the equation used for the expression. This file can be edited in any text editor program, such as Windows Notepad.

Depth Limits

The *Depth Limits* section determines how the minimum and maximum values are set for the new log. When *Depth limits from logs in expression* is selected, all of the logs used in the *Function Expression* are examined. The new log minimum value is the smallest minimum value off all logs used in the expression. The new log maximum value is the largest maximum value of all logs used in the expression. When *User-defined depth limits* is selected, the *Start Depth* and *End Depth* options become available. Highlight the existing values and type the desired minimum value in the *Start Depth* and maximum value in the *End Depth*. Data outside this range will be ignored when creating the new log.

New Log Hole ID

Any log can be used in the current view window to create the function log. This means that logs with different borehole IDs can be combined. So, the function log creates a new borehole ID for the function that is created. If *[Auto Assigned]* is selected, the table and function will use a borehole named *NewID*. Alternatively, you can click on *[Auto Assigned]* and select one of the borehole IDs from the list. If all logs use the same borehole ID, only that borehole is listed in the *New Log Hole ID* list. To use a specific new name, highlight the existing text and type the desired name in the box.

Depth Interval

The *Depth Interval* is the interval that the new function log data will have between depth values. The first value is specified by the *Start Depth*. The next value will be the *Start Depth* + *Depth Interval*, and so on until the last *End Depth* value is reached. By default, the *Depth Interval* is calculated by:

- The interval used in the *Log Variables*, if the interval is the same for all selected logs.
- The maximum evenly spaced interval used for all of the *Log Variables* if the interval is different for all *Log Variables*,
- A value of 10 is used if none of the *Log Variables* selected are evenly spaced in the original data files, or
- A value of 10 is used if no *Log Variables* are used in the *Function Expression.*

Log Data Interpolation

Data from the log variables are interpolated to get the values at the desired depth intervals, if the log data does not fall on the value. To calculate the interpolated values for the log variables, the data value before and data value after each depth point is evaluated using a linear interpolation. This creates a temporary uniformed depth point for each log. Once the data are on the appropriate interval, the *Function Expression* is applied.

OK or Cancel

Click *OK* to create the new *Math Results* table and new line/symbol log based on the math results. Click *Cancel* to exit the **Function Log** dialog without creating the new log and data.

If an error message is displayed, the function in the *Function Expression* resulted in no data. Click *OK* in the error message. Click the **Log | Function Log** command and click on the screen. In the **Function Log** dialog, click the *Expression History* button. Double-click on the expression at the top of the list. The expression is added to the *Function Expression* box. Check the *Depth Limits*, and the *Depth Interval* to ensure that these values are set correctly for the logs specified. If an error occurs again, check the logs to make sure that data is displayed for each log in the *Function Expression*.

Altering One Log with a Function or Constant

To create a new function log that is based on existing data, but altered by a constant value or mathematical equation, follow these steps. This could also be done in the data table with the **Data | Transform** command.

1. Click the **Log | Function** command or click the  button.
2. Click inside the log pane where you want the function log to appear.
3. The **Function Log** dialog appears.
4. Double-click on the log name. The log name is added to the *Function Expression.*
5. In the *Function Expression* box, type the remainder of the equation. For instance, if you double-clicked on *Log A*, and you want the arccosine of the log, type ACOS(before the *[Log A]* text and) after the *Log A* text. The *Function Expression* should look like ACOS([Log A]).
6. Click *OK* and the new *Math Results* table is created and the log appears in the view window.

Combining Multiple Logs with a Function

To create a new function based on multiple logs of data, follow these steps:

1. Click the **Log | Function** command or click the  button.
2. Click inside the log pane where you want the function log to appear.
3. The **Function Log** dialog appears.
4. Double-click on the first log name. The log name is added to the *Function Expression.*

5. Double-click on any *Operator* or *Function* in the lists.
6. Place the cursor in the desired location in the *Function Expression* and double-click on the second log name.
7. Type any additional part of the equation. For instance, if you want to add the logarithmic value of Log A and the square root value of Log B, the *Function Expression* should look like LOG10([Log A]) + SQRT([Log B]).
8. Click *OK* and the new *Math Results* table is created and the log appears in the view window.

Set the Depth Variable for a Function Log

In the **Function Log** dialog, the *Depth Variable* is the depth value.

For example, suppose you have a line/symbol log that shows Au (ppb) concentration values. You want to multiply the concentration by the depth.

9. Click the **Log | Function** command or click the  button.
10. Click on the view window where the log should be located.
11. In the **Function Log** dialog, double-click on *Au (ppb)* in the *Log Variables* list. The log name is automatically added to the *New Log* = equation.
12. Type an asterisk, * after the *[Au (ppb)]* text to multiple the log value.
13. Click the *Depth Variable* button and *Depth* is added after the *. The function is: *[Au (ppb)] *Depth*.
14. Click OK.

The calculated results are in the *Math Results* table and in the function log. The results display the the Au concentration value multiplied by the associated depth value.

Chapter 22

Drawing Objects

Introduction to Drawing Objects

Strater borehole views, map views, and cross section views contain a collection of individual graphic objects. These graphic objects include logs, scale bars, legends, and drawing objects such as text, rectangles, polygons, polylines, etc. This chapter focuses on creating the various drawing objects and editing the object properties.

Creating Drawing Objects

The **Draw** menu contains several objects that can be added to the plot window. You can add text, polygons, polylines, symbols, rectangles, rounded rectangles, ellipses, unconformities, linked text, scale bars, legends, and inserted map views through the **Draw** menu, or through the **Draw** toolbar.

Text

Click the **Draw | Text** command to create text in the view window. The typeface, size, style, alignment, opacity, and color can be set for individual characters in a text blocks.

Creating Text

To create text:

1. Click the **Draw | Text** command or click the .
2. Click where you want text to appear.
3. Enter text into the **Text Editor** dialog.
4. Highlight the text to be changed and set the text properties by clicking the appropriate button or option in the **Text Editor** dialog. The math text instructions are not used in this dialog.
5. Click *OK* to return to the view window.
6. Press the ESC key on the keyboard to end draw text mode.

The text appears inside a movable, sizable text box. Click on the box and drag it to move the box to the desired location.

Editing Text

The text can be edited in the **Text Editor**. To edit existing text content, double-click on the text to open the **Text Editor**, or you can edit text content in the **Property Manager**:

1. Click on the text object in the view window or **Object Manager** to select it.
2. In the **Property Manager**, the text and font properties can be edited.
3. To change the font properties, click the ⊞ next to *Font*. Set any font properties for all of the text in the text block.
4. To change the text, click the ⊞ next to *Text*. For a single line of text, highlight the characters next to *Text* and type the desired text. Math text instructions can be added directly to the *Text* line in the **Property Manager**.
5. To include multiple lines of text, press the ENTER key on the keyboard to create a new line.
6. For more complicated text, click the *Advanced* button next to *Advanced Properties*. The **Text Editor** opens. Make any desired edits. To change the text properties in the **Text Editor**, highlight the text and make any adjustments. Each character can have different properties when edited in the **Text Editor**.
7. Click *OK*.

The text updates in the *Text* box in the **Property Manager** and on the view window. Click the ⊞ next to *Font* to set the font properties for the text.

Polygon

Click the **Draw | Polygon** command to draw an irregularly shaped polygon in the view window. Polygons must have at least three vertices (points).

Creating Polygons

To draw a polygon:

1. Click the **Draw | Polygon** command or click the  button to begin drawing a polygon.
2. In the view window move the cross hair pointer to the location of the first vertex of the polygon and click the left mouse button.
3. Move the pointer to the next position of the polygon and click again.
4. Continue this procedure until you click the final point.

5. To end the polygon, double-click on the last point or press ENTER on the keyboard. The first and last points are automatically connected and the new polygon is drawn.
6. Press ESC on the keyboard to end drawing mode.

Editing Polygons

Polygons contain two types of properties: line properties and fill properties. You can change these properties in the **Property Manager**.

Polyline

Click the **Draw | Polyline** command to draw a polyline in the view window. A polyline is a collection of one or more connected line segments. You can choose a line style, color, and arrowheads for the polyline display.

Creating Polylines

To draw a polyline:

1. Click the **Draw | Polyline** command or click the  button to begin drawing a polyline.
2. In the view window, move the cross hair pointer to the location of the first vertex of the polyline and click the left mouse button.
3. Move the pointer to the next vertex along the line and click again.
4. Continue this process until you click the final point for the line.
5. To end the polyline, double-click on the last point or press ENTER on the keyboard.
6. Press ESC on the keyboard to end drawing mode.

Editing Polylines

Polylines contain line properties. You can change these properties in the **Property Manager**.

Symbol

Symbols are markers that are used to indicate point positions. Any TrueType glyph can be used as a symbol, including several custom glyphs provided with **Strater**. You can use the **Draw | Symbol** command to place symbols in the view window. You can change the symbol color, size, set, and opacity in the **Property Manager**.

Creating Symbols

To draw a symbol:

1. Click the **Draw | Symbol** command or click the  button .
2. Move the cross hair cursor to the desired location in the view window and click to position the symbol. The default symbol appears.
3. Press ESC on the keyboard to end drawing mode.

Editing Symbols

Symbols contain symbol properties. You can change these properties in the **Property Manager**.

Rectangle

Click the **Draw | Rectangle** command to create a rectangle in the view window.

Creating Rectangles

To draw a rectangle:

1. Click the **Draw | Rectangle** command or click the  button.
2. In the view window move the cross hair pointer to the location of the first corner of the rectangle. Click and hold the left mouse button.
3. Drag the pointer to the opposite corner of the rectangle.
4. Release the left mouse button when the rectangle is the preferred size and shape.
5. Press ESC on the keyboard to end drawing mode.

Creating Squares

To draw a square, hold down the CTRL key on the keyboard while dragging the mouse. A square is drawn instead of a rectangle.

Editing Rectangles

Rectangles contain two types of properties: line properties and fill properties. You can change these properties in the **Property Manager**.

Rounded Rectangle

Click the **Draw | Rounded Rectangle** command to create a rounded rectangle in the view window.

Creating Rounded Rectangles

To draw a rounded rectangle:

1. Click the **Draw | Rounded Rectangle** command or click the  button.
2. In the view window move the cross hair pointer to the location of the first corner of the rounded rectangle. Click and hold the left mouse button.
3. Drag the pointer to the opposite corner of the rounded rectangle.
4. Release the left mouse button when the rounded rectangle is the preferred size and shape.
5. Press ESC on the keyboard to end drawing mode.

Creating Rounded Squares

To draw a square, hold down the CTRL key on the keyboard while dragging the mouse. A rounded square is drawn instead of a rounded rectangle.

Editing Rounded Rectangles

Rounded rectangles contain two types of properties: line properties and fill properties. You can change these properties in the **Property Manager**.

Ellipse

Click the **Draw | Ellipse** command to create an ellipse or circle in the view window.

Drawing Ellipses

To draw an ellipse:

1. Click the **Draw | Ellipse** command or click the  button.
2. In the view window, click and hold the left mouse button at one corner of the bounding box of the ellipse.
3. Drag the pointer to the opposite corner of the ellipse.
4. Release the left mouse button when the ellipse is the preferred size and shape.
5. Press the ESC key on the keyboard to end drawing mode.

Drawing Circles

To draw a circle, hold down the CTRL key on the keyboard while dragging the mouse. A circle is drawn instead of an ellipse.

Editing Ellipses

Ellipses contain two types of properties: line properties and fill properties. You can change these properties in the **Property Manager**.

Unconformity

Click the **Draw | Unconformity** command to draw an unconformity line in the view window. An unconformity is a collection of one or more connected line segments. The lines are wavy. Usually this line type is used to show unconformable surface contacts in a cross section view or borehole view. You can choose a line style, color, and arrowheads for the unconformity display. The amplitude and wavelength of the line can also be set.

Creating Unconformities

To draw an unconformity:

1. Click the **Draw | Unconformity** command or click the  button to begin drawing an unconformity.
2. In the view window, move the cross hair pointer to the location of the first vertex and click the left mouse button.
3. Move the pointer to the next vertex along the line and click again.
4. Continue this process until you click the final point for the unconformity.
5. To end the unconformity, double-click on the last point or press ENTER on the keyboard.
6. Press ESC on the keyboard to end drawing mode.

Editing Unconformities

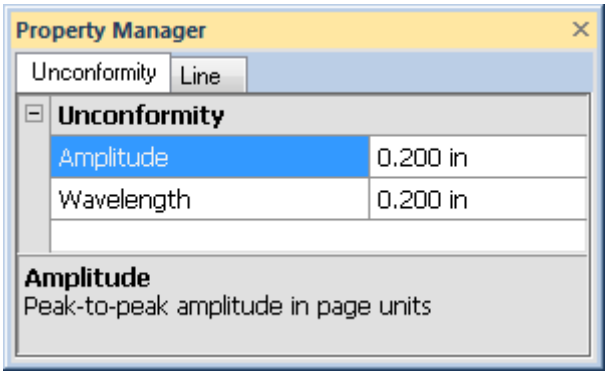
Unconformities contain unconformity and line properties. You can change these properties in the **Property Manager**.

Unconformity Page

Use unconformity properties to change the amplitude and wavelength for selected unconformity lines in the view window.

Amplitude

The *Amplitude* of the unconformity is the height of the unconformity wave in page units. Values can range between zero and 2.0 inches (zero and 5.08 centimeters). A value of zero makes a straight line. The larger the value, the taller the wave. To change the value, highlight the existing value and type a new value. Alternatively, click the  to increase or decrease the value. Press ENTER on the keyboard to make the change.



*The **Unconformity** page controls the height and length for the selected unconformity object.*

Wavelength

The *Wavelength* of the unconformity is the width of the unconformity wave in page units. This is the distance between peaks on the wave. Values range between 0.1 and 2 inches (0.254 and 5.08 centimeters). The larger the value, the wider the wave. To change the value, highlight the existing value and type a new value. Alternatively, click the  to increase or decrease the value. Press ENTER on the keyboard to make the change.

Linked Text

Linked text is text that is connected to information in a table or a view property. This text changes automatically if changes are made to the table or view settings.

Click the **Draw | Linked Text** command to create linked text in any view window. The typeface, size, style, alignment, opacity, and color can be set for text blocks.

Creating Linked Text

To create linked text:

1. Click the **Draw | Linked Text** command or click the  button.
2. Click where you want text to appear in a view window. The words *Linked Text* appear as a place holder if you are in design mode. If you are in active mode, the borehole name appears if a borehole ID has been set in the Hole ID Filter option. Otherwise, *-Empty-* appears.
3. Press ESC on the keyboard to end drawing mode.
4. Click on the linked text in the view window or **Object Manager** to select it.
5. Set the linked text properties in the **Property Manager** to define the text information and properties.

Editing Linked Text

Linked text contain two types of properties: linked text properties and label properties. You can change these properties in the **Property Manager**.

Linked Text Page

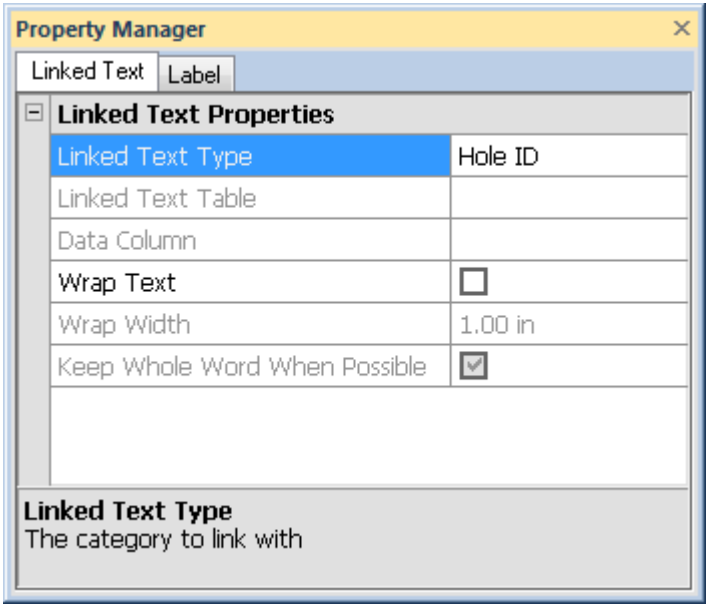
Linked text properties can be changed for all linked text objects. Use the following options to change the linked text values.

Linked Text Type

The *Linked Text Type* list contains the types of linking available for each linked text object. Available options are *Hole ID*, *Column*, *Column Description*, *Column Units, Current Page*, *Current Page Of Total Pages*, and *Total Pages* options. To change the type, click on the existing option. Select the desired option from the list.

- The *Hole ID* is the borehole name defined in the borehole view properties. Note: This option should not be used if there are multiple boreholes represented in the current borehole view.
- The *Column* option shows information from a table. When the *Linked Text Type* is set to *Column,* select a table from the *Linked Text Table* and select a *Data Column* to display. The table type can be a text, collars, or project settings data table.
- *Column Description* shows the table column description. You can enter or edit the column descriptions with **Table | Edit Column Properties** command in the data table view.
- *Column Units* shows the table column units description. You can enter or edit the column units with **Table | Edit Column Properties** command in the data table view.

- *Current Page* shows the current page number in a multi-page log.
- *Current Page Of Total Pages* shows the current page number, the word *of*, and the total number of pages in a multi-page log.
- *Total Pages* shows the total number of pages in a multi-log page.



The Linked Text *tab contains options for setting the linked text properties.*

Linked Text Table

If the *Linked Text Type* is set to *Column*, *Column Description,* or *Column Units,* the *Linked Text Table* option is available. This is the table in the project that contains the text that should be displayed. Only collars, text item, and project settings table types can be selected. The text item and collars tables must contain a Hole ID. The project settings table does not require a Hole ID.

Data Column

If the *Linked Text Type* is set to *Column*, *Column Description,* or *Column Units* the *Data Column* option is available. This is the column in the *Linked Text Table* that contains the text that should be displayed. Any defined column can be used from a collars, text item, or project settings table. For text item and collars tables, the first row with the defined borehole ID is used.

Wrap Text

Check the box next to *Wrap Text* to wrap long linked text objects onto multiple lines. After checking the box, set the *Wrap Width* option to set the length each line should appear. This value is approximate, as some wide characters may cause the value to increase/decrease slightly.

To set the *Wrap Width*, highlight the existing value and type the new value.

Alternatively, click the  button to the right of the value to increase or decrease the width. Press ENTER to make the width change. The value is in page units and must be between 0.1 and 10 inches (0.254 and 25.4 centimeters).

If line breaks should occur between words, check the box next to *Keep Whole Word When Possible*.

Math Text and Linked Text

Math text can be used to alter the appearance or add mathematical concepts or symbols to linked text. See Math Text Instructions for detailed information.

Linked Text and Multiple Boreholes

Because linked text can only be associated with a single borehole ID, when there are multiple boreholes in a view window, linked text should be used carefully. The last borehole to be used before multiple boreholes were shown is the borehole that is used for linked text.

When there are multiple boreholes in a view window:

- The *Hole ID* should not be used with linked text because only one borehole ID can be associated with linked text in a borehole view, regardless of the number of borehole IDs in the view.
- The *Column* option should only be used if the column data is the same for all boreholes in the view. Because of this, it is irrelevant which borehole the linked text is associated with, because the column information is identical. In circumstances where you want column information in text boxes to vary based upon different borehole IDs it is recommended to use simple text boxes and cut/paste the desired information into the boxes.

In general, using linked text boxes with multiple boreholes works well when *Current Page, Current Page Of Total Pages, Total Pages, Column Description*, and *Column Units* are the selected *Linked Text Type* because this information is the same regardless of the borehole.

Linked Text Tips

- Set the *Log Display Mode* to *Page View* in the Borehole View Properties to show the current page and the total number of pages.
- The page size is determined by your printer settings. Use **File | Page Setup** to set page size.

- Default text properties are set with the **Tools | Options** command.

Create Multiple Lines in Linked Text

To create multiple lines in linked text, math text commands need to be incorporated into the table entry that is linked to the text.

The commands of interest are:

- \sp1 = this remembers the location of the character immediately following the \sp1 command.
- \rp1 = this returns to the space remembered with the \sp1 command
- \dn100 = this lowers the text by 100% of the current font size
- \up100 = this raises the text by 100% of the current font size

The important thing to remember with math text is to always include a space after the command. So, \sp1 is actually typed in as "\sp1 ", without the quote marks.

An example line of text that might appear in the table is:

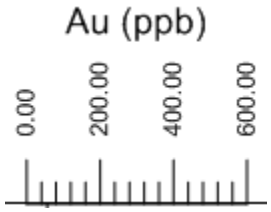
> \sp1 Here is a multiple line \rp1 \dn100 text field that uses \rp1 \dn200 linked text from a worksheet

The corresponding linked text in the borehole view will be on 3 lines:

> Here is a multiple line
>
> text field that uses
>
> linked text from a worksheet

Scale Bar

A scale bar is used to show variables in log items or distance in cross sections. Scale bars can be placed in any location in a borehole view or cross section view. Scale bars can be linked to line/symbol, crossplot, bar, tadpole, or function logs. You can also create a scale bar that is not associated with any log. Scale bars can be automatically created when creating a log or manually created by clicking the **Draw | Scale Bar** command or clicking the  button.



Scale bars show variable ranges in log items.

Creating Scale Bars

To create a scale bar:

1. Click the **Draw | Scale Bar** command or click the  button.
2. Click in the view window where the scale bar should appear.

A scale bar is created using the default properties. If a line/symbol, crossplot, bar, tadpole, or function log was selected before adding the scale bar, the scale bar is automatically linked to the selected log item. If any other item was selected before adding the scale bar or if no log was selected before adding the scale bar, a scale bar is created that is not linked to any log.

Editing Scale Bars

Scale bars contain scale bar properties, ticks properties, title properties, label properties, and line properties. You can change these properties in the **Property Manager** when the scale bar is selected.

Moving a Scale Bar

You can move a scale bar that was automatically created vertically by clicking on the scale bar to select it and dragging it to the desired location. A scale bar that is linked to a log cannot be moved horizontally away from its associated log.

For scale bars that are not linked to a log, the scale bar can be moved anywhere in the view window. Click on the scale bar to select it and drag the scale bar to any location.

All scale bars can also be moved by clicking on the scale bar and setting the position and size options in the Position/Size toolbar.

Unlinking a Scale Bar from a Log

To change a scale bar so that it is not linked to a log, click on the scale bar to select it. In the **Property Manager**, click on the Scale Bar tab. Change the *Type* to *User Defined*.

Disabling Automatic Scale Bars

By default, when you create line/symbol, crossplot, bar logs, tadpole, or function logs, a scale bar is automatically placed in the header, linked to the log. To turn off the automatic scale bar creation, click the **Tools | Options** command. In the **Options** dialog, uncheck the *Auto Create Scale Bar* option on the **General** page.

Uniform Spaced Cross Section Scale Bars

Cross section linked scale bars should only be used when the *Well Spacing* is set to *Proportional*. When a linked scale bar is attached to a cross section that has a *Proportional* well spacing that is changed to *Uniform*, a warning message appears indicating that the cross section scale bar may not be accurate with the *Uniform* well spacing. In this case, the distances will not be accurate across the entire cross section. Click *Yes* to continue changing the *Well Spacing* to uniform. It is then recommended that the scale bar be deleted. Click *No* to keep the cross section as *Proportional* so that the scale bar is accurate.

When a scale bar is added to a cross section that already has *Well Spacing* set to *Uniform*, a warning message appears indicating that the scale bar measurement will not be accurate. Click *Yes* to add the scale bar. Click *No* to not add the scale bar.

Scale Bar Page

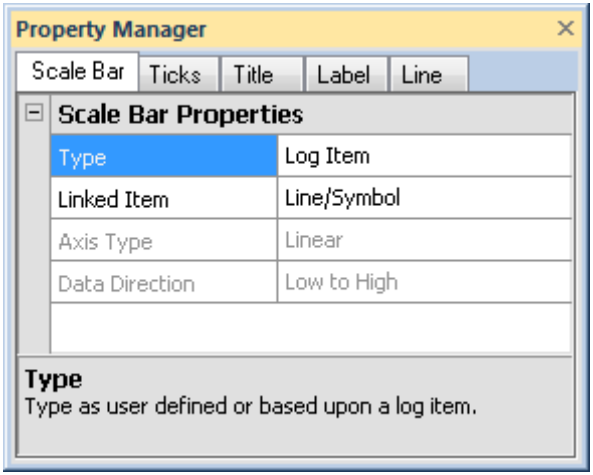
The **Scale Bar** tab in the **Property Manager** includes scale bar options such as the type of scale bar, scale bar range, axis type, data direction, and tick mark properties.

Type

The scale bar *Type* determines how the scale bar is created. Available options are *User Defined, Log Item,* or *Cross Section*. The *Log Item* type creates a scale bar for line/symbol, crossplot, bar, tadpole, or function logs where the scale is linked to the log. The *User Defined* type creates a scale bar that is not linked to a particular log item. This is useful for displaying general information. The *Cross Section* type creates a scale bar that is linked to a cross section. To change the type, click on the existing option and select the desired option from the list.

Linked Item

When the *Type* is set to *Log Item* or *Cross Section*, the *Linked Item* option becomes available. The *Log Item* is the log that should be used to set the scale on the scale bar. To change the log item, click on the existing log name and select the desired log name from the list. The list contains all line/symbol, crossplot, bar, tadpole, and function logs that exist in the current borehole view. Once a log item is selected, the scale bar is moved horizontally so that it is aligned with the log item. In addition, the scale bar resizes to the same width as the log item. Scale bars attached to log items can be moved vertically, but not horizontally.



Set the scale bar properties on the ***Scale Bar*** *tab in the* ***Property Manager****.*

Axis Type

The *Axis Type* is available when the *Type* is set to *User Defined.* The *Axis Type* is the method used to space values on the scale bar. Available options are *Linear* and *Logarithmic*. To change the axis type, click on the existing option and select the desired option from the list. When the axis type is linear, values are evenly spaced along the scale bar. When the axis type is logarithmic, a Log (base 10) scale is used to space the values. The distance between 1 and 100 covers the same amount of the axis as the distance between 100 and 1000 or 1000 and 10,000. When set to *Logarithmic,* data values equal to and less than zero are ignored.

To control the scaling type for a scale bar linked to a log item, click on the log to select it. In the **Property Manager**, click on the log's property tab. This is the **Line / Symbol Log**, **Curve One**, **Curve Two**, **Bar Log**, or **Tadpole Log** tab. Change the *Axis Type* option. The scale bar updates and the log displays the values with the selected scaling type.

Data Direction

The *Data Direction* is available when the *Type* is set to *User Defined*. The *Data Direction* determines which side of the scale displays the lower and higher values. Available options are *Low to High* and *High to Low*. To change the *Data Direction*, click on the existing option and select the desired option from the list. *Low to High* creates

a scale bar with the minimum value on the left and the maximum value on the right. *High to Low* creates the scale bar with the minimum value on the right and the maximum value on the left.

To control the data direction for a scale bar linked to a log item, click on the log to select it. In the **Property Manager**, click on the log's property tab. This is the **Line/Symbol Log**, **Curve One**, **Curve Two**, or **Bar Log** tab. Change the *Data Direction* option. The scale bar updates and the data reverses direction, if needed. The *Data Direction* is not available for a tadpole plot.

Ticks Page

The **Ticks** page in the **Property Manager** includes options for setting the tick scaling, interval, and length of the ticks for a scale bar. To view and edit scale bar tick properties, click on the scale bar in the view window or **Object Manager** to select the scale bar. Then, click on the **Ticks** tab in the **Property Manager**.

Scaling

The *Scaling* option is only available when the *Type* is set to *Cross Section* on the Scale Bar tab. The *Scaling* controls how tick marks appear on the scale bar. To change the *Scaling,* click on the existing option and select the desired option from the list. Available options are *Automatic* and *User Interval*. Set the *Scaling* to *Automatic* to automatically define the starting and ending ticks, based on all of the logs in the cross section. Set the *Scaling* to *User Interval* if you want the tick range calculated automatically, but want to set the *Major Interval* to a custom value.

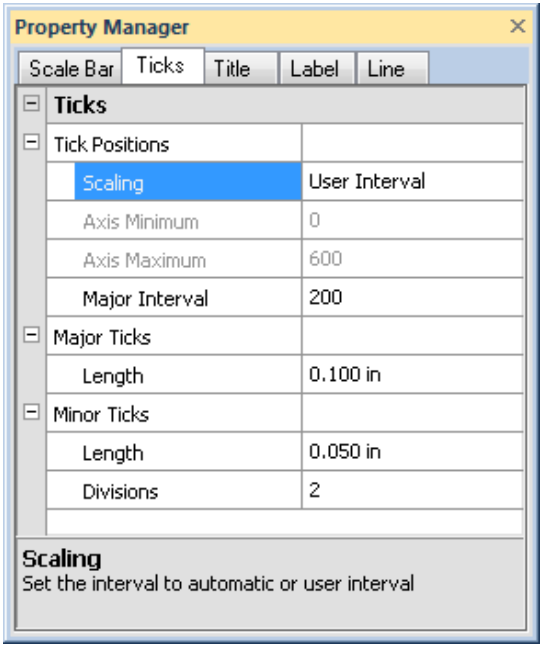
To set the *Axis Minimum* or *Axis Maximum*, click on the **Scale Bar** tab and set the *Type* to *User Defined*. Then, click on the **Ticks** tab and set the *Axis Minimum* and *Axis Maximum* values.

To control the *Axis Minimum, Axis Maximum*, and *Major Interval* for a log linked scale bar, click on the log and click the Grid Line tab. Set the *Grid Minimum, Grid Maximum,* and *Grid Interval* in the in the *Variable Grid Lines* section.

Axis Minimum and Maximum

When the Scale Bar *Type* is set to *User Defined*, you can enter an *Axis Minimum* and an *Axis Maximum*. The *Axis Minimum* must be less than the *Axis Maximum*. To change the *Axis Minimum* or *Axis Maximum* value, highlight the existing number and type the desired value. Press ENTER on the keyboard to make the change.

To control the minimum and maximum values for a scale bar linked to a log item, click on the log to select it. In the **Property Manager**, click on the log's **Grid Line** tab. In the *Variable Grid Lines* section, set the *Scaling* to *User Defined.* Then, set the *Grid Minimum* or *Grid Maximum* values to the smallest and largest values that should be shown on the scale bar. The scale bar updates and the log only displays the points that are within the range.



Set the scale bar tick properties on the ***Ticks*** *tab in the* ***Property Manager****.*

Major Interval

When the Scale Bar *Type* is set to *User Defined* or *Cross Section* and the *Scaling* option is set to *User Defined*, *use* the *Major Interval* setting to control the spacing between major tick marks. The interval value is in the same units as the *Axis Minimum* and *Axis Maximum*. The interval must be greater than zero. A *Too many intervals* warning message appears is the number typed in the *Major Interval* creates more than 1000 tick marks on the scale bar. To change the interval, set the *Scaling* option to *User Defined.* Then, highlight the existing value next to *Major Interval* and type the desired number. Press ENTER on the keyboard to make the change.

To control the major interval for a scale bar linked to a log item, click on the log to select it. In the **Property Manager**, click on the Grid Line tab. Change the *Scaling* to *User Defined.* In the *Show Major Variable Grid Lines* section, set the *Grid Interval* to the desired major interval. The scale bar updates.

Major Tick Length

The length of the major tick marks is set in the *Major Ticks* section with the *Length* option. Values are in page units and range between 0.0 to 2.0 inches (0 and 5.08 centimeters). To change the value, highlight the existing value and type the desired length. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the tick length.

Minor Tick Length

The length of the minor tick marks is set in the *Minor Ticks* section with the *Length* option. Values are in page units and range between 0.0 to 2.0 inches (0 and 5.08 centimeters). To change the value, highlight the existing value and type the desired length. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the tick length.

Minor Divisions

The *Divisions* are the number of divisions (gaps) between the major tick marks. The value should be between 1 and 20. A value of one creates no minor tick marks and one gap. A value of 10 is entered into the *Divisions* box, there are nine minor tick marks and 10 gaps between major ticks. To change the number of divisions, highlight the existing value and type the desired value. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the number of divisions.

To control the number of tick mark divisions for a scale bar linked to a log item, click on the log to select it. In the **Property Manager**, click on the Grid Line tab. Change the *Scaling* to *User Defined.* In the *Show Minor Variables Grid Lines* section, set the *Grid Division* to the desired number of divisions. The scale bar updates.

Title Properties

The **Title** page in the **Property Manager** controls the location, text, and font properties for the scale bar or legend title.

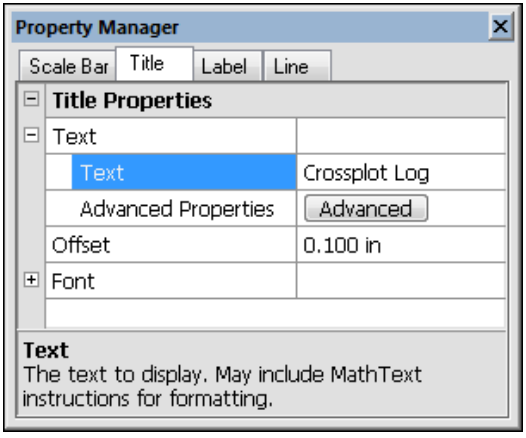
Text Properties

Click the ⊞ next to *Text* to open the *Text* section. You can set the text that appears for the title by highlighting the existing text next to *Text* and typing the desired text. Press ENTER on the keyboard for the change to be displayed in the view window.

For multiple lines of text or for text that uses different font properties for some characters, click the Advanced button next to *Advanced Properties*. The **Text Editor** opens, allowing each character to have different properties.

Offset

The *Offset* determines how far the title is from the scale bar labels. The distance must be between -2.0 inches and 2.0 inches. To change the offset, highlight the existing value and type a a new value or click the button to increase or decrease the values. Press ENTER on the keyboard and the scale bar title is updated. The offset is not available for legends.



*Click on the **Title** tab in the **Property Manager** to set the scale bar title text properties.*

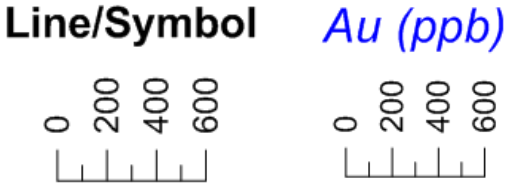
Font Properties

Click the ⊞ next to *Font* to open the font properties section. The properties in this section affect all text in the title, unless advanced text properties have been set.

Changing the Title

This example demonstrates how to change the scale bar title. The steps are the same for a legend, once a legend is selected.

1. Open a file containing a scale bar. As an example, select the file *Example Logs.sdg* file from the **Strater** Samples folder. By default, this directory is located at C:\Program Files\Golden Software\Strater 4\Samples.
2. Click on any scale bar, such as the *Scale Bar - Au (ppb)* scale bar, associated with the *Line/Symbol Log 1*, in the *Borehole 1* view.
3. In the **Property Manager** click on the *Title* tab.
4. Next to *Text,* highlight the existing text, *Line/Symbol*.
5. Type in the new title, such as *Au (ppb)* and press ENTER on the keyboard.
6. Make any changes to the title's font properties (font, size, etc.) in the *Font* section.



This is the scale bar before the change. *You can easily change the title of any scale bar.*

Label Page

The **Label** page in the **Property Manager** includes options for setting the label side, units, and label range for the ticks on a scale bar. To view and edit scale bar label properties, click on the scale bar in the view window or **Object Manager** to select the scale bar. Then, click on the **Label** tab in the **Property Manager**.

Label Side

The *Label Side* changes the location of the ticks and labels from above the scale bar (the default location) to below the scale bar. Normally, when the scale bar appears in the footer, the *Label Side* is set to *Below* and when the scale bar appears in the header, the *Label Side* is set to *Above.* To change the label side, click on the existing option and select the desired option from the list.

Units

The *Units* option is available when the Scale Bar *Type* is set to *Cross Section*. The *Units* option controls the tick mark values displayed on the cross section scale bar. To change the units, click on the existing option and select the desired option from the list. Setting the *Units* to *Automatic* reads the units from the coordinate system of the map in the associated map view.

If the units are not specified for the *Map*, the Column units from the *Easting* and *Northing* column are used. If the units are different in these columns, the *Easting* column is used. If only one of the *Easting* or *Northing* column has units, that column's units are used. When the column units are not recognized, conversion between units is not done properly.

Auto Label Range

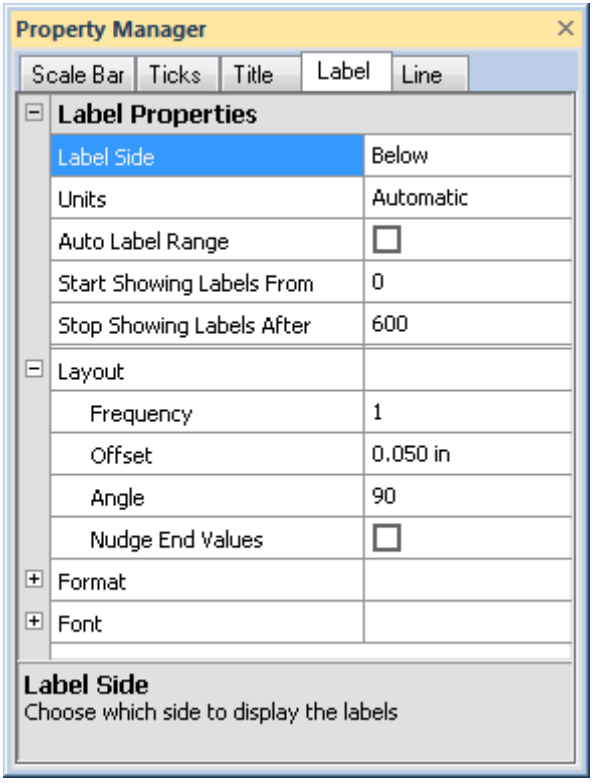
Check the box next to *Auto Label Range* to have the starting and stopping labels set to the starting and ending tick marks. When unchecked, the *Start Showing Labels From* and *Stop Showing Labels After* options become available.

Start Showing Labels From

When the *Auto Label Range* is unchecked, the *Start Showing Labels From* option lists the first tick value on the scale bar that should contain a label. To change the first label value, uncheck the *Auto Label Range* option. Then, highlight the number next to *Start Showing Labels From* and type the desired starting label value. Press ENTER on the keyboard to make the change. The label value is specified in the *Units* for a cross section scale bar or in the units displayed on the Ticks tab for a log or user defined scale bar.

Stop Showing Labels From

When the *Auto Label Range* is unchecked, the *Stop Showing Labels From* option lists the last tick value on the scale bar that should contain a label. To change the last label value, uncheck the *Auto Label Range* option. Then, highlight the number next to *Stop Showing Labels From* and type the desired ending label value. Press ENTER on the keyboard to make the change. The label value is specified in the *Units* for a cross section scale bar or in the units displayed on the **Ticks** tab for a log or user defined scale bar.



*Set label properties on the **Label** tab in the **Property Manager**.*

Layout

Click the ⊞ next to *Layout* to set the label layout options.

Frequency

The *Frequency* option controls how many major labels appear on the scale bar. Setting the value to zero displays no labels on the scale bar. Setting the value to one displays a label at all major tick mark values. Change the *Frequency* to two to display a label at every other value or three to display a label at every third value. To change the *Frequency*, highlight the existing value and type a new number. Enter a number between 0 and 200. Press ENTER on the keyboard to make the change. Alternatively, click on the  to increase or decrease the value.

Offset

The *Offset* moves the label numbers up (positive offset) or down (negative offset). To change the offset, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click the  to increase or decrease the offset. Numbers are in page units and range from -2 to 2 inches (-5.08 to 5.08 centimeters).

Angle

The *Angle* option sets the displayed data at an angle. The numbers are in degrees offset from horizontal moving in a counter-clockwise direction. For example, an angle of 90 displays the numbers vertically, and an angle of 180 displays the numbers upside-down.

Nudge End Values

The *Nudge End Values* option moves the starting and ending labels away from the edges of the log pane so that they are completely visible. This 'nudging' occurs only if the label is near the edge of the log pane, otherwise the location of the label does not change.

Format

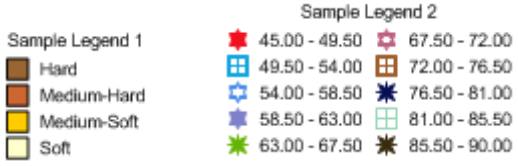
Click the ⊞ next to *Format* to open the label format section.

Font

Click the ⊞ next to *Font* to open the font properties section.

Legend

Legends explain information contained in a log, such as a zone bar log or classed post log. Legends display symbols and fill options from a scheme. Any scheme in the project can be displayed with a legend. If no scheme exists in the project, the legend is displayed as *Scheme not found*. Click the **Draw | Legend** command or click the  button and click in the view window to create a legend.



Create legends of different styles, based on the schemes in your project.

Creating Legends

To create a legend:

1. Click the **Draw | Legend** command or click the  button.
2. Click in the view window where the legend should appear.

The legend appears with the default properties, based on the first scheme listed in the **Scheme Editor**. If a specific log and scheme should be displayed, click on the log before clicking the **Draw | Legend** command.

Editing Legends

Legends contain legend properties, title properties, label properties, frame line and background properties. You can change these properties in the **Property Manager** when the legend is selected.

Changing the Scheme Associated with a Legend

A legend can be associated with any scheme in the project. To change the scheme associated with a legend:

1. Click on the legend in the **Object Manager** or view window to select it.
2. In the **Property Manager**, click on the **Legend** tab.
3. Click the name next to the *Schemes* option. In the list, select the desired scheme.

The legend automatically updates to display the newly selected scheme.

Ordering Legend Items

Legends are displayed in the same order that the scheme items appears in the **Scheme Editor**. To display items in the legend in a particular order, sort the scheme items.

Legend Page

The **Legend** tab in the **Property Manager** includes legend options such as selecting the scheme, defining number of columns, and controlling legend content placement.

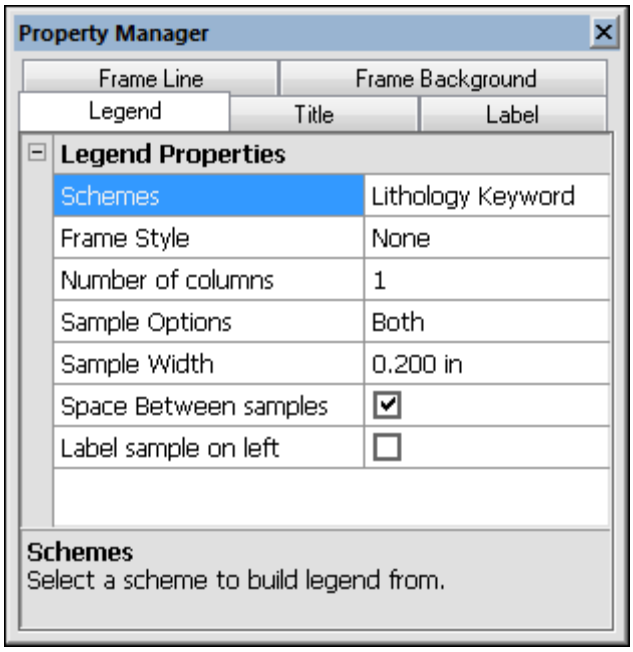
Schemes

The *Schemes* option sets the scheme associated with the legend. To change the scheme, click on the existing scheme name and select the desired scheme from the list. All schemes in the existing project appear in the list.

Frame Style

The *Frame Style* sets the display of the line surrounding the legend. To change the *Frame Style*, click on the existing option and select the desired option from the list. Available options are *None*, *Rectangle*, and *Rounded Rectangle.* Setting the style to *None* removes the line around the legend. *Rectangle* places a rectangle around the legend. The *Rounded Rectangle* option places a rectangle with rounded edges around the legend.

To modify the frame line properties, set the line properties on the Frame Line tab.



*Set legend properties in the **Property Manager** on the **Legend** tab.*

Number of Columns

The *Number of columns* changes the display of the legend to use multiple columns. To change how many columns the legend has, highlight the existing value and type a new value. Press ENTER on the keyboard. Alternatively, click the  button to increase or decrease the number of columns. The value must be a whole number between 1 and 20. The program then takes the number of scheme items and separates them into the number of columns. For instance, if the scheme has 20 items, and the *Number of columns* is set to 4, each column will have 5 rows. If the *Number of columns* is set to 5, each column will have 4 rows.

Sample Options

The *Sample Options* determines how scheme items are displayed in the legend. To change the sample option, click on the existing option and select the desired option from the list. The available options are *Rectangle, Symbol,* and *Both*. *Rectangle* shows small rectangles displaying the scheme's fill and line properties. This is useful when displaying legends for a zone bar, bar, percentage, well construction, or lithology logs. *Symbol* shows the symbol properties specified in the scheme. This is useful for displaying the scheme information for a post or classed post log. *Both* displays both the filled rectangle and the symbol.

Sample Width

The *Sample Width* controls the width of the rectangle next to each entry in the legend. The width is displayed in page units, ranging from 0.1 to 2.0 inches (0.254 to 5.08 centimeters). To change the width, highlight the existing value and type a new value.

Press ENTER on the keyboard to make the change. Alternatively, click the button to increase or decrease the width of the filled rectangles. *Sample Width* is not available if the *Sample Options* is set to *Symbol*.

Space Between Samples

The *Space Between Samples* option controls the display of the space between the rectangle or symbol samples in a legend. Check the box next to *Space Between Samples* to display a small space between adjacent rows. Uncheck the box to have the filled rectangles or symbols in adjacent rows touch.

Label Sample on Left

The *Label sample on left* option controls the location of the labels relative to the filled rectangles or symbols. To display the labels on the left side of the rectangles and symbols, check the box next to *Label sample on left*. To display the labels on the right side, uncheck the box.

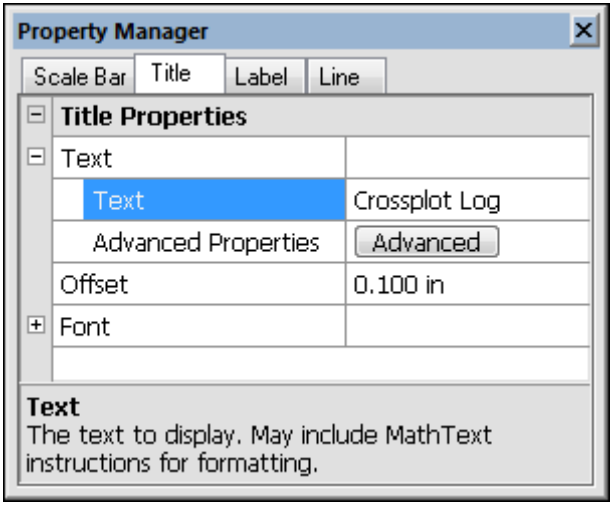
Title Page

The **Title** page in the **Property Manager** controls the location, text, and font properties for the scale bar or legend title.

Text Properties

Click the ⊞ next to *Text* to open the *Text* section. You can set the text that appears for the title by highlighting the existing text next to *Text* and typing the desired text. Press ENTER on the keyboard for the change to be displayed in the view window.

For multiple lines of text or for text that uses different font properties for some characters, click the Advanced button next to *Advanced Properties*. The **Text**



*Click on the **Title** tab in the **Property Manager** to set the scale bar title text properties.*

Editor opens, allowing each character to have different properties.

Offset

The *Offset* determines how far the title is from the scale bar labels. The distance must be between -2.0 inches and 2.0 inches. To change the offset, highlight the existing value and type a a new value or click the button to increase or decrease the values. Press ENTER on the keyboard and the scale bar title is updated. The offset is not available for legends.

Font Properties

Click the ⊞ next to *Font* to open the font properties section. The properties in this section affect all text in the title, unless advanced text properties have been set.

Label Page

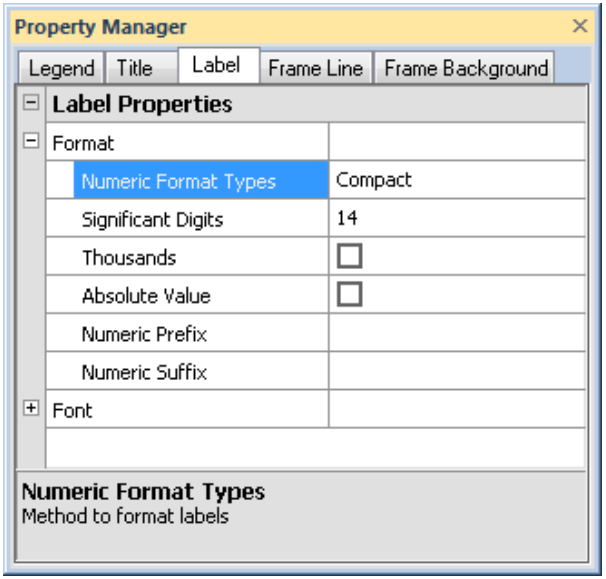
The **Label** page in the **Property Manager** includes options for setting the label font and format for a legend. To view and edit legend label properties, click on the legend in the view window or **Object Manager** to select the legend. Then, click on the **Label** tab in the **Property Manager**.

Format

Click the ⊞ next to *Format* to open the label format section.

Font

Click the ⊞ next to *Font* to open the font properties section.



*Set label properties on the **Label** tab in the **Property Manager**.*

Frame Line Page and Frame Background Page

Set the line properties for the legend frame on the **Frame Line** tab.

Set the fill properties for the legend background on the **Frame Background** tab.

Setting the Legend Frame

Before making any line or fill changes for the legend frame, click on the Legend tab and set the *Frame Style* to either *Rectangle* or *Rounded Rectangle*. Click on the **Frame Line** tab and change the *Style, Color, Foreground Opacity*, and *Width* of the frame line. Click on the **Frame Background** tab and change the fill properties.

Drawing Tips

The below drawing tips work for most drawing objects.

- Click individual points on the page to draw a polygon or polyline.
- Click only the endpoints of the polyline to draw a straight line.
- Click the endpoints of the unconformity to draw a wavy line that varies uniformly along the entire length of the line, or click several points to create an irregularly shaped wavy line.
- Sharp changes in direction for the unconformity line bends the unconformity along the center axis. Connections for the waves will bend, which may result in jaggedness.
- Click and hold the left mouse button and drag the pointer to draw a continuous stream of points for polygons or polylines.
- Click the right mouse button to remove the last drawn point. Repeatedly clicking the right mouse button removes all points in reverse order.
- Press the CTRL key on the keyboard to constrain the points to 45-degree angles.
- Press the CTRL key on the keyboard when drawing a rectangle, rounded rectangle, or ellipse to draw a square, rounded square, or circle.
- Double-click the left mouse button or press ENTER on the keyboard to close the polygon.
- To cancel drawing, press the ESC key before finishing the object.
- Edit the selected object properties in the **Property Manager**.
- Edit the object shape by selecting the object and clicking the **Draw | Reshape** command.
- Default properties are set through the **Tools | Options** command.
- Rotate an object by clicking on the object in the **Object Manager** or view window to select it. Click the **Arrange | Rotate** command. Alternatively, right-click on the object and select *Rotate.* Set the rotation angle and click *OK*.

Inserting a Map View

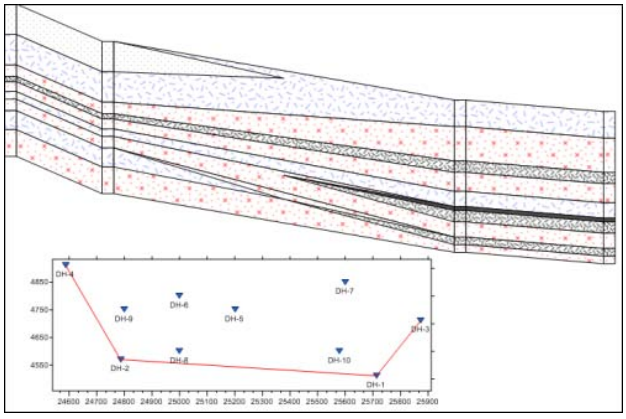
An inserted map view provides location information for the boreholes displayed in a borehole view or cross section view. To insert a map view into a borehole view or cross section view, click the **Draw | Insert Map View** command. If only one map view exists, the map is immediately displayed. If multiple map views exist, select the desired map view from the dialog and click *OK*. The map is added to the borehole view or the cross section view in the center of the selected pane.

Changing the Inserted Map

To change the map that is displayed in the inserted map, click on the *Map View* object in the **Object Manager**. In the **Property Manager**, click on the name next to *Map View Name*. In the list, select the desired map view to display. The inserted map automatically updates. Click *[None]* if no map view should be displayed.

Editing the Inserted Map

The inserted map displays exactly as it appears in the linked map view. To make any changes to the inserted map, select the map view in the **View Manager**. Make any changes to the appearance of the map and the inserted map automatically updates.



Insert a map view into a cross section, to give the cross section spatial perspective.

Insert Map View Unavailable

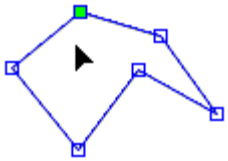
If no map view has been created in the project, the **Draw | Insert Map View** command is not available. Create a map view by clicking the File | New | Map View command. In the map view, creating a base map or well location map. Then insert the map in the borehole view or cross section view using the **Draw | Insert Map View** command.

Reshape

Click the **Draw | Reshape** command to move, add, or delete vertices from polylines and polygons. The **Draw | Reshape** command is also used to edit cross section connections.

Entering the Reshape Mode

Click on the polyline, polygon, or cross section layers either in the **Object Manager** or the view window to select the object. Click the **Draw | Reshape** command, click the  button, or right-click on the object and choose *Reshape* to enter the reshape mode. After selecting **Reshape**, the cursor changes to  to indicate reshape mode. For a cross section, click on the layer name in the **Object Manager** or in the cross section view window and click the **Draw | Reshape** command to edit a specific layer. The object's vertices appear as hollow blue squares. Reshape mode is persistent and you can reshape multiple items until you exit the reshape mode. After you reshape an object, select another object to reshape or exit reshape mode.



*When **Reshape** is activated the lines of the object turns blue, with blue squares for vertices.*

Exiting the Reshape Mode

To exit reshape mode and save the changes made to the object, press ENTER on the keyboard, press ESC on the keyboard, select another command or toolbar button, or double-click in the white space in the view window.

Selecting Vertices

- Left-click on a vertex to select it. The selected vertex is indicated by a solid cyan square.
- To select the first vertex, press the HOME key. To select the last vertex, press the END key.
- To shift the selected vertices forward by one position, press the TAB key. To shift the selected vertices backward by one position, hold the SHIFT key and press the TAB key.
- Hovering the mouse over an unselected vertex will display a grey highlight around the vertex indicating it may be selected or dragged.

- The cursor will change to when it is over a vertex to indicate the vertex may be selected or dragged.



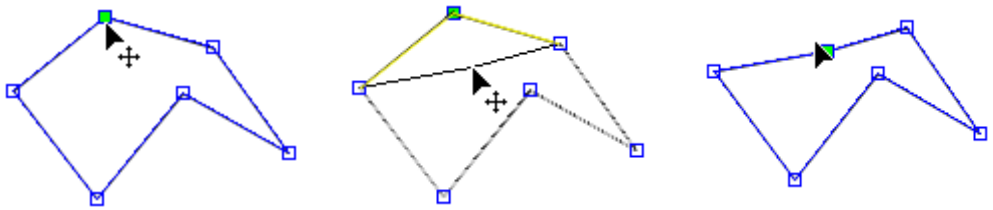
A selected vertex turns cyan.

Deselecting Vertices

All vertices can be deselected by clicking in an unused space in the view window.

Moving Vertices

When a vertex is selected and the cursor displays as , hold the left mouse button down and drag the vertex to a new location. As the vertex is dragged its prior position is still visible as a cyan square. The location of the former line segments are displayed in yellow, and the current location of the line segments is displayed in black. Release the left mouse button to place the vertex in the new location. Alternatively, place the cursor over the vertex, hold the SPACEBAR, and use the ARROW keys on the keyboard to move the vertex to a new location.



Click on a vertex and drag it to the new location.
Release the mouse button and the vertex is moved.

Undo Moving Vertices

Each individual edit can be undone using the **Edit | Undo** command.

Adding Vertices

To enter insert mode, hold down the CTRL key. The cursor will change to ⊕. Left-click anywhere in the view window, or on the existing object and a new node will be added at that location to the closes point on the existing object.

Deleting Vertices

To delete a vertex, select the vertex and press the DELETE key on the keyboard.

Unlinking Vertices

If two or more vertices are linked together, you can unlink them by pressing the SHIFT key on the keyboard, selecting one vertex and moving it to a new location.

Linking Vertices

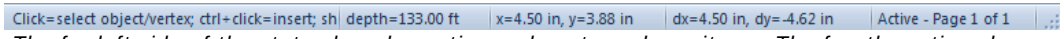
If two or more vertices should be linked together, you can press the SHIFT and ALT keys on the keyboard. Then, click on the first vertex and drag it near the other vertex. The point will snap to the nearby point.

Panning

While in reshape mode you can move the page by holding down the left mouse button in an area where there are no vertices and dragging the mouse.

Status Bar

When the reshape tool is active, the status bar displays tips on reshaping objects on the far left side. The fourth section indicates how far the selected vertex has been moved.



The far left side of the status bar shows tips on how to reshape items. The fourth section shows how far the vertex has been moved (4.50 inches to the right in the X direction and 4.62 inches down in the Y direction).

To Reshape a Polyline or Polygon

To edit a polyline or polygon:

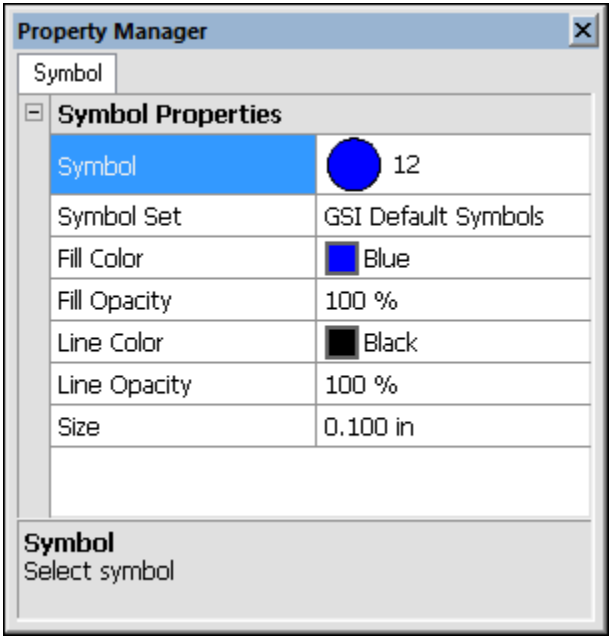
1. Click on the polyline or polygon in the view window or **Object Manager** to select it.
2. Click the **Draw | Reshape** command.

3. The cursor changes to and all the vertices in the selected polyline or polygon appear as small hollow squares.
4. To move a vertex, left-click on the vertex with the mouse and drag it to a new location.
5. To add a vertex, hold down the CTRL key and click the area on the polygon or polyline where the point should be added.
6. To delete a vertex, click on the vertex to delete and press the DELETE key on the keyboard.
7. After reshaping the object, press the ENTER or ESC key to exit edit mode.

Symbol Properties

Symbol properties can be changed for selected objects in the borehole, map view, or cross section view windows. Default symbol properties are set by clicking the **Tools | Options** command. Custom symbols can be created using a third party TrueType font editing software.

If the options on the **Symbol** tab are not available, a scheme is likely being used. Uncheck the appropriate *Use Keyword Scheme, Use Range Scheme,* or *Use Indent Keyword Scheme* option to turn off the display of the scheme properties and set the symbol properties on the **Symbol** tab.



*Set the symbol properties for the selected object in the **Property Manager**.*

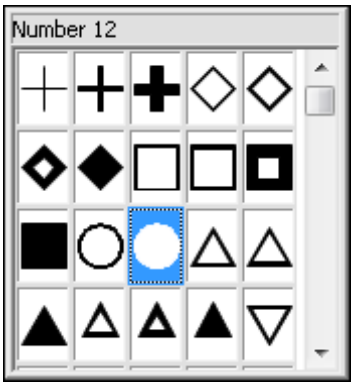
Symbol

The *Symbol* is the symbol that is displayed for the selected object. To change the *Symbol*, click on the existing symbol. The symbol palette is displayed. Click on the new symbol. The object is automatically updated to show the new symbol.

The symbol index is the symbol or glyph number as it appears in the title bar above the palette and adjacent to the symbol in the **Property Manager**.

Symbol Set

The *Symbol Set* displays the font that is currently used for the symbol. To change the *Symbol Set*, click on the existing symbol set name. In the list, select a new font from the list. All TrueType fonts are listed in the *Symbol Set*.



Use the symbol palette to select a symbol.

Fill Color

The *Fill Color* is the inside color of the symbol, when the selected symbol is a solid filled symbol. To change the *Fill Color* of the symbol, click on the existing *Fill Color* and select a new color from the color palette. Create new colors by clicking the Custom button at the bottom of the color palette.

Fill Opacity

The *Fill Opacity* controls the transparency of the filled portion of the symbol. To change the *Fill Opacity*, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click on the button to increase or decrease the opacity value. Opacity values are between 0% (zero opacity, full transparency) to 100% (full opacity, zero transparency).

Line Color

The *Line Color* is the outside edge color of the symbol. To change the symbol outline color, click on the existing *Line Color* and select a new color from the color palette. Create new colors by clicking the *Custom* button at the bottom of the color palette.

Line Opacity

The *Line Opacity* controls the transparency of the line around the symbol. To change the *Line Opacity*, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click on the button to increase or decrease the opacity value. Opacity values are between 0% (zero opacity, full transparency) to 100% (full opacity, zero transparency).

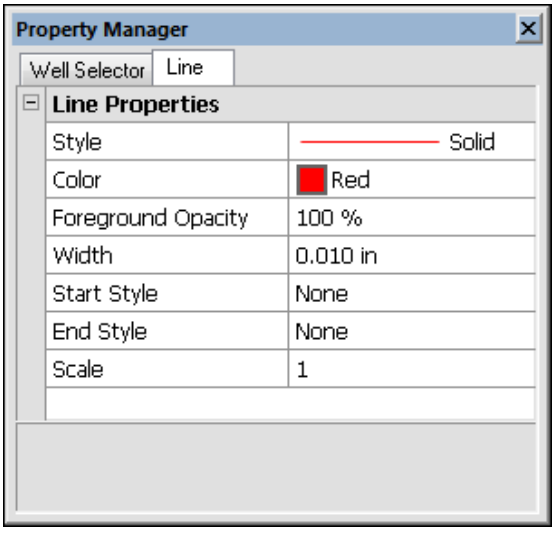
Size

The *Size* controls the symbol size. This is the size of the full symbol box, not just the symbol glyph. To change the *Size* of the symbol, highlight the existing value and type

a new number in the box. Alternatively, click on the  button to increase or decrease the size of the symbol. Symbol sizes are between 0.0 and 4.0 inches (0.0 and 10.16 centimeters) and are shown in page units.

Line Properties

Use line properties to change line properties for selected lines in the view. To edit the line properties, click on the object in the **Object Manager** or plot window to select it. The properties are listed in the **Property Manager**. Default line properties are set in the **Tools | Options** dialog on the **Line** page.



The Line Properties *section controls theline properties for the selected object.*

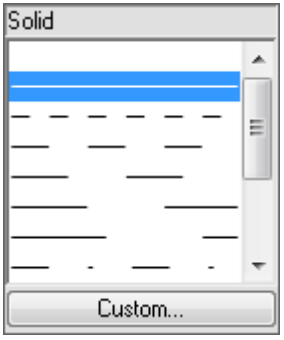
If the options on the **Line** tab are not available, a scheme is likely being used. Uncheck the appropriate *Use Keyword Scheme, Use Range Scheme,* or *Use Indent Keyword Scheme* option to turn off the display of the scheme properties and set the line properties on the **Line** tab.

Use Keyword Scheme For Line

Check the box next to the *Use Keyword Scheme For Line* option to set the line properties for a percentage log from the keyword scheme. Uncheck the box for all percentage line properties to be controlled by the properties on the **Line** tab.

Style

Click the line next *Style* to open the line style palette. Click on a style to use it for the selected line. The line style sample updates to show the new selection.

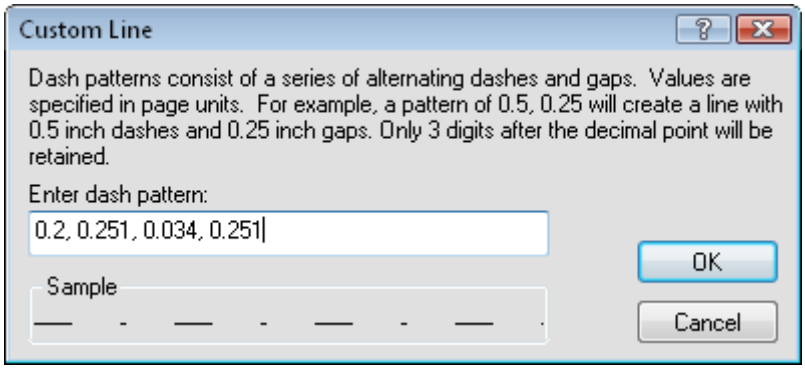


Select a predefined or custom line style from the line palette.

Click the *Custom* button at the bottom of the line style palette to open the **Custom Line** dialog to

create new line styles.

The *Enter dash pattern* field determines the pattern of the custom line. To create custom lines, specify the line and gap lengths. All line styles are entered numerically and begin with the first line segment, or *dash*. The next value is a gap length, followed by a dash length, gap length, etc. until all values are input. The *Sample* box shows the new line style as it is created.



*Enter the dash pattern in the **Custom Line** dialog to create new line styles.*

As an example, the following is a line pattern that is easily created in the **Custom Line** dialog:

1. Enter the first dash length in inches, such as 0.200 for the example above, followed by a comma.
2. Enter the first gap length in inches, 0.251 for the example above, followed by a comma.
3. The second dash segment in this repeating pattern is a short 0.034 inches, followed by a comma.
4. Another gap of length of 0.251 inches, followed by a comma.
5. The pattern repeats after the last value so no more dash or gap definitions are necessary.
6. Click *OK* to place the new line pattern in the palette as a custom style selection.

A combination of up to ten dashes and ten gaps can be used to create a new line style. Each number in the dash or gap can have three decimal digits of precision.

Color

Click the color next to *Color* to open the color palette. Click on a color to use it for the selected line. The color box and the sample line update to show the new selection. Click on the *Custom* button at the bottom of the color palette to choose a custom color.

Foreground Opacity

The *Foreground Opacity* changes the opacity (transparency) of the line. Values range between 0% (completely transparent) to 100% (completely opaque). To change the opacity, highlight the existing value and type a new value or click the  to increase or decrease the opacity level.

Width

Change the line *Width* by highlighting the existing value and typing a new number or by clicking the  to increase or decrease the line width. The line width can be zero to 0.5 inches (1.27 cm) wide. A width of zero is one pixel wide.

Start Style

For polylines the *Start Style* option is available. The *Start Style* adds an arrow to the starting point of the polyline. To set the arrow style, click on the existing option and select the desired option. Available options are *None* (no arrow drawn), *Simple head, Filled head, Triangle head,* and *2-Stick head*.

End Style

For polylines the *End Style* option is available. The *End Style* adds an arrow to the ending point of the polyline. To set the arrow style, click on the existing option and select the desired option. Available options are *None* (no arrow drawn), *Simple head, Filled head, Triangle head,* and *2-Stick head*.

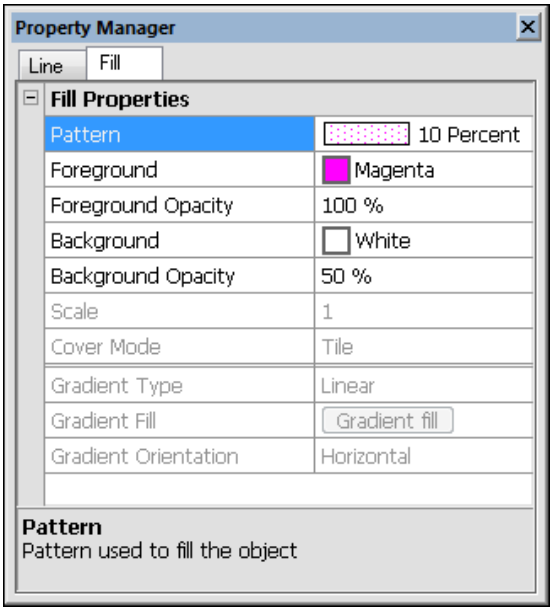
Scale

For polylines the *Scale* option is available. The *Scale* controls the relative size of the selected start and end arrow styles. Values are between 0.001 and 100. To change the scale, highlight the existing value and type a new value or click the  to increase or decrease the arrow scale.

Fill Properties

Fill properties can be changed for selected objects. To edit the fill properties, click on the object in the **Object Manager** or plot window. The properties are listed in the **Property Manager**. Default fill properties are set in the **Tools | Options** dialog by clicking on the **Fill** page.

If the options on the **Fill** tab are not available, a scheme is likely being used. Uncheck the appropriate *Use Keyword Scheme, Use Range Scheme,* or *Use Indent Keyword Scheme* option to turn off the display of the scheme properties and set the fill properties on the **Fill** tab.

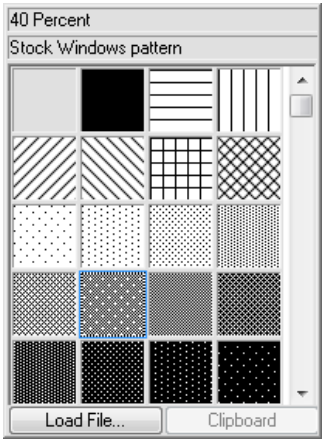


*The **Fill** page in the **Property Manager** controls the fill properties for the selected object.*

Pattern

The *Pattern* indicates the way that an object is filled. To change the *Pattern*, click on the existing pattern sample next to *Pattern*. In the list, select a new pattern from the fill palette. There are three types of fill patterns: Windows stock, image, and gradient patterns. Stock patterns and some image patterns can have different foreground and background colors. All patterns can have the foreground or background color partially transparent. Image patterns can be scaled.

Load an image as a fill pattern by clicking the *Load File* button at the bottom of the palette. Use an image placed on the clipboard by clicking the *Clipboard* button at the bottom of the palette.



Select the desired fill pattern from the list.

Foreground

The *Foreground* is the color of the pattern. Click the existing color sample next to *Foreground* to open the

color palette. Click on a color in the palette to use it for the selected foreground fill color. Click the Custom button at the bottom of the palette to open the Colors dialog and create custom colors.

Foreground Opacity

The *Foreground Opacity* controls the transparency of the foreground portion of the pattern. To change the *Foreground Opacity*, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click on the  button to increase or decrease the opacity value. Opacity values are between 0% (zero opacity, full transparency) to 100% (full opacity, zero transparency).

Background

The *Background* is the color behind the pattern. Click the existing color sample next to *Background* to open the color palette. Click on a color in the palette to use it for the selected foreground fill color. Click the *Custom* button at the bottom of the palette to open the **Colors** dialog and create custom colors.

Background Opacity

The *Background Opacity* controls the transparency of the background portion of the pattern. To change the *Background Opacity*, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click on the  button to increase or decrease the opacity value. Opacity values are between 0% (zero opacity, full transparency) to 100% (full opacity, zero transparency).

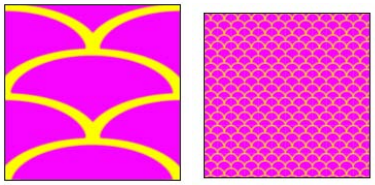
To make a fill pattern appear transparent with only the foreground portion of the fill pattern showing, change the *Background Opacity* value to 0%.

Scale

The *Scale* controls the density of the image fill *Pattern*. This option is only available when an image pattern is selected and *Cover Mode* is set to *Tile*. Set the *Cover Mode* to *Tile* and set the *Scale* factor to a value between 0.1 and 10. The larger the *Scale*, the larger the resulting pattern.

Cover Mode

The *Cover Mode* is used with image patterns. The *Cover Mode* determine how the image is used to fill the desired area. You can *Stretch* a image to fit the fill area or *Tile* the pattern in the fill area.

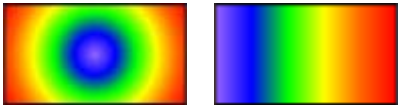


The image fill on the left has the Cover Mode *set to* Stretch*.*
The image on the right has the Cover Mode *set to* Tile*.*

Gradient Type

The *Gradient Type* controls how a gradient fill pattern is used to fill the selected area. To use a *Gradient Type*, a gradient must first be selected in the *Pattern* list. The gradients are at the very bottom of the *Pattern* list.

To change the *Gradient Type*, click on the current type and select the new type in the list. Select *Linear* or *Radial* for the *Gradient Type*. When the *Gradient Type* is set to *Linear*, a linear color gradient fills the area. The colors change in a linear manner from the top to the bottom or from the left to the right of the area. When the *Gradient Type* is set to *Radial*, a radial color gradient fills the area. The colors change in concentric circles, either expanding from the interior and going out or from the exterior and going in.



The Radial *type is shown on the left and the* Linear *type is shown on the right.*

Gradient Fill

The *Gradient Fill* option sets the colors to use in the gradient pattern. Click the 

button to select or create a color gradient in the Colormap dialog. This option is disabled if the *Pattern* is not set to a gradient pattern.

Fill Orientation

The *Fill Orientation* option sets the direction the gradient fills. When the *Gradient Type* is set to *Linear,* choose either *Vertical* or *Horizontal* for the *Fill Orientation*. The *Vertical* option sets the gradient to change along the Y axis. The *Horizontal* option sets the gradient to change along the X axis. When *Radial* is selected as the *Gradient Type*, the *Fill Orientation* options are *Inward* and *Outward.* This reverses the color direction. The *Fill Orientation* option is disabled if the *Pattern* is not set to a gradient pattern.

Schemes and Fill Properties

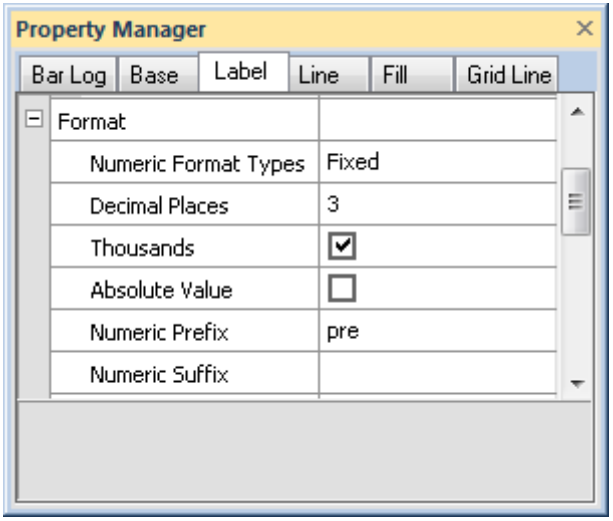
Note that if a scheme is used in a log item, the fill properties will be unavailable on the **Fill** tab. You must change the fill properties for the scheme in the **Scheme Editor** or turn off the display of the scheme.

Numeric Format Properties

Most labels can have different numeric formats. Use the following options to change the numeric format options.

Format

Click the ⊞ next to *Format* to set the numeric format for the labels.



Set the Format *options for labels.*

Numeric Format Types

Set the *Numeric Format Types* to the desired format. Options include *Fixed, Exponential,* and *Compact.* To change the format, click on the existing option and select the desired option from the list.

Fixed displays a numeric label with a fixed number of decimal digits. You can change the number of digits to the right of the decimal by changing the *Decimal Digits.* For example, if you set the decimal digits to 3, the number 24 is displayed as 24.000.

Exponential displays the numeric label in exponential format. You can change the number of digits to the right of the decimal by changing the *Decimal Digits.* For example, if you set the decimal digits to 3, the number 24 is displayed as 2.400E+1.

Compact is the default value and displays the labels in a format that requires the fewest digits [up to 14 digits]. You can change the number of digits before and after the decimal by changing the *Significant Digits.* For example, if you set the *Significant Digits* to 2, the number 172 is displayed as 1.7E+2. If the *Significant Digits* is set to 3, the number is displayed as 172.

Decimal Digits or Significant Digits

The *Decimal Digits* controls the number of digits displayed to the right of the decimal for *Fixed* and *Exponential* numeric formats. The *Significant Digits* controls the total number of digits before and after the decimal for *Compact* numeric formats. To change the number, highlight the existing value and type a new value or click the  to increase or decrease the value.

Thousands

Check the box next to *Thousands* to include a separator every 3 digits to the left of the decimal for numbers greater than 999. Unchecking this box does not display the thousands separator. When the *Decimal Separator* in the Options dialog is set to *Comma*, the comma is used as the thousands separator. When the *Decimal Separator* is set to *Period*, the period is used as the thousands separator. When the *Decimal Separator* is set to *System default*, the Windows system settings determine the thousands separator.

Absolute Value

Check the box next to *Absolute Value* to display both negative and positive values identically, for example -2 and 2 would both display as 2.

Prefix

Click in the box next to *Numeric Prefix* to type the prefix for the value. *Numeric Prefix* adds a prefix to all displayed numbers. For example, if the numbers displayed were in dollars you can add a **$** in this field that is placed in front of all numbers.

Suffix

Click in the box next to *Numeric Suffix* to type the suffix for the value. *Numeric Suffix* adds a suffix to all displayed numbers. For example, if you are displaying percentages you can add a **%** in this field that is placed after each number.

Font Properties

Font properties can be changed for most text objects, including labels. Use the following options to change the text values.

Face

Use the *Face* option to change the font for the text. All TrueType fonts are listed in the font list. to change the font, click on the existing option and select the desired font from the list.

Points

Set the text size in the *Points* field by scrolling to a new number using the  or by highlighting the existing value and typing a number into the box. Sizes are in points.

Foreground Color

Change the *Foreground Color* of the text by clicking on the color box. Select a new color by clicking on a color in the color palette. You can create new colors by clicking the Custom button at the bottom of the color palette.

Foreground Opacity

Use the *Foreground Opacity* to change the opacity of the text. 0% is completely transparent and 100% is completely opaque. To change the value, highlight the existing value and type a new value or click the  to increase or decrease the value.

Background

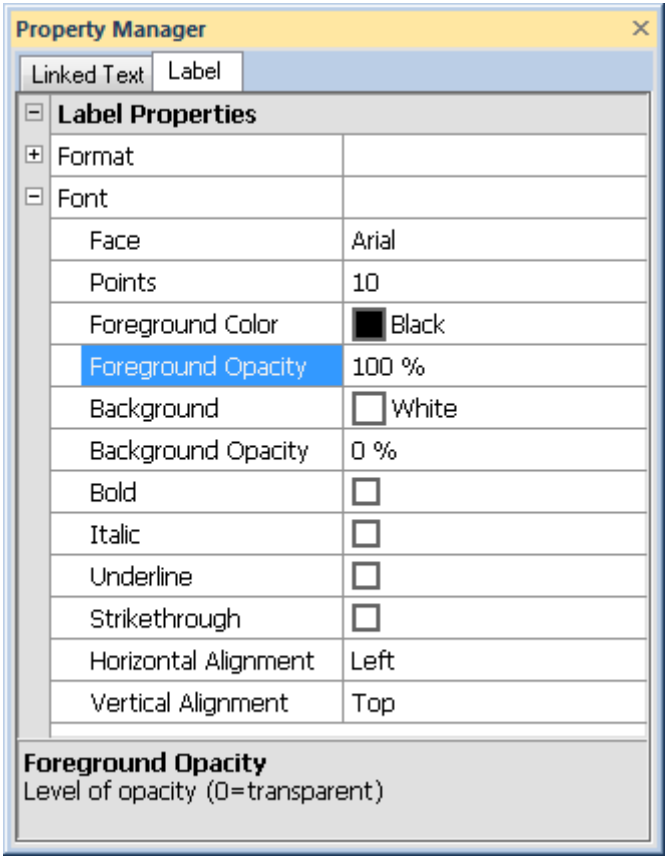
Use *Background* to change the color fill of a background rectangle that surrounds the text. Click the color box and select from the palette or click *Custom* to select a custom color.

Background Opacity

Use *Background Opacity* to change the opacity of the background. 0% is completely transparent and 100% is completely opaque. To change the value, highlight the existing value and type a new value or click the  to increase or decrease the value.

Style

In most places text options will appear in the **Property Manager**. In these case, check the box next to the *Bold, Italic, Underline,* and *Strikethrough* options to apply one or more of those text styles. Note that some typefaces, such as *Symbol*, do not support bold or italicized text.



The Font *section displays the options for setting the font properties.*

Horizontal Alignment

Use *Horizontal Alignment* to place text horizontally in the selected object. The reference point for alignment is the exact center of the object.

- *Left* horizontally aligns a text box so that the reference point is to the left of the text box. For labels in bar, zone bar, and complex text logs, *Left* aligns the label to the left side of the bar.
- *Center* horizontally centers the text box on the reference point. For labels in bar, zone bar, and complex text logs, *Center* aligns the label in the center of the bar.
- *Right* horizontally aligns the text box so that the reference point is to the right of the text box. For labels in bar, zone bar, and complex text logs, *Right* aligns the label to the right side of the bar.

Vertical Alignment

Use *Vertical Alignment* to place default text vertically in the selected object. The reference point for alignment is the exact center of the object.

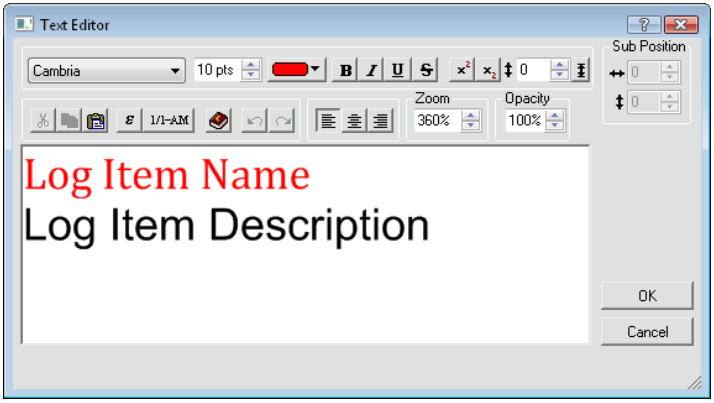
- *Top* vertically aligns the text box so that the reference point is above the text box. For labels in bar, zone bar, and complex text logs, *Top* aligns the label at the top of the bar.
- *Center* vertically centers the text box on the reference point. For labels in bar, zone bar, and complex text logs, *Center* aligns the label in the center of the bar.
- *Baseline* vertically aligns the text box so that the reference point is located at the base of the text. The baseline is the imaginary line along which characters are positioned as they are drawn. Descenders on characters are drawn below the baseline. For labels in bar, zone bar, and complex text logs, *Baseline* aligns the baseline of the label at the center of the bar.
- *Bottom* vertically aligns the text box so that the reference point is below the text box. For labels in bar, zone bar, and complex text logs, *Bottom* aligns the label at the bottom of the bar.

Text Properties

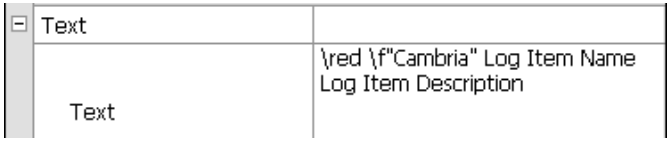
Click the ⊞ next to *Text* to open the *Text* section. You can set the text that appears by highlighting the existing text next to *Text* and typing the desired text. The ENTER key on the keyboard can be used to create multiple lines of text. Click anywhere else in the **Property Manager** for the change to be displayed in the view window.

For text that uses different font properties for some characters, click the Advanced button next to *Advanced Properties*. The **Text Editor** opens, allowing each character to have different properties.

For example, suppose you type the following in the **Text Editor**. After typing the text, you have highlighted the first line and made the color red and font *Cambria*.



After clicking *OK* in the **Text Editor**, the following appears in the *Text* section of the **Property Manager**:



The two lines of text would appear in the view window as:

Log Item Name
Log Item Description

Now, in the **Property Manager** in the *Font* section, set the *Face* to "Calibri", the *Foreground Color* to Blue, and set the *Bold* and *Italic* to *Yes*. Because the first line contains a font name and color, the font and color will not change. But, the red text will be bold and italic.

Log Item Name
Log Item Description

If the second line of text should remain without any text embellishments, such as bold or italics, in the **Property Manager**, click before the *Log Item Description* text and add a *\plain* math text option. This does not control the font name and color, so they will change. The **Property Manager** would appear as:

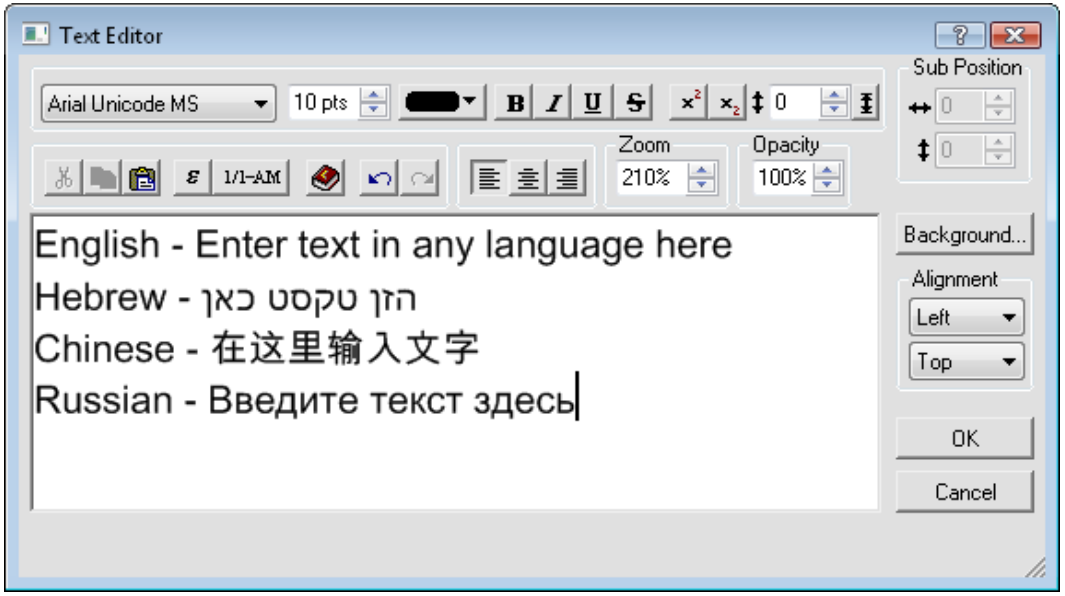
Font Properties	
Text	
Text	\red \f"Cambria" Log Item Name \plain Log Item Description
Advanced Properties	Advanced

And, the text would appear in the view window as:

Log Item Name
Log Item Description

Text Editor

You can access the **Text Editor** by creating new text or by editing existing text.



*Type or edit text in the **Text Editor**.*

Text Appearance

Select a typeface from the list in the upper left corner of the dialog.



Set the font, font size, and color. Add bold, italic, underline, or strikethrough properties to the highlighted text.

Set the size (in points) of the typeface in the box to the right of the typeface list.

Click the colored button to the right of the size box to display the color palette and change the text color.

Several styles (including bold, italic, underline, and strikethrough) can be applied to the text. Note that some typefaces, such as Symbol, do not support bold or italicized text.

Superscripts and Subscripts

When working with superscripts and subscripts, you can type the character, highlight it, and then click the superscript or subscript buttons. Alternatively, you can also click the  button or  button and then type the characters. Click the  button or  button a second time to return to the normal size font and placement.

If the default superscript or subscript placement is not sufficient, you can highlight the text and enter a number in the box adjacent to the subscript box to raise or lower text from the midpoint of the existing line. Click the  button to reset the highlighted character's position to the default unsuperscripted or unsubscripted position.

You can click in any field in a template and use the boxes below *Sub Position* to modify the position of the field in a template. The values are offsets from the main character's zero position and are in pixels. How far each value moves the template field is determined in part by the font size. Positive values move the field to the right and up.

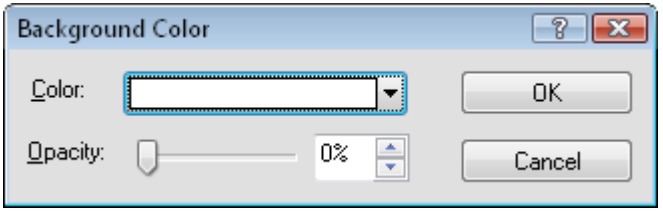
Editing Tools

Text can be edited using the following tools:

- You can cut, copy, or paste selected text, or paste objects from the clipboard into the **Text Editor**.
- Click the button to open the **Symbol Properties** dialog and add a symbol to the text block.
- Click the button to open the **Insert Date/Time** dialog and enter the date or time. The information entered in this dialog will automatically update every time the **Strater** project is redrawn.
- Click to open the Template Library dialog and enter equations based on a template.
- You can undo and redo actions.
- You can left justify, right justify, or center the text in the bounding box. These options only make a difference with multiple lines of text.
- You can magnify text in the **Text Editor** by entering a new number in the *Zoom* box. By default, the text is zoomed to a reasonable level.
- You can adjust the opacity of the selected text by entering a new number in the *Opacity* box. Enter a value between zero (no opacity, full transparency) and 100% (full opacity, no transparency).

Background

Click the *Background* button to open the **Background Color** dialog to set the background fill properties for the text object. To edit the background fill for text that already exists, change the *Background* and *Background Opacity* options in the **Property Manager** on the Font tab.



*Set the background color and opacity in the **Background Color** dialog.*

Text Box Alignment

A reference point is the point clicked on in the view window after clicking the **Draw | Text** command. The text box is horizontally and vertically aligned relative to the reference point. The default position is that the reference point is at the upper left corner of the bounding box (left, top).

- *Right* horizontally aligns the text box so that the reference point is to the right of the text box.
- *Left* horizontally aligns the text box so that the reference point is to the left of the text box.
- *Center* horizontally centers the text box on the reference point.
- *Bottom* vertically aligns the text box so that the reference point is below the text box.
- *Top* vertically aligns the text box so that the reference point is above the text box.
- *Baseline* vertically aligns the text box so that the reference point is located at the base of the text. The baseline is the imaginary line along which characters are positioned as they are drawn. Descenders on characters are drawn below the baseline.

To edit the alignment for text that already exists, change the *Horizontal Alignment* and *Vertical Alignment* options in the **Property Manager** on the Font tab.

Resize the Text Editor

To make the **Text Editor** larger or smaller, click and drag on the lower left corner of the dialog. When the dialog is the desired size, release the mouse button.

OK or Cancel

Click the *OK* button to save your changes and close the **Text Editor**. Click the *Cancel* button to exit the **Text Editor** without saving your changes.

Symbol Properties Dialog

The **Symbol Properties** can be used to insert symbols from any font into a text block in the **Text Editor** or change for selected objects in the text template.

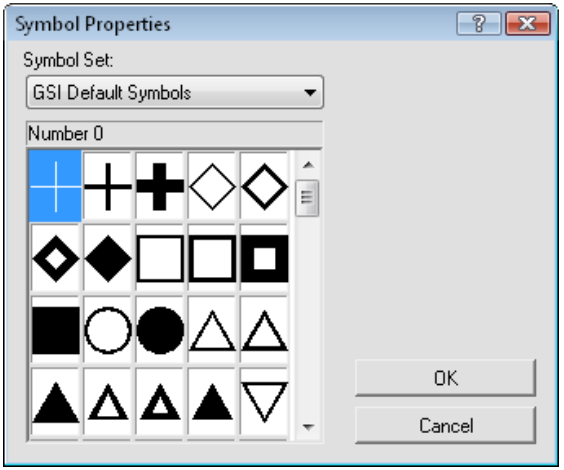
You can set default symbol properties through the **Tools | Options** command. In the **Options** dialog, scroll down to the *Symbol* section to access these defaults. Changes made in the **Options** dialog affect all subsequent documents. Custom symbols can be created using a third party TrueType font editing software.

Symbol Set

The *Symbol Set* displays all the fonts installed on the computer. Click on the symbol set name and then you can choose a new font from the list.

Symbol

Click on the displayed symbol to choose a *Symbol* from the symbol palette. The number of the selected symbol is indicated in the title bar above the palette and adjacent to the symbol in the **Property Manager**. Add 32 if you are using font sets or TrueType symbols, such as GSI Default Symbols.



Specify a Symbol Set *and* Symbol *in the* ***Symbol Properties*** *dialog.*

The symbol index is the symbol or glyph number as it appears in the title bar above the palette and adjacent to the symbol in the **Property Manager**.

Insert Date/Time Dialog

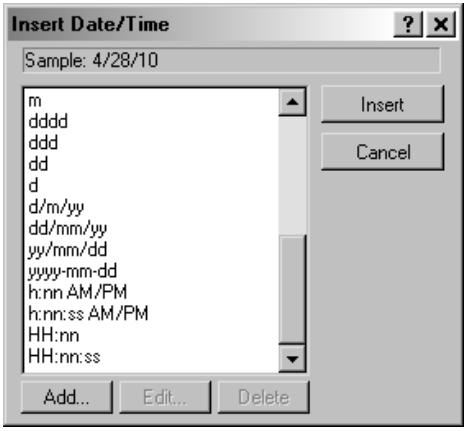
In the **Text Editor** dialog, click the 1/1-AM button to open the **Insert Date/Time** dialog. The date/time will update every time the project updates.

Format List

Select a default format from the list. Use the vertical scroll bar to scroll through the list. A sample of the selected format is displayed above the list.

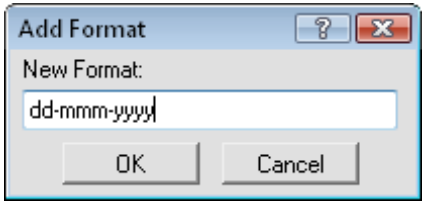
Add

Click the *Add* button to open the **Add Format** dialog and add a new format.



The ***Insert Date/Time*** *dialog allows you to select from many different date and time formats, and create new formats.*

The **Add Format** dialog is used to add a custom date/time format. The **Edit Format** dialog is identical, but is used to edit existing custom date/time formats. Enter a new format in the *New Format* box. See the *Add or Edit Format* section for a list of format examples.



*Add custom date formats in the **Add Format** dialog.*

Edit

Select a custom format. Click the *Edit* button to open the **Edit Format** dialog and edit the custom format. The default formats cannot be edited.

Delete

Select an custom format. Click the *Delete* button to delete the custom format. The default formats cannot be deleted.

Insert or Cancel

Click the *Insert* button to insert the selected date/time format. Click the *Cancel* button to close the **Insert Date/Time** dialog without making changes.

Add or Edit Date/Time Formats

You can create custom formats for dates and times.

Predefined Formats

The following predefined date/time designations are available:

Date/Time Code	Description	Example
m/d/yy	Month single digit number excludes leading 0, 1-12, then Day single digit numbers excludes leading 0, 1-31, then Last two digits of year	7/14/09
mm/dd/yy	Month double digit number includes leading 0, 01-12, then Day double digit numbers including leading 0, 01-31, then Last two digits of year	07/14/09

Date/Time Code	Description	Example
mmm dd, yyyy	Month name abbreviated, then the Day double digit numbers including leading 0, 01-31, then Year	Jul 14, 2009
mmmm dd, yyyy	Month name, then the Day double digit numbers including leading 0, 01-31, then Year	July 14, 2009
d-mmm-yy	Day single digit numbers excludes leading 0, 1-31, then Month name abbreviated, then Last two digits of year	14-Jul-09
d-mmm	Day single digit numbers excludes leading 0, 1-31, then Month name abbreviated	14-Jul
mmm-yy	Month name abbreviated, then Last two digits of year	Jul-09
mmm-yyyy	Month name abbreviated, then Year	Jul-2009
mmmm-yyyy	Month name, then Year	July-2009
h:nn AM/PM	Hour in standard format, then Minutes, 0 to 60, then a space and AM or PM	2:45 PM
h:nn:ss AM/PM	Hour in standard format, then Minutes, 0 to 60, then Seconds, 0 to 60, then a space and AM or PM	2:45:44 PM
hh:nn	Hour, 0-23 (military time), then Minutes, 0 to 60	14:45
hh:nn:ss	Hour, 0-23 (military time), then Minutes, 0 to 60, then Seconds, 0 to 60	14:45:44
m/d/yy hh:nn	Month single digit number excludes leading 0, 1-12, then Day single digit numbers excludes leading 0, 1-31, then Last two digits of year, then a space and Hour, 0-23 (military time), then Minutes, 0 to 60	7/04/09 14:45
yyyy	Year	2009
yy	Last two digits of year	09
mmmm	Month name	April
mmm	Month name abbreviated	Apr

Date/Time Code	Description	Example
mm	Month double digit number includes leading 0, 01-12	04
m	Month single digit number excludes leading 0, 1-12	4
dddd	Day name	Tuesday
ddd	Day name abbreviated	Tue
dd	Day double digit numbers including leading 0, 01-31	14
d	Day single digit numbers excludes leading 0, 1-31	14
d/m/yy	Day single digit numbers excludes leading 0, 1-31, then Month single digit number excludes leading 0, 1-12, then Last two digits of year	14/7/09
dd/mm/yy	Day double digit numbers including leading 0, 01-31, then Month double digit number includes leading 0, 01-12, then Last two digits of year	14/07/09
yy/mm/dd	Last two digits of year, then Month double digit number includes leading 0, 01-12, then Day double digit numbers including leading 0, 01-31	09/07/14
yyyy-mm-dd	Year, then Month double digit number includes leading 0, 01-12, then Day double digit numbers including leading 0, 01-31	2009-07-14
mm-dd-yy	Month, then Day, then Year. All double digits, including the leading 0, if needed	07-14-09

Creating New Date/Time Codes

To add new date/time designations, use any combination of the following codes:

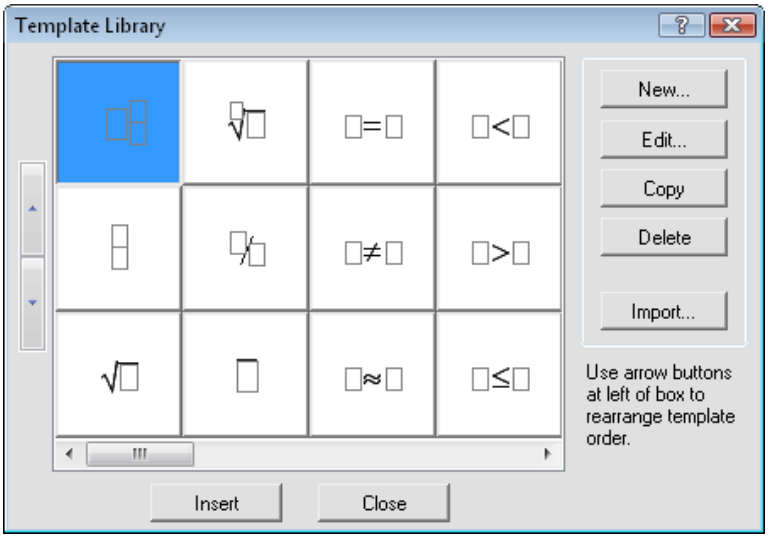
Date/Time Code	Description	Example
yyyy	Year	2009
yy	Last two digits of year	09
mmmm	Month name	April
mmm	Month name abbreviated	Apr
mm	Month double digit number includes leading 0, 01-12	04
m	Month single digit number excludes leading 0, 1-12	4
dddd	Day name	Tuesday
ddd	Day name abbreviated	Tue
dd	Day double digit numbers including leading 0, 01-31	14
d	Day single digit numbers excludes leading 0, 1-31	14
hh	Hour, 0-23 (military time)	18
h	Hour in standard format	6
nn	Minutes, 0 to 60	45
ss	Seconds, 0 to 60	44
tt	AM or PM	AM

Custom Date/Time Example

mm/dd/yy h:nn:ss tt	Month double digits, Day double digits, Year double digits, Hour in standard format, Minutes, Seconds and AM/PM designation	04/14/09 6:45:44 PM

Text Editor Template Library

You can use text templates from the **Template Library** to add equation formats into the **Text Editor**. Click the  button in the **Text Editor** dialog to open the **Template Library** dialog.



*Use the **Template Library** to insert templates that can be used to input equations into the **Text Editor**.*

Up/Down

Use the up and down buttons at the left side of the screen to reposition a selected template in the library.

New

Click the *New* button to create a new template. The **Symbol Properties** dialog opens. Select a base symbol, click *OK*, and the **Create/Edit Template** dialog appears.

Edit

Click the *Edit* button to edit the selected template in the **Create/Edit Template** dialog.

Copy

Click the *Copy* button to duplicate the selected template. The copied template is automatically pasted at the end of the template library.

Delete

Click the *Delete* button to delete a template.

Import

Click the *Import* button to use a different Golden Software template library file [.LBT].

Insert

Click the *Insert* button to insert a template into the **Text Editor**.

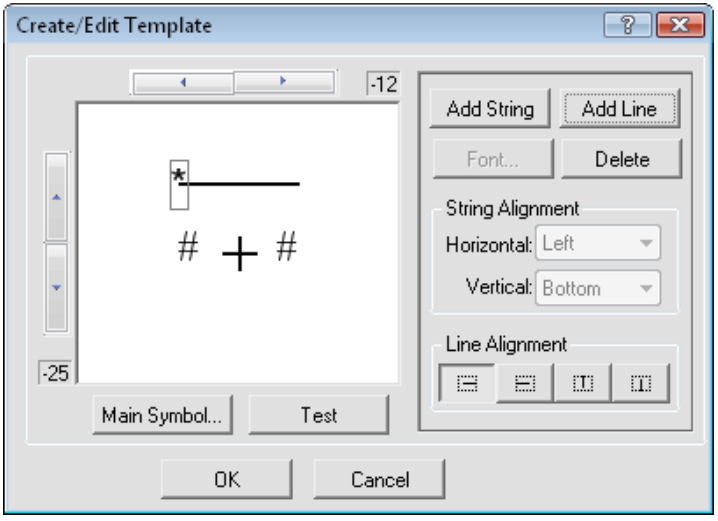
Close

Click the *Close* button to close the template library without inserting a template into the **Text Editor**.

Create/Edit Template Dialog

To add custom templates to the **Text Editor**'s template library, click the *New* button in the **Template Library** dialog. To edit an existing template, select the template and click the *Edit* button.

If you are creating a new template select a symbol and click the *OK* button before the **Create/Edit Template** dialog opens.



*Use the **Create/Edit Template** dialog to create new templates or edit existing templates from the template library.*

Arrow Buttons

Click the arrow buttons on the left and top sides of the dialog to position a string or a line. The numbers at the edge of the arrow buttons show the string location.

Add String

Click the *Add String* button to add a text string box. Text string boxes in the templates allow numbers or letters to be entered into the template in the **Text Editor**.

Add Line

Click the *Add Line* button to add a line to the template.

Font

Select a text string (#) and click the *Font* button to open the **Text Properties** dialog and set the properties of the text string. The font and size can be set, in addition to setting the font bold, italic, underline, or strikethrough properties.

Delete

Select a text string or a line, and then click the *Delete* button to remove it from the template.

String Alignment

Once a text string is created (#), you can set the *String Alignment* of the entered text. Text is entered after the template has been inserted into the **Text Editor**. Refer to the *Text Box Alignment* section of the **Text Editor** topic for more information on alignment.

Line Alignment

You can set the *Line Alignment* to extend to the right, left, top, or bottom of the marker by selecting a line and clicking one of the *Line Alignment* buttons. The line length depends on the bounding box size.



Use the Line Alignment *buttons to determine how lines are drawn.*

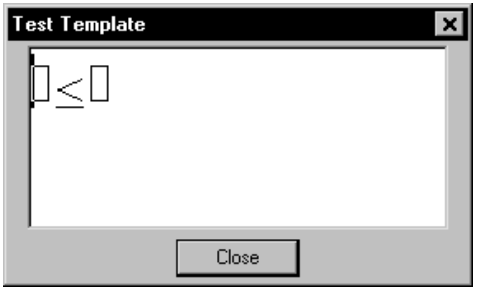
Main Symbol

Click the *Main Symbol* button open the **Symbol Properties** dialog and change the main symbol appearing in the template.

To delete the main symbol, click the *Main Symbol* button to open the **Symbol Properties** dialog. Choose an empty symbol box, such as symbol number zero.

Test

Click the *Test* button to open the **Test Template** dialog and see how the template will appear in the **Text Editor**. Click the *Close* button in the **Test Template** dialog to return to the **Create/Edit Template** dialog.



*The **Test Template** dialog displays the final template.*

Examples

The text editor can be used to create very simple text or very complext text, using multiple formulas and inserted date/time values. The following are a few examples of text that can be created.

Inserting a Square Root

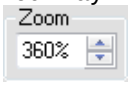
For example, to use the **Template Library** to create an image of the square root of a number:

1. Click the **Draw | Text** command.
2. Click on the view window where you want the text to be displayed.
3. In the **Text Editor** dialog, click the  button.
4. In the **Template Library** dialog, select the  template and click the *Insert* button.
5. In the **Text Editor**, the template is inserted as . Enter the numeric value, for example the number nine.
6. Click *OK* to display the $\sqrt{9}$ in the view window.

Using Multiple Templates

Templates can be inserted into other templates. For instance, you may want to create a square root of a fraction.

To create the dividing/square root equation:

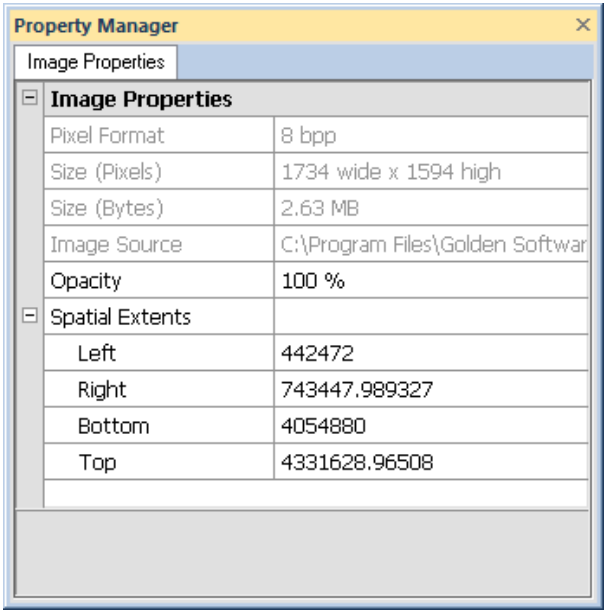
1. Click the **Draw | Text** command.
2. Click on the view window where you want the text to be displayed.
3. In the **Text Editor** dialog, click the  button.
4. In the **Template Library**, highlight the square root template and click *Insert*.
5. You may want to make the symbol larger. Adjust the *Zoom* of the text with the 

option.
6. Click inside the text box underneath the square root sign.
7. Click  to open the **Template Library**.

8. Click the division template in the **Template Library** and click *Insert*.
9. The division template is inserted under the square root sign.
10. Click in the numerator box and type the letter X.
11. Click in the denominator box and type the number 2.
12. Click *OK* to display the $\sqrt{\frac{X}{2}}$ in the view window.

Image Properties

Click on an image that has been imported to select it. The **Property Manager** displays the **Image Properties**.



*Click on the image to see image properties in the **Property Manager**.*

Pixel Format

The *Pixel Format* lists the type of image that is selected. This is a read-only option.

Size (Pixels)

The *Size (Pixels)* lists the size in pixels of the currently selected image. This is a read-only option. To change the size, use a photo-editing program to resample the file and reimport the saved file.

Size (Bytes)

The *Size (Bytes)* lists the size in bytes of the currently selected image. This is a read-only option. This is an indication of the amount of memory needed to display the image in **Strater**. To change the size, use a photo-editing program to resample the file and reimport the saved file.

Image Source

The *Image Source* lists the path and file name of the image that is currently selected. This is a read-only option.

Opacity

The *Opacity* indicates the amount of transparency on the image. The values can range between 0% (fully transparent) to 100% (fully opaque). A partially transparent image can display objects behind it. To change the opacity, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change. Alternatively, click the  button to increase or decrease the level of opacity.

Spatial Extents

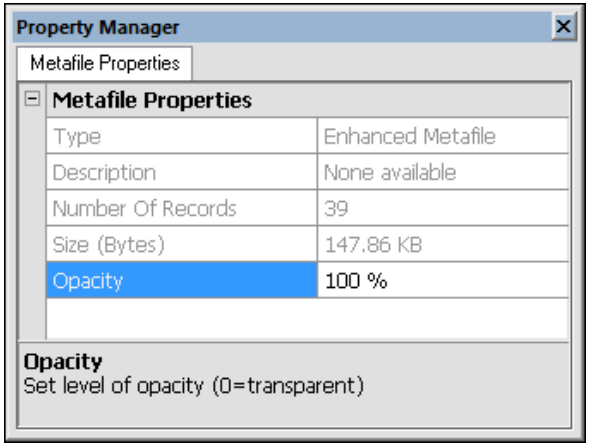
The *Left, Right, Bottom,* and *Top* values in the *Spatial Extents* section display the current extents of the image. Enter a new value into the *Left, Right, Bottom,* and *Top* boxes to change the image extents.

Remarks

Changing the *Spatial Extents* does not update the map Limits or Scale. After changing the *Spatial Extents*, you may need to click on the *Map* object and change the options on the **Limits** and **Scale** pages in the **Property Manager**. After changing the *Spatial Extents*, it may also be necessary to change the Coordinate System for the base layer.

Metafile Properties

Click on a metafile that has been imported to select it. The **Property Manager** displays the **Metafile Properties**.



*Click on the metafile to see metafile properties in the **Property Manager**.*

Type

The *Type* lists the type of metafile that is selected. This is a read-only option.

Description

The *Description* lists any additional information that is available about the metafile. This is a read-only option.

Number of Records

The *Number of Records* indicates how many objects are in the

metafile. This is a read-only option.

Size (Bytes)

The *Size (Bytes)* lists the size in bytes of the currently selected metafile. This is a read-only option. This is an indication of the amount of memory needed to display the metafile in **Strater**. To change the size, edit the object in the original program and reimport the saved file.

Opacity

The *Opacity* indicates the amount of transparency on the metafile. The values can range between 0% (fully transparent) to 100% (fully opaque). A partially transparent metafile can display objects behind it. To change the opacity, highlight the existing value and type a new value. Press ENTER on the keyboard to make the change.

Alternatively, click the  button to increase or decrease the level of opacity.

Colors

Many different types of items have a color option. For instance, items with line properties can change the line color. Items with fill properties can change the foreground and background color. Change the color of the item by clicking on the existing color and selecting the desired color from the color palette.

- The name of the currently highlighted color appears at the top of the palette.
- Select a color from the palette by clicking on a color.
- Create new colors by clicking *Custom* at the bottom of the color palette.



The Color Palette *includes multiple predefined colors and a link to a custom color tool.*

Custom Colors

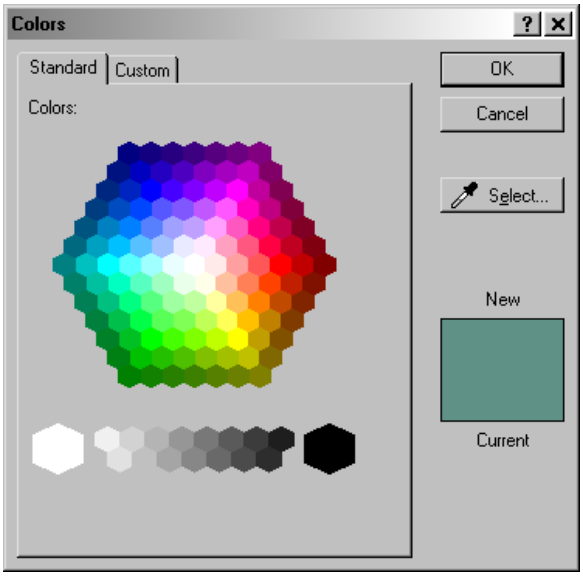
Click the **Custom** button at the bottom of the color palette to select from more colors and create new colors. You can add colors to the palette, remove colors from the palette, or replace existing colors in the palette. The **Colors** dialog consists of two tabbed pages: **Standard** and **Custom**.

Standard Tab

The **Standard** tab is open when the Custom button is selected.

Move the cursor to the desired color in the expanded palette and click to select. The selected color appears in the *New* section on the right. Click **OK** to make the selection.

To select a specific color anywhere on your screen, click **Select.** An eyedropper cursor appears. Move this cursor to anywhere on your screen (even beyond the **Colors** dialog or the **Strater** program). Click the mouse button when the eyedropper tip is touching the desired color. The selected color appears in the *New* section.



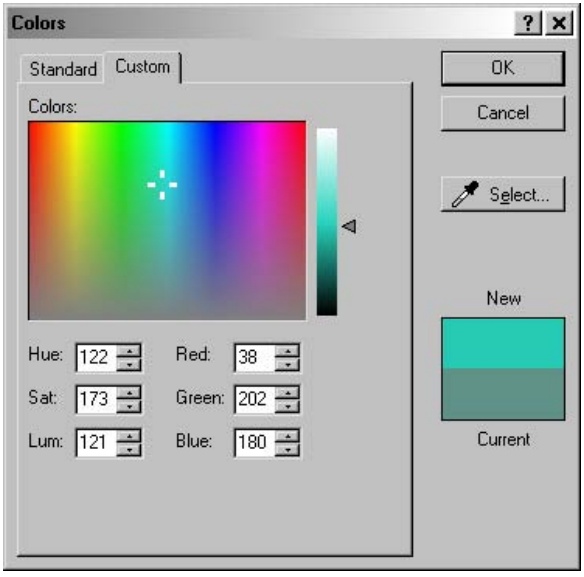
*Use the **Standard** tab's palette and selector to choose any color that currently appears on your monitor.*

Custom Tab

Click the **Custom** tab to create a specific RGB or Hue/Saturation/Luminosity-based color.

There are four methods for selecting a color in the custom page.

- Hue/Saturation/Luminosity: Use the arrows or type in the values for a particular color's *hue*, *saturation*, and *luminosity*.
- Red/Green/Blue: Use the arrows or type in the RGB values.
- Palette Window: Click inside the colors pane to display a vertical array of colors to the right of the pane. Click the



Create a custom color from one of over 16 million possible colors.

desired color in the vertical array.

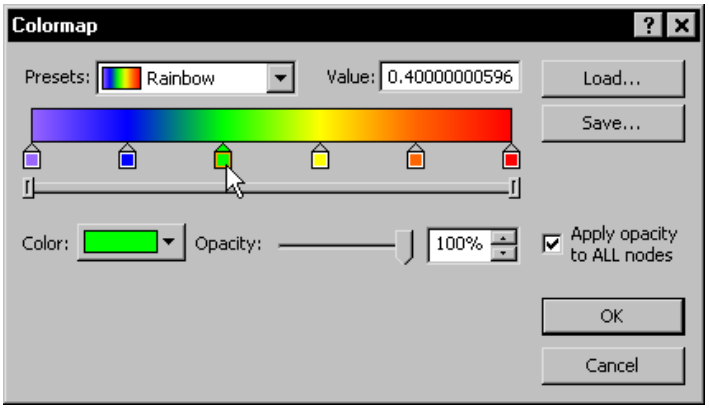
- To select a specific color anywhere on your screen, click the *Select* button. An eyedropper cursor appears. Move this cursor to anywhere on your screen (even beyond the **Colors** dialog or the **Strater** program). Click the mouse button when the eyedropper tip is touching the desired color. The selected color appears in the *New* section.

When any of these methods is used the new color appears as the *New* color. Click **OK** to select the new color.

Colormap Dialog

The **Colormap** dialog is used to assign either preset or custom color spectrums to a gradient fill.

A colormap has specific colors assigned to nodes along the displayed color spectrum. **Strater** automatically blends colors between the nodes to produce a smooth color gradation over the fill. After you create a colormap, you can save the spectrum as a .CLR file for later use with other fills. Several predefined colormaps are available in the fill properties menu and in the *Presets* field in this dialog.



*Set a range of colors for the selected object in the **Colormap** dialog.*

Presets

The *Presets* drop-down menu allows you to select a predefined gradient fill. Custom colormaps cannot be added to the preset drop-down list. Presets can be the basis for custom .CLR files, but cannot be changed and saved with the original Preset name. When you make any change to an existing colormap its name automatically changes in the *Preset* field to *Custom.*

Blending Colors

A colormap spectrum consists of start and end *Anchor Nodes* that are associated with specific colors. The colormap automatically linearly interprets the two colors in a seamless transition from the first color to the last color. In addition, you can add multiple anchor nodes to any position in the spectrum and assign different colors to each node. In all cases the nodes indicate the point where color transitions begin between the nodes on each side of the new node.

Value

The *Value* displays the numerical location of the selected node on line, which always begins with the left-most node at 0.00 and the right-most node at 1.00.The numbers for these end nodes cannot be changed. Accurately reposition the selected node by entering a new number in the Value box.

Nodes

An *Anchor Node* is a point on the colormap spectrum that indicates a location where there is a specified color. In the above example the cursor was placed on the green node  and highlighted. The *Color* field indicates the current color associated with the selected node. The *Value* field lists the location of the node on the colormap line, in which the 0 point is the left-most node and 1.00 is the right-most node.

Adding a Node

To add an anchor node, left-click below or on the colormap where you want the new node added. The new anchor is automatically assigned a color in the color palette, and the value is displayed in the *Value* field. In the above example, the green node is at the .4000000596 point of the line between the start 0.0 point and the end 1.0 point (or a bit over 40%). You can add as many anchor nodes as you want. This lets you blend colors in many different ways on the colormap.

Editing a Node

Highlight an existing node to edit its color or location. When highlighted you can change its associated color by clicking inside the *Color* box and using the Color Palette to select a new color. To change its location on the colormap spectrum either drag it to its new location or click inside the *Value* field and enter the specific numerical location in the colormap spectrum.

When any change is made to an anchor node's location or color the name of the colormap changes to *Custom.*

Deleting a Node

To delete an existing node, select the node and press the DELETE key on the keyboard. Nodes can also be dragged outside the top or bottom of the dialog to remove it from the spectrum. The first (far left) and last (far right) anchor nodes cannot be deleted.

Loading a Preset Colormap

Click *Load* to open the **Open** dialog where you can select an existing colormap file .CLR. Double-click the file you want to use with the current fill property, and the colormap is updated to show the colormap file settings.

Saving a Colormap

Click *Save* in the Colormap dialog to open the *Save As* dialog where you can create a colormap file .CLR based on the current colormap settings. Type the file name for the colormap file and click *Save*. The file is saved for use with other data files.

Scroll Control

The scroll control is a horizontal bar with draggable end handles. Use the scroll control to zoom into an area of the colormap spectrum for more precise editing:

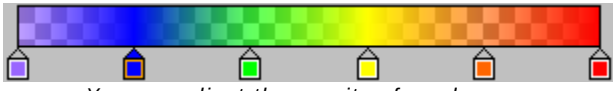


Drag a handle left or right to zoom the colormap in or out. Drag the center section to scroll the visible portion left or right. Double-click the center section to return it to the fully visible state.

Changing the Opacity

Change the *Opacity* of a node by selecting the node and entering a value from 0% (completely transparent) to 100% (completely opaque), using the arrow buttons to the right of the box, or dragging the slider to change the opacity percentage.

When *Opacity* is assigned to the spectrum its appearance changes. In the following example the purple, green, and orange nodes were assigned opacity of 62% and the blue, yellow, and red nodes were 100% opaque:



You can adjust the opacity of a colormap spectrum to all nodes or to individual nodes.

Changing the Opacity of All Nodes

Click *Apply Opacity to ALL nodes* to change the opacity for all nodes. Un-check *Apply opacity to ALL nodes* to change individual node opacity.

When you have made all the edits you want click **OK**.

To exit the Colormap dialog without saving click **Cancel**.

Opacity

Strater allows you to make object properties transparent in percentage increments of opacity from 0% to 100%. An opacity value of 0% is completely transparent and 100% opacity is completely opaque.

Transparency is available for the following properties: **Fill**, **Lines**, **Font** and **Symbols**.

What is Opacity?

Opacity allows you to overlap and 'see through' multiple objects simultaneously. For example, you can display a zone bar log and a lithologic log superimposed on each other. If you add the appropriate legends the result can look like the following:

Opacity for Objects without a Scheme

Some objects, such as line logs, do not have schemes. For these objects the opacity fields are located in the **Property Manager**. Click on the **Line**, **Fill**, **Symbol**, **Font**, or **Image Properties** tab. Highlight the opacity value and type a new desired opacity percentage. Press the ENTER key on the keyboard to make the change.

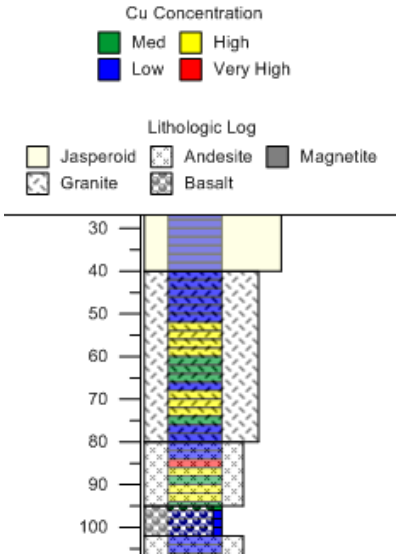
Opacity in the Scheme Editor

For log objects whose properties are based on schemes, you must change the opacity property of each item in the applied scheme. To change the opacity of the text, line, and symbol properties in a scheme, open the **Scheme Editor** and change the properties. For example, to change the opacity of symbols (in this example, the Class Post Log 1 in the file *Example Logs.sdg*) you:

1. Click the **Draw | Scheme Editor** command, the  button, or click on the name of the scheme and click the  button. The **Scheme Editor** dialog opens.

2. Expand the desired scheme. Click the ⊞ next to *Au Keyword*.
3. Select the desired scheme item, such as *Med*.
4. Locate the *Symbols Properties* section on the right side of the **Scheme Editor**.
5. Change the *Fill Opacity* and *Line Opacity* to the desired level and click *Apply*.
6. Make any further changes, and click *OK* to close the **Scheme Editor**.

Any objects, such as the *Post Log 1*, that use the scheme will update to show the opacity. Use the same instructions above for *Font* and *Line* opacity properties.



Two logs can appear superimposed over each other when you change the opacity of their properties.

Chapter 23

Schemes and the Scheme Editor

Introduction to Schemes

Schemes provide a mechanism for defining drawing properties, such as fill properties, based on data contained in a table. For example, you may have the word *Granite* in a lithology keyword column in a table. You can create a lithology keyword scheme that links the name *Granite* from the column to specific fill properties, line properties, contact line properties, and font properties. When the scheme is assigned to a log in the borehole view or cross section view, every time the word *Granite* appears in the table column, **Strater** uses the properties assigned in the scheme for the display.

Scheme Requirements

Some log items are dependent on schemes for display. For example, lithology and well construction logs require schemes. Other logs, such as bar logs, can optionally use schemes. Wells layers in a map view and cross section layers in a cross section view optionally use schemes.

Data and Schemes

Since schemes are linked to the data, be sure to understand the data requirements for the type of log being created and the column requirements for the associated scheme type. For example, to use schemes with lithology logs, you must have specific keywords defined in specific columns.

Making a Scheme

The scheme keywords are case-sensitive, so it is advisable to have **Strater** create the scheme item names using column data in the New Scheme dialog. To do this, click on the table view. Highlight the column that contains the scheme data or keywords and click the **Table | Create Scheme** command.

Making a scheme is a multi-step process:

1. Decide if the scheme will be automatically generated by **Strater** based on the contents of a column of data in a current data table, or by manually creating the scheme.

2. Create the scheme, which defines the basics of the scheme including the name, type, and what data column is associated to the scheme.
3. Build the scheme in the **Scheme Editor**, which involves applying properties to each item in the scheme.
4. Modify the fill and color of the items in the scheme. Schemes that are auto-created include style properties for individual items that may require adjustment to make their appearance the most appropriate for their use in the project.

Scheme Types

There are five main scheme types: Keyword, Range, Lithology Keyword, Indent Keyword, and Well Construction. The settings for each scheme item vary depending on the scheme type.

New Scheme Dialog

Creating a scheme is a multiple-step process. Each step is simple, and the steps vary depending upon the type of scheme you want to create and whether you want to manually create the scheme or have the creation process automated.

The first step in creating a scheme is to open the **New Scheme** dialog. Data can be determined automatically from a column in a table or can be manually created.

Creating a Scheme From a Table Column

In a table view, click on any cell the column you want to use to create the scheme. Click the **Table | Create Scheme** command or right-click in the table and select *Create Scheme*. The New Scheme dialog appears, with the selected table and column name.

Default Scheme

The *Default Scheme* option is selected if a scheme should be created manually. The *Table Name* and *Column Name* options are then unavailable.

Base Scheme on Column Data

If a table and column were selected, the *Base Scheme on Column Data* option is selected. The *Table Name* and *Column Name* are automatically set to the selected column. When the *Base Scheme on Column Data* option is selected, **Strater** automatically determines the number of items in the scheme based on the column contents.

Table Name

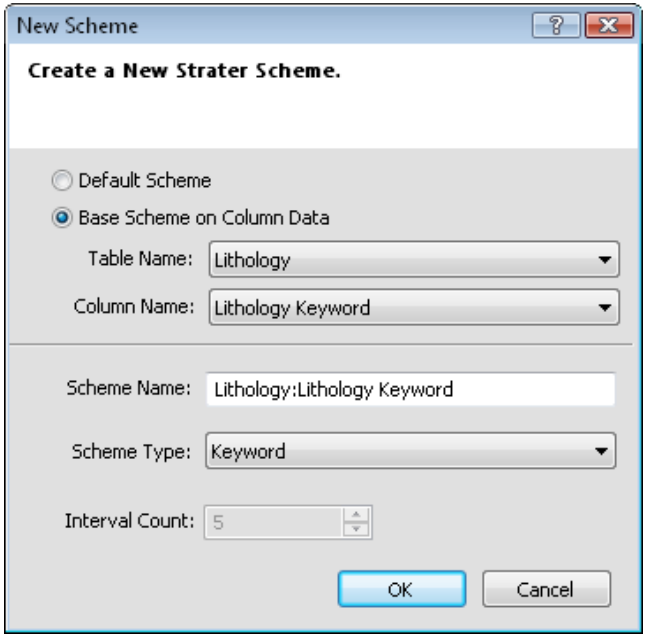
Click on the table name next to *Table Name* to select a different table. In the list, select the table in the current project that contains the column that is the basis of the scheme's contents.

Column Name

Click on the column name next to *Column Name* to select a different column. In the list, select the column that contains the keywords or values to base the scheme.

Scheme Name

The *Scheme Name* is the name for the scheme. The name must be unique and not a duplicate of an existing scheme name. When the scheme is created from a column, the column name is used for the *Scheme Name* by default.



*The **New Scheme** dialog allows a scheme to be created automatically from a table column.*

Scheme Type

The *Scheme Type* is the type of scheme being created. Click on the existing type and select the desired scheme type from the list. If the scheme is based on column data, **Strater** automatically scans the contents of the selected column and determines an appropriate *Scheme Type*, but this can be changed. The scheme type can be Keyword, Range, Lithology Keyword, Indent Keyword, and Well Construction.

Interval Count

The *Interval Count* is the number of separate items in the scheme.

When the *Base Scheme on Column Data* option is selected, **Strater** automatically determines the number of items in the scheme based on the column contents. Except when *Scheme Type* is set to *Range*, the *Interval Count* cannot be edited and is a read-only field when creating the scheme from a table column.

If a *Range* scheme is being created, the default *Interval Count* is 10. This can be changed by either using the up and down arrows or highlighting the 10 and typing a new number for the interval.

If the scheme is not based on a table column, the interval count can be set manually.

OK or Cancel

To create the scheme with the settings, click *OK*. To exit without creating a scheme click *Cancel*.

Creating a Scheme Not Based on Current Column Data

Whenever possible it is advantageous to associate a new scheme with column data if you are planning on using the new scheme in the current project. Creating a scheme from scratch has many potential pitfalls. For example, keywords are case-sensitive and even the most minor typographical error will make the scheme not work correctly. When creating a scheme automatically, the only edits that are typically required are those to adjust the appearance (color, fill style, etc.) because auto-created schemes include these properties for all items; these auto-created properties will likely require adjusting to make the logs appear as desired.

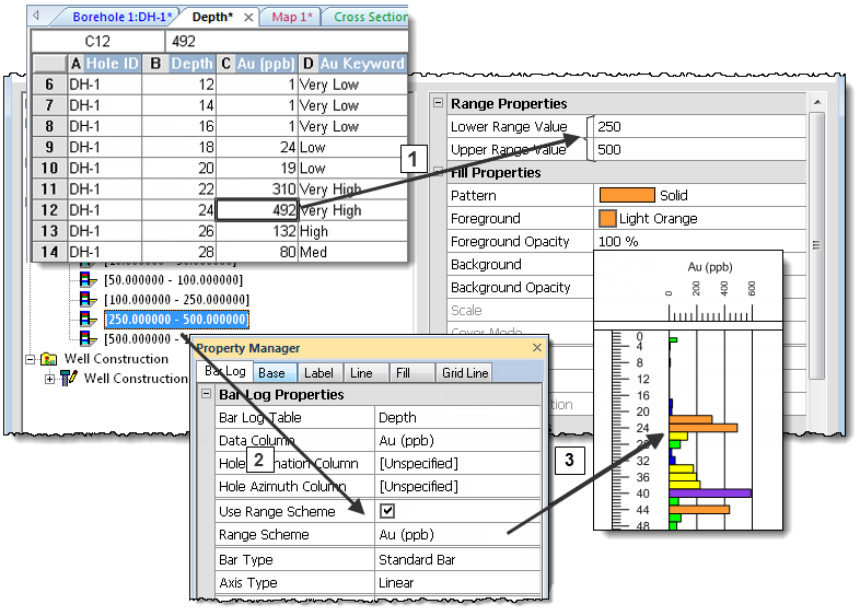
It is common to create a scheme from scratch when working in design mode, which is when you are building a **Strater** project template you intend to use many times. In this case the time-consuming nature of creating the scheme is rewarded because the process occurs only once. Remember, even if you forget to include an item or include unnecessary items you can make these changes at any time after the scheme is completed and saved by opening the **Scheme Editor**.

Data, Schemes, and Log Properties

The data, scheme, and log, map, or cross section properties are all related in the process of creating a log in a borehole view or cross section view, creating a map Wells layer, or creating layers in a cross section. The data contains depth information (either single depth or from-to interval depth), borehole names, and the data to be displayed on the log. Schemes contain line, symbol, label, and fill property information that links the data to the log. When scheme information (keywords or numeric ranges) is found in the data, the logs in the borehole or cross section displays the properties of the scheme. The **Property Manager** determines which data table and column are used to create the log, the scheme to use (if any), and properties such as the log width. Each log item can use a different data table, column, scheme, and properties.

Project data, schemes, and log properties are all related in the process of creating a borehole log.

1. The data in each row is linked to a scheme item. This scheme links the *Au (ppb)* values from column C. In this case, the data in row 12 has a value of 492 and appears at a depth of 24. The data in row 12 falls within the range scheme item of 250 to 500. Note the fill is a solid light orange.
2. A bar log is created displaying the *Au (ppb)* data column. The *Au Concentration* scheme is selected.
3. The bar log is displayed. The *Au Concentration* scheme determines the appearance of the log. The color at the depth 24 is light orange, as indicated by the scheme.



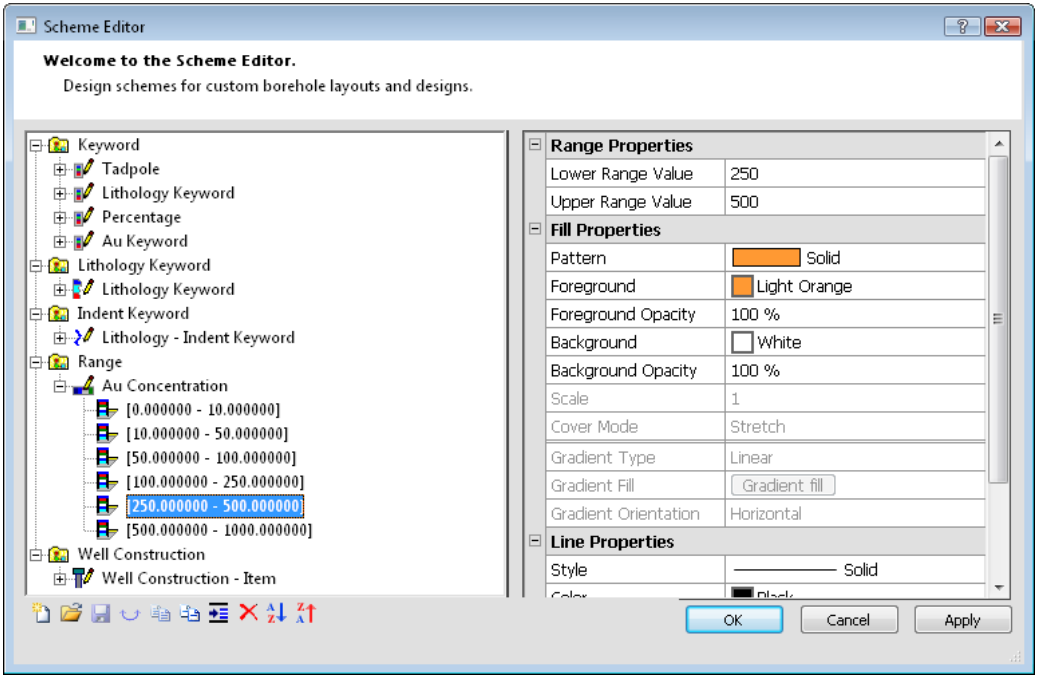
This diagram shows the connection between a value in the table column, the scheme, and the log being displayed.

Scheme Editor

Use the **Scheme Editor** to create or modify the contents of a scheme. To open the **Scheme Editor**:

- Click the **Draw | Scheme Editor** command.
- Click the  button.
- Select an object that uses a scheme. In the **Property Manager**, click in the scheme selection field and click the  button.
- Select a column or cell in a table. Right-click and select *Create Scheme,* or click the **Table | Create Scheme** command. Click *OK* in the **New Scheme** dialog and the **Scheme Editor** appears.

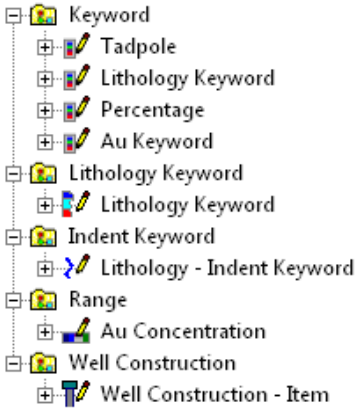
The **Scheme Editor** is divided into two sections. On the left is a hierarchical menu with all scheme types, schemes, and items in schemes. On the right are the properties for the selected scheme item.



*The **Scheme Editor** allows users to create, load, modify, and save a scheme. In the above example we are editing the parameters of a single item (*250-500*) that appears in the* Au Concentration *scheme.*

Schemes List

The **Scheme Editor** schemes list is displayed on the left side of the dialog. It contains a list of all of the schemes loaded into the current project.

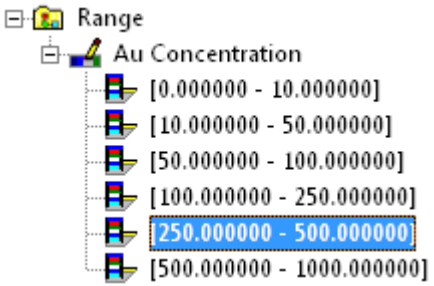


Each scheme type is indicated by the icon. To expand a scheme type section, click the ⊞, or select the scheme type name and press the RIGHT ARROW or + key on the keyboard. To collapse a scheme type, click the ⊟, or select the scheme type name and press the LEFT ARROW or - key on the keyboard.

Each scheme has an icon indicating the type of scheme, either keyword , lithology keyword , indent keyword , range , or well construction scheme types. Click the ⊞ to expand a scheme and see the scheme items. Click the ⊟ to collapse the scheme.

Scheme Items

Scheme items are the individual parts of a scheme. In the *Au Concentration* scheme above, there are six scheme items. Each represents a range of *Au Concentration* values. The 250-500 concentration scheme item is selected, as indicated by the blue highlight surrounding the item name. When a scheme item is selected on the left side of the **Scheme Editor**, the properties for that item are displayed in the right side.



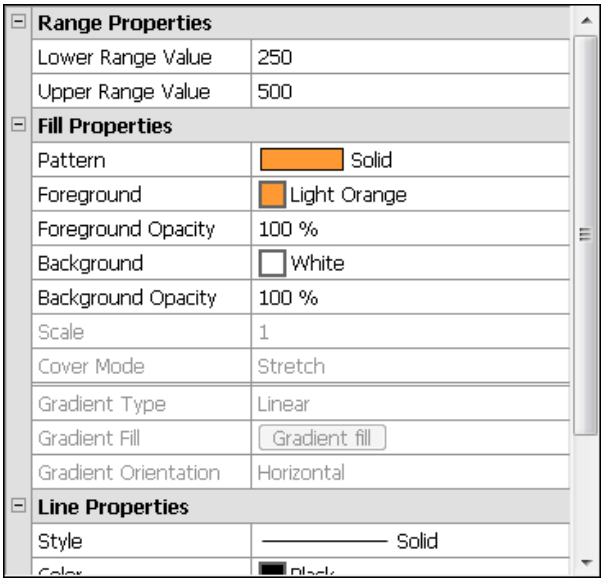
This range scheme has six scheme items.

There is no limit to the number of items a scheme can have.

Scheme Item Properties

The properties for a selected scheme item are displayed on the right side of the **Scheme Editor**.

The available properties vary depending upon the scheme type being edited. Many scheme items have line, fill, symbol, font, and contact line properties. Additionally, schemes have specific scheme type options: Keyword, Lithology Keyword, Indent Keyword, Range, and Well Item properties. Use the additional scheme item properties to rename the scheme item or define the range for that item.



*The 250-500 units range scheme item is selected. The properties are displayed on the right side of the **Scheme Editor**.*

Scheme Editor Tools

The buttons  at the bottom of the scheme editor provide additional tools for the user when editing schemes and scheme items.

Creating New Schemes

To create a new scheme, click the  button. The New Scheme dialog opens, where you define scheme properties such as the type of scheme and the number of scheme items. New schemes created in this way can be based on column data by selecting *Base Scheme on Column Data*. This ensures that the data matches the text in the selected table view.

Opening Schemes

Click the  button to open a **Strater** Scheme .SCH File. Scheme files are created by saving an existing scheme. Several sample schemes are saved in the **Strater** Samples directory, which is located at C:\Program Files\Golden Software\Strater 4\Samples, by default. Several sample scheme files are located in the Samples directory and can be opened into any project. Once a scheme is opened, it appears in the appropriate scheme type section.

Saving Schemes

To reuse schemes with other projects or to share schemes with colleagues, save the scheme. Click on the scheme name and click the  button. The **Scheme Files** dialog appears. Type a *File name* and click *Save*. The scheme is saved as a **Strater** Scheme .SCH File. The .SCH file can then be used with any other **Strater** project by selecting the .SCH file after clicking the  button at the bottom of the **Scheme Editor**.

If the  button is not available, a scheme name is not selected.

Converting Schemes

Click the  button to convert a lithology keyword scheme to a keyword scheme or a keyword scheme to a lithology keyword scheme. This button is only available when a lithology keyword or keyword scheme is selected. Highlight the scheme to convert and click the button. This is useful if you wish to reuse schemes for different log types without the necessity of recreating complex schemes.

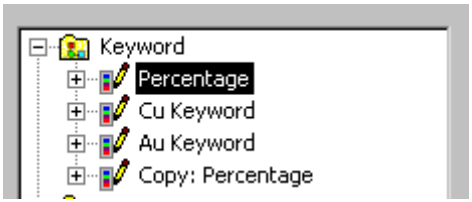
For example, if you created a zone bar log, a keyword scheme is created. You can design the keyword scheme exactly how you want it to appear. To use the same scheme item names and properties with a lithology log,

1. Click on the keyword scheme to select it.
2. Click the  button to copy the keyword scheme. A duplicate keyword scheme is created.
3. With the duplicate scheme selected, click the  button.
4. The duplicate scheme is converted to a lithology keyword scheme and moved under the *Lithology Keyword* scheme type list. The lithology keyword scheme is created with the same properties as the keyword scheme.

If the  button is not available, a keyword or lithology keyword scheme is not selected. Click on the appropriate keyword or lithology keyword scheme name to convert the scheme.

Copying Schemes

You can copy a scheme by selecting a scheme name and clicking the  button. A duplicate of the scheme appears in the scheme type list. You can edit the copy of the scheme, including the scheme name and scheme item properties.



*You can easily create copies of schemes in the **Scheme Editor**.*

In this example the Percentage scheme was selected and copied. The copy is listed as Copy: Percentage.

If the  button is not available, a scheme is not currently selected.

Copying Scheme Items

Scheme items can be copied by clicking on the scheme item and clicking the  button. A new scheme item with the name *New Item* will appear. All of the properties from the original scheme item are copied. Edit the new item properties on the right side of the scheme editor.

Creating New Scheme Items

To create a new scheme item in a scheme, select the scheme name or an existing item within the scheme and click the  button. The item will appear labeled as *New Item.* Edit the new item properties on the right side of the scheme editor.

Deleting Schemes

To delete a scheme, select the scheme name and click the  button or press DELETE on the keyboard. If the  button is not available a scheme or scheme item is not currently selected.

Deleting Scheme Items

To delete an item in a scheme, click on the scheme item to be deleted and click the  button or press DELETE on the keyboard. If the  button is not available a scheme or scheme item is not currently selected.

Ordering Scheme Items

To order scheme items automatically, click on any scheme item in the scheme.

Clicking the  button to order the scheme items in ascending order or click the  button to order the scheme items in descending order. Refer to the Sort page for information on the order that is used for sorting.

To manually order scheme items, click on the scheme item name. Hold down the left mouse button and drag the scheme item to the desired position. The cursor changes to  if the object can be moved to the position. The cursor changes to  if the scheme item cannot be moved to the position. Scheme items can be dragged anywhere in the existing scheme or to another scheme of the same scheme type.

Updating Schemes

After making any edits to a scheme, click the *Apply* button to apply the changes to the current view window. Click *OK* to make the change in the view window and close the **Scheme Editor**. Click *Cancel* to return to the view window without making the change.

Undoing Scheme Changes

Click *OK* to close the **Scheme Editor**. Click the **Edit | Undo** command to undo all changes that were made in the **Scheme Editor** from the time the *Apply* button was last clicked until the *OK* button was clicked. If the *Apply* button was clicked multiple times, you may need to click **Edit | Undo** multiple times to undo all of the changes that were made in the **Scheme Editor**.

Modify a Scheme

To modify an existing scheme you must open the project that includes the scheme you wish to modify. Open the **Scheme Editor** using one of the following methods:

- Click the **Draw | Scheme Editor** command.
- Click the  button.

- Select an object that uses a scheme. In the **Property Manager**, click in the scheme selection field and click the  button.
- Select a column or cell in a table. Right-click and select *Create Scheme,* or click the **Table | Create Scheme** command. Click *OK* in the **New Scheme** dialog and the Scheme Editor appears.

In the **Scheme Editor**, click the ⊞ next to the scheme type and scheme name to expand the scheme. Click on the buttons at the bottom of the **Scheme Editor** to make copy, save, convert, and insert items into the scheme. Make property changes on the right side of the dialog.

See the Keyword, Lithology Keyword, Indent Keyword, Range, and Well Construction scheme sections for information about specific scheme type requirements.

Keyword Scheme

Keyword schemes link words or numbers in a table column with line, fill, symbol, and font properties. Each item in a keyword scheme has different properties that are displayed in the log, map, or cross section. In map views, keyword schemes are used to define symbols on a well map. In borehole views, keyword schemes are used with percentage, post, tadpole, and zone bar logs. In cross section views, keyword schemes are used with zone bar logs, with the layers connecting wells, and with the well headers.

Creating a Keyword Scheme

To create a keyword scheme based on existing data in the project:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the  button to open the **New Scheme** dialog.
3. In the **New Scheme** dialog, select *Base Scheme on Column Data*, which allows you to determine the source column of data on which to base the scheme.
4. Click the box next to *Table Name* and select the table that contains the scheme information from the list.
5. Click the box next to *Column Name* and select the column that contains the scheme information from the list.
6. Type a *Scheme Name.*
7. Select *Keyword* as the *Scheme Type,* if it is not already selected.

8. The *Interval Count* is automatically set to the number of unique items in the *Column Name*.
9. Click *OK* to close the **New Scheme** dialog.
10. In the **Scheme Editor**, click on the ⊞ next to *Keyword*.
11. Click on the desired scheme name.
12. Click on the ⊞ next to the scheme name in the *Keyword* list.
13. Select each scheme item and edit the properties on the right side of the dialog.
14. Click *OK* to exit the **Scheme Editor** and save the properties of the new scheme.

Editing a Keyword Scheme

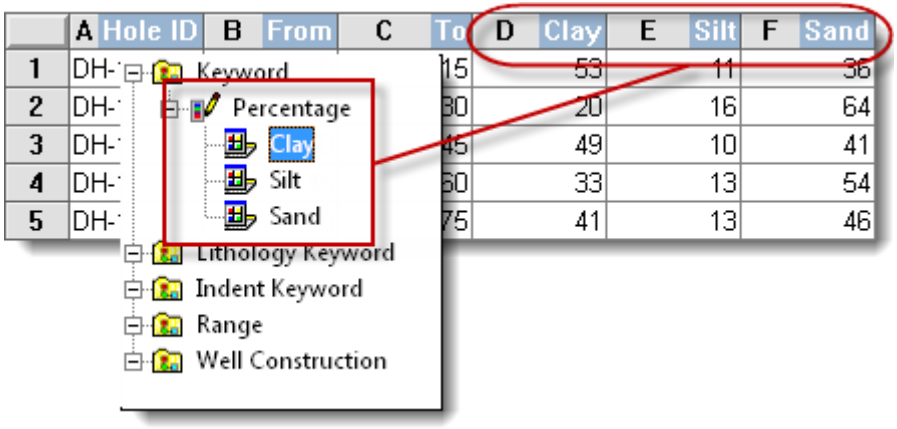
To edit a keyword scheme:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click on the ⊞ next to *Keyword*.
3. Click on the desired scheme name.
4. To change the scheme name, on the right side of the dialog, type a new name next to *Name* and press ENTER on the keyboard. The scheme name is updated.
5. To change a scheme item name,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, click the ⊞ next to *Keyword Properties*, if necessary.
    d. Type a new name next to *Keyword* and press ENTER on the keyboard. The scheme item name is updated.
6. To change scheme item properties,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, edit the line, fill, symbol or font properties.
7. Click *OK* to exit the **Scheme Editor** and save the properties of the scheme.

Important: the keyword scheme item names or numbers must match the keyword in the table column for the scheme item properties to be shown on the log. Keywords are case-sensitive.

Percentage Keyword Schemes

Keyword schemes are required for percentage logs. Because more than one column is displayed in this log, keyword schemes are used to differentiate between the columns. The names of each item in the keyword scheme must match the titles of the data columns. For example, if you have Clay, Silt, and Sand as three column titles in the table, Clay, Silt, and Sand must be used as your keyword item names. You can define the fill, line, symbol, and font properties for each of these parameters.

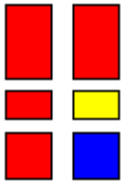


The column titles in the table must match the keyword item names exactly when creating a percentage log.

Set the keyword scheme for a percentage log on the Percentage Log tab in the **Property Manager** in the *Keyword Scheme* option.

Post, Tadpole, and Zone Bar Keyword Schemes

Keyword schemes are optional with post, tadpole, and zone bar logs. Creating a keyword scheme for post, tadpole, and zone bar logs means you can use multiple fill, line, symbol, and font properties for the logs. If a keyword scheme is not used, the default properties are used for the entire log. For example, if you create a keyword scheme for a post log, you can have more than one symbol style displayed on the log. If you do not use a keyword scheme, the symbol properties are derived from the **Symbol** tab in the **Property Manager** and only one symbol style is displayed on the log. Therefore, depending on your needs you may or

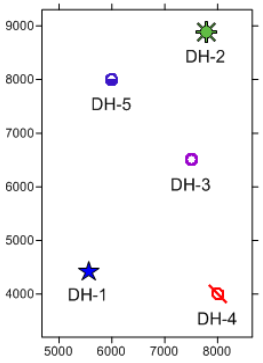


*The zone bar log on the left is not using a keyword scheme, so the fill color is set to one color in the **Property Manager**. The zone bar log on the right is using a keyword scheme, therefore, multiple fill colors are used.*

may not want to use keyword schemes for these logs.

Well Map Keyword Schemes

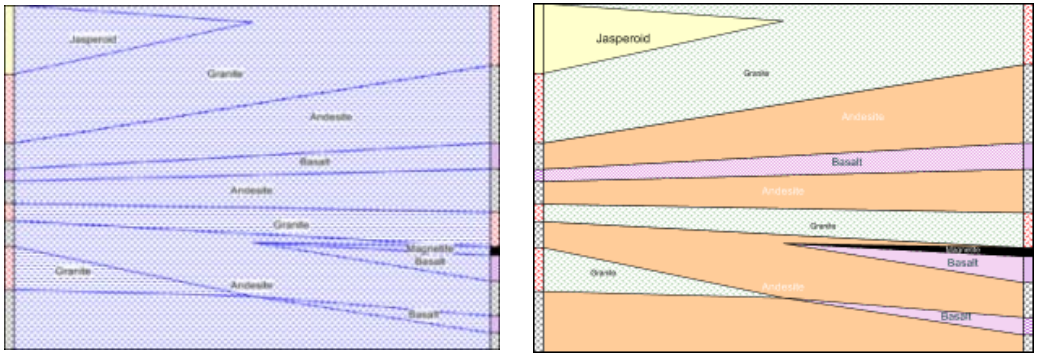
Keyword schemes are optional with well maps. Creating a keyword scheme for a well map means that different symbol properties can be used for each well on the map. If a keyword scheme is not used, all wells use the same symbol, set on the Symbol tab in the **Property Manager**.



Well maps display symbols based on information from a table column.

Cross Section Layers Keyword Schemes

Keyword schemes are optional with layers on a cross section. Creating a keyword scheme for a cross section layers means that different fill, line, symbol, and font properties can be used for each layer on the map. If a keyword scheme is not used, all layers use the same line, fill, and font as set on the **Line**, **Fill**, and **Font** tabs in the **Property Manager**.



The cross section on the left shows no schemes for the layers. All layers use the same properties. The cross section on the right uses different properties for each layer, based on a keyword scheme.

Cross Section Well Header

Keyword schemes are optional with well headers in cross sections. Creating a keyword scheme for a well header means that different symbol properties can be used for each well on the map. If a keyword scheme is not used, all wells use the same symbol, set in the *Symbol* section on the **Well Header** tab in the **Property Manager**.

Data Requirements

Most keyword schemes use text from a single column as the keyword scheme item names. Keyword schemes for percentage logs use column titles.

Reusing a Keyword Scheme

A keyword scheme can be used with multiple data tables in multiple projects. When selecting a data table and data column, be sure that the data column titles (percentage logs) or column contents match the keyword scheme's item names.

To use an existing keyword scheme, click on the log, layer, header, or well map. The properties are displayed in the **Property Manager**. Check the box next to the *Use Keyword Scheme* option. Set the *Keyword (or Data) Column* and *Keyword Scheme* to the appropriate options.

To use a keyword scheme with percentage logs, edit the log properties so that the selected *Percentage Columns* contain the same names as the keyword items and then select the scheme name from the *Keyword Scheme* list.

Converting a Keyword Scheme to a Lithology Keyword Scheme

Click the  button to convert a keyword scheme to a lithology keyword scheme. This button is only available when a lithology keyword or keyword scheme is selected. Highlight the scheme to convert and click the button. This is useful if you wish to reuse schemes for different log types without the necessity of recreating complex schemes.

For example, if you created a zone bar log, a keyword scheme is created. You can design the keyword scheme exactly how you want it to appear. To use the same scheme item names and properties with a lithology log,

1. Click on the keyword scheme to select it.
2. Click the  button to copy the keyword scheme. A duplicate keyword scheme is created.
3. With the duplicate scheme selected, click the  button.
4. The duplicate scheme is converted to a lithology keyword scheme and moved under the *Lithology Keyword* scheme type list. The lithology keyword scheme is created with the same properties as the keyword scheme.

If the  button is not available, a keyword or lithology keyword scheme is not selected. Click on the appropriate keyword or lithology keyword scheme name to convert the scheme.

Lithology Keyword Scheme

Lithology keyword schemes link words or numbers in a table column with contact line, fill, line, and font properties. Each item in a keyword scheme has different properties that are displayed in lithology logs in borehole views and cross section views. Lithology keyword schemes can define rock type, alteration, layer information, etc.

Creating a Lithology Scheme

To create a lithology keyword scheme based on existing data in a project:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the  button to open the **New Scheme** dialog.
3. In the **New Scheme** dialog, select *Base Scheme on Column Data*, which allows you to determine the source column of data on which to base the scheme.
4. Click the box next to *Table Name* and select the table that contains the scheme information from the list.
5. Click the box next to *Column Name* and select the column that contains the scheme information from the list.
6. Type a *Scheme Name.*
7. Select *Lithology Keyword* as the *Scheme Type*.
8. The *Interval Count* is automatically set to the number of unique items in the *Column Name*.
9. Click *OK* to close the **New Scheme** dialog.
10. In the **Scheme Editor**, click on the ⊞ next to *Lithology Keyword*.
11. Click on the desired scheme name.
12. Click on the ⊞ next to the scheme name in the *Lithology Keyword* list.
13. Select each scheme item and edit the properties on the right side of the dialog.
14. Click *OK* to exit the **Scheme Editor** and save the properties of the new scheme.

Editing a Lithology Keyword Scheme

To edit a lithology keyword scheme:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click on the ⊞ next to *Lithology Keyword*.
3. Click on the desired scheme name.
4. To change the scheme name, on the right side of the dialog, type a new name next to *Name* and press ENTER on the keyboard. The scheme name is updated.
5. To change a scheme item name,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, click the ⊞ next to *Lithology Keyword Properties*, if necessary.
    d. Type a new name next to *Keyword* and press ENTER on the keyboard. The scheme item name is updated.
6. To change scheme item properties,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, edit the contact line, fill, line, or font properties.
7. Click *OK* to exit the **Scheme Editor** and save the properties of the scheme.

Important: the lithology keyword scheme item names or numbers must match the names in the table column for the scheme item properties to be shown on the log. Lithology keywords are case-sensitive.

Contact Line Properties

The *Contact Line Properties* section sets the bottom line properties for the lithology block that uses the scheme item.

Data Requirements

Lithology keyword schemes require a column of text or numbers. Note that lithology keywords are case-sensitive.

Reusing a Lithology Keyword Scheme

A lithology keyword scheme can be used with multiple data tables in multiple projects. When selecting a data table and data column, be sure that the data column contents match the lithology keyword scheme's item names.

To use an existing lithology keyword scheme, click on the lithology log. The properties are displayed in the **Property Manager**. Set the *Lithology Keyword Column* and *Lithology Scheme* to the appropriate column and scheme.

Converting a Lithology Keyword Scheme to a Keyword Scheme

Click the  button to convert a lithology keyword scheme to a keyword scheme. This button is only available when a lithology keyword or keyword scheme is selected. Highlight the scheme to convert and click the button. This is useful if you wish to reuse schemes for different log types without the necessity of recreating complex schemes.

For example, if you created a lithology log, a lithology keyword scheme is created. You can design the lithology keyword scheme exactly how you want it to appear. To use the same scheme item names and properties with a zone bar log,

1. Click on the keyword scheme to select it.
2. Click the  button to copy the lithology keyword scheme. A duplicate lithology keyword scheme is created.
3. With the duplicate scheme selected, click the  button.
4. The duplicate scheme is converted to a lithology keyword scheme and moved under the *Lithology Keyword* scheme type list. The lithology keyword scheme is created with the same properties as the keyword scheme.

If the  button is not available, a keyword or lithology keyword scheme is not selected. Click on the appropriate keyword or lithology keyword scheme name to convert the scheme.

Indent Keyword Scheme

Indent keyword schemes link words and numbers in an table with indent line styles and line properties for a lithology log. The indent line styles can show transgressive or regressive sequences, can represent how eroded various layers are compared to other layers (for example, shale is more highly eroded compared to the surrounding sandstones), or can use a wavy line to represent undulations or cross bedding on layers.

Important: the indent keyword scheme item names must match the keyword in the table column for the scheme item properties to be shown on the log. Keywords are case-sensitive.

Creating an Indent Keyword Scheme

To create an indent keyword scheme based on existing data in the project:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the  button to open the **New Scheme** dialog.
3. In the **New Scheme** dialog, select *Base Scheme on Column Data*, which allows you to determine the source column of data on which to base the scheme.
4. Click the box next to *Table Name* and select the table that contains the scheme information from the list.
5. Click the box next to *Column Name* and select the column that contains the scheme information from the list.
6. Type a *Scheme Name.*
7. Select *Indent Keyword* as the *Scheme Type*.
8. The *Interval Count* is automatically set to the number of unique items in the *Column Name*.
9. Click *OK* to close the **New Scheme** dialog.
10. In the **Scheme Editor**, click on the ⊞ next to *Indent Keyword*.
11. Click on the desired scheme name.
12. Click on the ⊞ next to the scheme name in the *Indent Keyword* list.
13. Select each scheme item and edit the properties on the right side of the dialog.
14. Click *OK* to exit the **Scheme Editor** and save the properties of the new scheme.

Editing an Indent Keyword Scheme

To edit an indent keyword scheme:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click on the ⊞ next to *Indent Keyword*.
3. Click on the desired scheme name.
4. To change the scheme name, on the right side of the dialog, type a new name next to *Name* and press ENTER on the keyboard. The scheme name is updated.
5. To change a scheme item name,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, click the ⊞ next to *Indent Keyword Properties*, if necessary.
    d. Type a new name next to *Keyword* and press ENTER on the keyboard. The scheme item name is updated.
6. To change scheme item properties,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, edit the shape of the lithology indent line or the line properties.
7. Click *OK* to exit the **Scheme Editor** and save the properties of the scheme.

Important: the keyword scheme item names or numbers must match the keyword in the table column for the scheme item properties to be shown on the log. Keywords are case-sensitive.

Data Requirements

Indent keyword schemes require a column of text or numbers. Note that keywords are case-sensitive.

Using Indent Keyword Schemes

Once a indent keyword scheme is defined you can use it with multiple data tables in multiple projects. Click on the lithology log to select it. In the **Property Manager**, check the box next to the *Use Indent Keyword Scheme* option and set the *Indent Keyword Scheme* to the desired scheme.

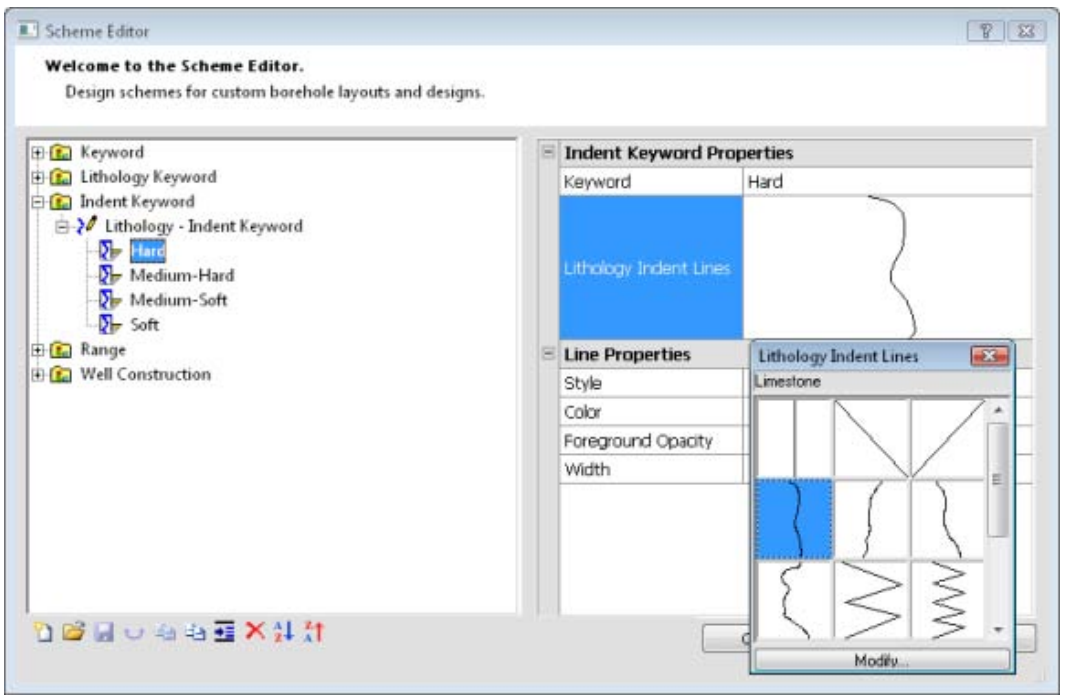
Lithology Indent Lines

The lithology indent lines form the shape of one side of the lithology layer in the lithology log.



This lithology log displays various indent line styles on the right side.

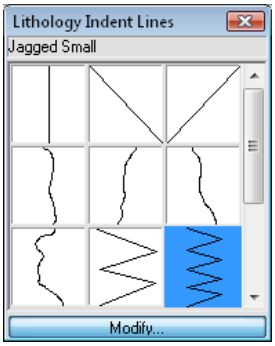
Choose an indent line style for each scheme item by clicking on the scheme item and then selecting the *Lithology Indent Lines* type for that scheme item. To see available types, click on the line to the right of *Lithology Indent Lines* and select the desired style from the list.



Select from a list of predefined indent lines.

Customizing Line Styles

If you wish to import a new line, click on the line style next to the *Lithology Indent Lines* option. In the list that appears, click the *Modify* button.

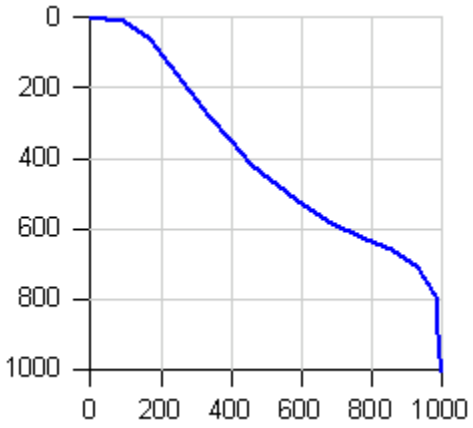


Click Modify *in the list to*

The **Lithology Indent Lines** dialog opens.

Importing Lines

Line indent styles are simple vector line files. There are line styles available in **Strater**, or you can create your own in another program or in a text editor. **Strater** imports Atlas Boundary (*.BNA), Golden Software Blanking (*.BLN), and Strater Lithologic Lines (*.LLF) files for lithology indent lines.



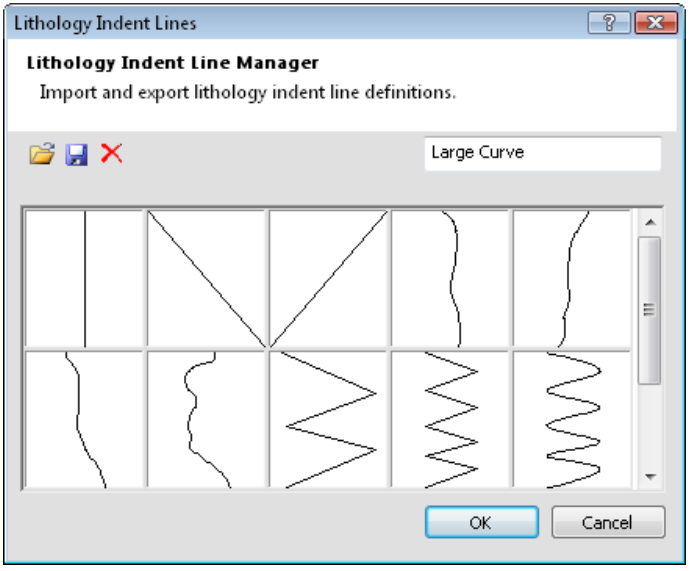
The following are requirements for imported indent line files.

- The limits of the file must be from 0 to 1000, otherwise the line cannot be imported.
- The X and Y coordinate range must be zero to 1000. Values cannot be negative.
- The first Y value must be zero.
- The last Y value must be 1000.
- The coordinate (0,0) is in the upper left corner and (1000,1000) is in the lower right corner.

To import a file to be used as an indent line:

1. Click the  button in the *Lithology Indent Lines* dialog.
2. In the **Open Lithology Indent Lines** dialog, browse to the folder containing the file to import.
3. Select the file and click *Open.*
4. If an error message occurs saying Unable to import all lithology indent curves, the file probably does not meet the coordinate requirements. Edit the original file to meet the requirements above and try to import again.

5. If the file imports, all new lines are displayed at the bottom of the list.
6. Select the desired indent line and click *OK* to return to the **Scheme Editor**.
7. Click *OK* or *Apply* to make the change on the view window.



The Lithology Indent Lines *dialog allows you to manage, save, and import lines used in* Indent Keyword *schemes.*

Exporting Indent Line Styles

All of the lines in the **Lithology Indent Lines** dialog can be saved for use on other computers.

1. In the **Lithology Indent Lines** dialog, click the  button.
   The **Save Strater Lithology Indent Lines** dialog opens.
2. Use the *Save In* field to select the location where you want the line file saved.
3. Enter the name of the line in the *File Name* field. All indent lines are saved in file format .LLF.
4. Click **Save** to save the line.

Deleting Indent Line Styles

Select any line in the **Lithology Indent Lines** dialog and click the  button to delete the selected line. Note: The first three indent line styles (Straight, Slope Down, and Slope Up) cannot be deleted.

Renaming Indent Line Styles

To rename any line, click on the line in the **Lithology Indent Lines** dialog. Type a new name in the box on the upper right side. The name is saved when the *OK* button is clicked. Note: The first three indent line styles (Straight, Slope Down, and Slope Up) cannot be renamed.

Range Scheme

Range schemes link values in a table column with line, fill, symbol, and font properties. Each item in a range scheme has different properties that are displayed in the bar or classed post log for the range of values in the scheme item. This is useful when grouping data by setting unique properties for each range of data. Range schemes are optional with bar and classed post logs.

As an example, a data set contains values from zero to 100. The data can be grouped into any number of divisions. If you use four divisions the ranges can show different properties for values between zero and 25, 25 and 50, 50 and 75, and 75 and 100. With a bar log, you could show different fill patterns for each of the ranges. With a classed post log, you could show different symbols and colors for each of the ranges.

Creating a Range Scheme

To create a range scheme based on existing data in the project:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the  button to open the **New Scheme** dialog.
3. In the **New Scheme** dialog, select *Base Scheme on Column Data*, which allows you to determine the source column of data on which to base the scheme.
4. Click the box next to *Table Name* and select the table that contains the scheme information from the list.
5. Click the box next to *Column Name* and select the column that contains the scheme information from the list.
6. Type a *Scheme Name.*
7. Select *Range* as the *Scheme Type,* if it is not already selected.
8. The *Interval Count* is set to 10 by default. Highlight the 10 and type a new value or click the  buttons to increase or decrease the number of intervals. The total range of values is evenly split by the number of intervals initially.
9. Click *OK* to close the **New Scheme** dialog.
10. In the **Scheme Editor**, click on the ⊞ next to *Range*.
11. Click on the desired scheme name.
12. Click on the ⊞ next to the scheme name in the *Range* list.
13. Select each scheme item and edit the properties on the right side of the dialog.
14. Click *OK* to exit the **Scheme Editor** and save the properties of the new scheme.

Editing a Range Scheme

To edit a range scheme:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click on the ⊞ next to *Range*.
3. Click on the desired scheme name.
4. To change the scheme name, on the right side of the dialog, type a new name next to *Name* and press ENTER on the keyboard. The scheme name is updated.
5. To change a scheme item range of values,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, click the ⊞ next to *Range Properties*, if necessary.
    d. Type a new minimum value next to *Lower Range Value* and press ENTER on the keyboard. The scheme item name is updated.
    e. Type a new maximum value next to *Upper Range Value* and press ENTER on the keyboard. The scheme item name is updated.
    f. Data greater than or equal to the *Lower Range Value* and less than the *Upper Range Value* are included in the bin for a range. The last bin includes data greater than or equal to the *Lower Range Value* and less than or equal to the *Upper Range Value* in the bin.
6. To change scheme item properties,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, edit the line, fill, symbol or font properties.
7. Click *OK* to exit the **Scheme Editor** and save the properties of the scheme.

Data Requirements

Range schemes require a numeric column in the table to create the log. Text cannot be used for a range scheme.

Reusing Range Schemes

A range scheme can be reused. Once a range scheme is defined you can use it with multiple data tables in multiple projects.

To reuse a range scheme, click on any bar or classed post log. The properties are displayed in the **Property Manager**. Check the box next to the *Use Range Scheme* option and set the *Data Column* and *Range Scheme* to the appropriate column and scheme.

Well Construction Scheme

Well construction schemes link words or numbers in a table column with special types of well item shapes, line, and fill properties. Each item in a well construction scheme has different properties that are displayed in the well construction log.

Important: the well construction scheme item names must match the text in the table column for the scheme item properties to be shown on the well construction log. Keywords are case-sensitive.

Creating a Well Construction Scheme

To create a well construction scheme based on existing data in the project:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click the  button to open the **New Scheme** dialog.
3. In the **New Scheme** dialog, select *Base Scheme on Column Data*, which allows you to determine the source column of data on which to base the scheme.
4. Click the box next to *Table Name* and select the table that contains the scheme information from the list.
5. Click the box next to *Column Name* and select the column that contains the scheme information from the list.
6. Type a *Scheme Name.*
7. Select *Well Construction* as the *Scheme Type*.
8. The *Interval Count* is automatically set to the number of unique items in the *Column Name*.
9. Click *OK* to close the **New Scheme** dialog.
10. In the **Scheme Editor**, click on the ⊞ next to *Well Construction*.
11. Click on the desired scheme name.
12. Click on the ⊞ next to the scheme name in the *Well Construction* list.
13. Select each scheme item and edit the properties on the right side of the dialog.
14. Click *OK* to exit the **Scheme Editor** and save the properties of the new scheme.

Editing a Well Construction Scheme

To edit a well construction scheme:

1. Click the **Draw | Scheme Editor** command or click the  button.
2. In the **Scheme Editor**, click on the ⊞ next to *Well Construction*.
3. Click on the desired scheme name.
4. To change the scheme name, on the right side of the dialog, type a new name next to *Name* and press ENTER on the keyboard. The scheme name is updated.
5. To change a scheme item name,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, click the ⊞ next to *Well Item Properties*, if necessary.
    d. Type a new name next to *Keyword* and press ENTER on the keyboard. The scheme item name is updated.
6. To change scheme item properties,
    a. Open the scheme by clicking the ⊞ next to the scheme name.
    b. Click a scheme item name.
    c. On the right side of the dialog, edit the well item appearance, line, and fill properties.
7. Click *OK* to exit the **Scheme Editor** and save the properties of the scheme.

Important: the well construction scheme item names must match the text or numbers in the table column for the scheme item properties to be shown on the well construction log. Keywords are case-sensitive.

Data Requirements

Well construction schemes use text or numbers from a single column as the scheme item names.

Using Well Construction Schemes

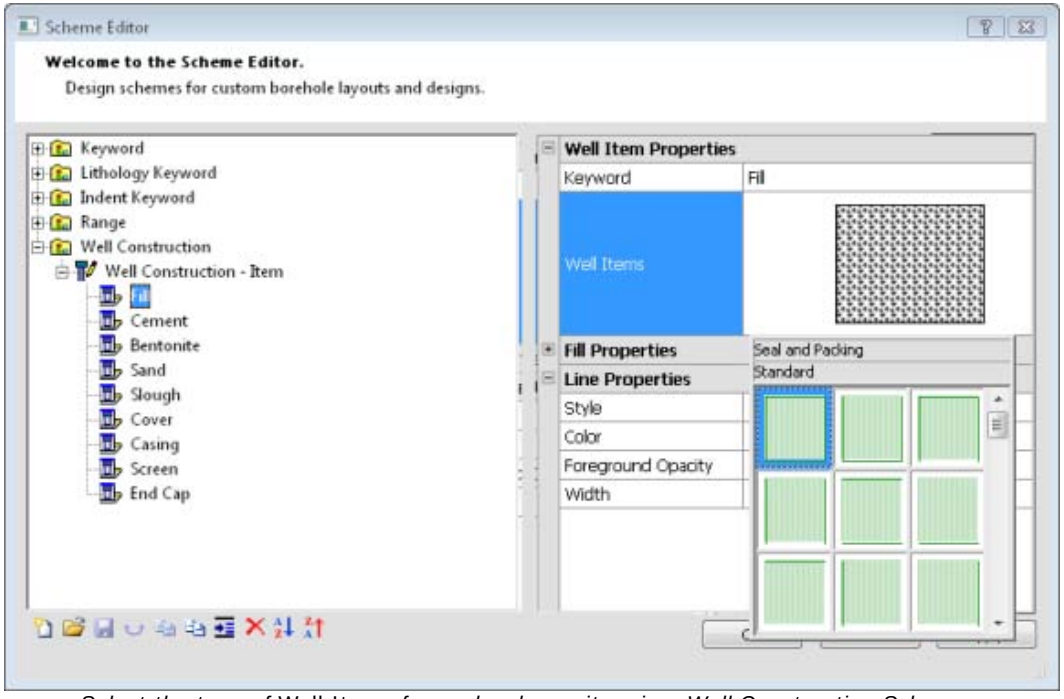
Once a well construction scheme is defined, you can use it with multiple data tables in multiple projects. To use a well construction scheme, click on the well construction log. The properties are listed in the **Property Manager**. Set the *Well Item Column* and the *Well Construction Scheme* to the desired column and scheme for the well.

Well Items

Well items control the shape of well for the scheme item. There are three main item types: *Seal and Packing*, *Casing and Screens*, and *Cover and End Caps*.

- *Seal and Packing* types are used to create packing material rectangles. Seal and packing types are indicated with green in the palette.
- *Casing and Screens* types are used to show the screen and casing types. Casing and screens types are indicated with a reddish color in the palette.
- *Cover and End Caps* types are used for end caps and covers. Cover and end caps types are indicated with blue in the palette.

To change the type of shape, click on the existing option next to *Well Items* and select the desired option from the list.



Select the type of Well Items *for each scheme item in a Well Construction Scheme.*

Each well item type has specific characteristics. For instance, seal and packing items are the only items to use the inner diameter dimensions. In addition, the screen and cap items all use a default white fill for the non-color filled area. You can define the fill for some cap and casing items, but the fill color is defined to the small areas depicted in the color examples.

Chapter 24

Editing, Selecting, and Arranging Objects

Selecting Objects

There are several ways to select objects in **Strater**. An object is selected if there is a bounding box with selection handles surrounding the object. The name of the selected object appears in the status bar. Several procedures are available to select objects:

- Select objects with the **Object Manager**. Click an object's name in the **Object Manager** and it is highlighted in the view window.
- To select a single object in the view window, move the cursor over the object using the mouse or the arrow keys. When the pointer is over the desired object, click the left mouse button or press the SPACEBAR on the keyboard. Six square selection handles appear around the object, indicating that the object is selected.
- To select the correct object when the bounding boxes for several objects are overlapping hold down the CTRL key and continue clicking with the mouse until the desired object is selected. Any objects that were previously selected become deselected.
- To select two or more objects in the view window, hold down the SHIFT key while making your selections. This retains previously selected objects and includes the newly selected objects.
- You can hold down both the CTRL and SHIFT keys to select several overlapping objects in the view window. Clicking on an object a second time while holding down the SHIFT key deselects an object.
- To select two or more objects in the **Object Manager**, hold down the CTRL key while making your selections.
- To select adjacent items in the **Object Manager**, hold down the SHIFT key. All objects between the first click and the last click are selected.
- The block select mouse procedure allows you to select one or more objects contained in a user-defined rectangle. Press and hold the left mouse button on an empty portion of the view window. Drag the mouse to form a rectangle around the group of objects you wish to select. If the rectangle partially contains an object's bounding box it will be included in the box's contents. Alternatively, you can use the arrow keys to position the pointer on an empty portion of the borehole view, press and hold the SPACEBAR, and move the pointer with the arrow keys.
- Click the **Edit | Select All** command to select all the objects in the active pane. Pressing the CTRL+A keys performs the same command.
- You can select multiple objects only when they are all in the same pane.

- The **Edit | Invert Selection** command selects all unselected objects and deselects all selected objects. This command is useful for selecting a large number of objects and leaving a few isolated objects unselected. Select the objects you ultimately *do not* want to select and then use the **Invert Selection** command.
- Use the TAB key to cycle through all objects in the view window, selecting each one at a time.
- To deselect all objects, either click an area in the page where there is no object, or when the log pane has little if any empty space click anywhere outside the page in the log pane with a white background color. You can also select **Edit | Deselect All**.

Select All

Click the **Edit | Select All** command or press CTRL+A on the keyboard to select all objects in the map view or all objects in the active pane in the borehole view or cross section view. A bounding box surrounds all selected objects.

Block Select

The block select feature is available in the borehole view, cross section view and map view. Use block select only among objects in a single pane to move them or to place them in a group.

To select objects with block select drag the cursor across the objects to select.

When an object (or objects) is selected a bounding box surrounds the object and all selected object names are highlighted in the **Object Manager**.

Invert Selection

Click the **Edit | Invert Selection** command to reverse the selected and deselected objects in the active pane in the current view. A bounding box surrounds all selected objects.

Deselect All

Click the **Edit | Deselect All** command or press the CTRL+ALT+A keys on the keyboard to deselect all selected objects. This command is useful when zoomed in on objects.

Alternatively, you can deselect all objects by clicking in the white space outside the objects, including the white space outside the page in the log pane.

Setting the Zoom

There are several ways to zoom in on the objects on the page.

Fit Pane to Window

Click the **View | Fit Pane to Window** command, click the  button, or press CTRL+F on the keyboard to scale the active pane so it is sized to fill the view window. The pane to be scaled is listed on the right side of the status bar.

You can zoom to the width of the active pane by pressing the SHIFT key while selecting the **View | Fit Pane to Window** option or press the CTRL+SHIFT+F keys on the keyboard. The contents of the active pane fill the width of the current view.

In addition, use the mouse wheel to zoom in (by rotating the wheel towards you) or zoom out (by rotating the wheel away from you.)

Zoom Page

Click the **View | Page** command, click the  button, or press CTRL+G on the keyboard to fill the view window with the entire page, including all panes.

The mouse wheel can also be used to zoom in (by rotating the wheel towards you) or zoom out (by rotating the wheel away from you.)

Zoom In

Click the **View | Zoom | In** command, click the  button, or press CTRL+= on the keyboard to increase the magnification of the view window. After clicking the command, click on the screen in the area you wish to magnify. Click on another tool button or press the ESC key to end zoom mode.

Zoom Out

Click the **View | Zoom | Out** command, click the  button, or press CTRL+- on the keyboard to decrease the magnification of the view window. Click on another tool button or press the ESC key to end zoom mode.

Zoom Rectangle

Click the **View | Zoom | Rectangle** command, click the  button, or press CTRL+R to magnify a portion of the view. Hold down the left mouse button and drag a rectangle around the area of interest to magnify it. Click on another tool button or press the ESC key to end zoom mode.

Zoom Selected

Click the **View | Zoom | Selected** command, click the  button, or press CTRL+L on the keyboard to magnify selected objects.

Zoom to Selected Width

To zoom to the width of the selected object, press the CTRL+SHIFT+L keys on the keyboard or press SHIFT on the keyboard and select the **View | Zoom | Selected** command.

Zoom Realtime

Click the **View | Zoom | Realtime** command, click the  button, or press CTRL+T on the keyboard to zoom in and out as the mouse is dragged up and down inside the log pane.

Hold down the left mouse button and then drag it up or down in the view to zoom in or out. As you drag the mouse up, the screen is zoomed in. As you drag the mouse down, the screen is zoomed out. Click on another tool button or press the ESC key to end zoom mode.

Pan

The view window can be panned. This is useful when the scene is magnified and you would like to look at a different portion of the object. To use this feature, select the **View | Pan** command or click the  button. Click and hold the left mouse button

and drag the cursor around the window to pan. Click on another tool button or press the ESC key to end zoom mode.

Zoom or Pan with a Wheel Mouse

You can use a wheel mouse to zoom in/out and pan in the view window. Rotate the wheel forward to zoom in, or rotate the wheel backward to zoom out. The window auto scrolls to keep the point of interest centered.

You can use a wheel mouse to zoom in/out and pan in the view window. Hold down the wheel button straight down, and the cursor will turn to a closed hand. When the cursor is a , drag the mouse to pan the plot window. Be sure to click straight down with the scroll wheel.

Scroll Page

To scroll the page up and down, hold the CTRL key down while rotating the mouse wheel. Moving the mouse wheel away from you scrolls the page down on the screen, and moving the mouse wheel towards you scrolls the page up on the screen.

To scroll the page left and right, hold the SHIFT key down while spinning the mouse wheel. Moving the mouse wheel away from you scrolls the page to the right on the screen, and moving the mouse wheel towards you scrolls the page up to the left on the screen.

You can also use the vertical and horizontal scroll bars on the sides of the page to scroll the page view.

Pages [Page View Mode]

The borehole view and cross section view can be shown in full view or page view mode. If the page view mode is selected and the borehole extends beyond one page, click the **View | Pages** commands or the various page toolbar buttons to move between the pages in the view.

To move between pages when the borehole or cross section is in page view mode:

- Click the **View | Pages | First Page** command, click the button, or press HOME on the keyboard to move to the first page.
- Click the **View | Pages | Previous Page** command, click the button, or press PAGE UP on the keyboard to move to the previous page.

- Click the **View | Pages | Next Page** command, click the button, or press PAGE DOWN on the keyboard to move to the next page.
- Click the **View | Pages | Last Page** command, click the button, or press END on the keyboard to move to the last page.

Redraw and Auto Redraw

Click the **View | Redraw** command, click the button, or press the F5 key to redraw the view window.

If the data for a log are changed, the view automatically updates if *Auto Update Table Changes* is checked under **Tools | Options | General**.

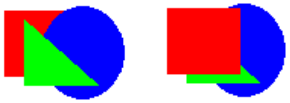
The **View | Auto Redraw** command is used to automatically redraw the contents of the view window each time the contents change. The **Auto Redraw** command is on by default, and this is indicated by a check mark next to the command name. Select **View | Auto Redraw** to toggle the command on and off. If **Auto Redraw** is disabled, click the **View | Redraw** command, click the button, or press the F5 key to redraw the image.

Ordering Objects

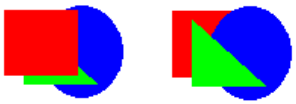
Click the **Arrange | Order Objects** commands to change the order objects are drawn in the view window. Objects can also be moved by dragging them to a new position in the **Object Manager**.

In the examples below, the red square is being moved with the selected command. The diagrams show where the red square starts (left image) and where the red squares ends after the command is used (right image).

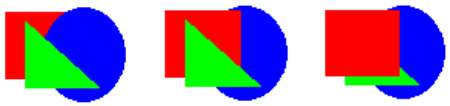
Click the **Arrange | Order Objects | Move to Front** command or click the  button to move the selected object to the front of other objects. The object will appear on top of the other objects.



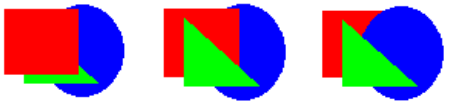
Click the **Arrange | Order Objects | Move to Back** command or the  button to move the selected objects to the back. The object will appear behind the other objects.



Click the **Arrange | Order Objects | Move Forward** command or the  button to move the selected objects forward one layer.



Click the **Arrange | Order Objects | Move Backward** command or the  button to move the selected object backward one layer.



Aligning Objects

Click the **Arrange | Align Objects** commands to align selected objects relative to the bounding box surrounding the selected objects. The objects can be aligned both vertically and horizontally.

When objects are aligned the bounding box automatically resizes to fit the outside boundaries that most closely fit the newly arranged objects. If you try to resize the bounding box the objects inside will increase in size as the bounding box increases in size. If you grab a corner to resize the bounding box the objects will remain proportionately accurate. If you resize by grabbing a side of the bounding box the objects will expand in that direction (for example, squares distorting to rectangles).

Arrange | Align Objects | Left or the  button aligns all selected objects along the left side of the bounding box.

Arrange | Align Objects | Center or the  button centers all selected objects between the left and right sides of the bounding box.

Arrange | Align Objects | Right or the  button aligns all selected objects along the right side of the bounding box.

Arrange | Align Objects | Top or the  button aligns all selected objects along the top of the bounding box. This alignment is available for drawing objects in all views and panes. This option is not available for log objects.

Arrange | Align Objects | Middle or the  button centers all selected objects between the top and bottom sides of the bounding box. This alignment is available for drawing objects in all views and panes. This option is not available for log objects.

Arrange | Align Objects | Bottom or the  button aligns all selected objects at the bottom of the bounding box. This alignment is available for drawing objects in all views and panes. This option is not available for log objects.

Spacing Objects

Click the **Arrange | Space Objects** commands to arrange multiple selected objects relative to each other. To use these commands, first select all of the objects in the **Object Manager** or view window. Then, click the **Arrange | Space Objects** command.

Arrange | Space Objects | Left to Right or the  button aligns the right edge of the left object to the left side of the right object. This alignment is available for all objects.

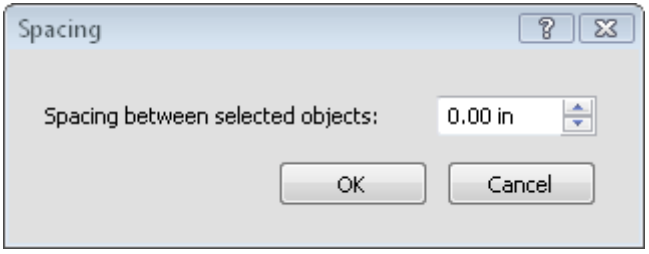
Arrange | Space Objects | Right to Left or the  button aligns the left edge of the right object to the right side of the left object. This alignment is available for all objects.

Arrange | Space Objects | Top to Bottom or the  button aligns the bottom edge of the top object to the top edge of the bottom object. This alignment is not available for log objects.

Arrange | Space Objects | Bottom to Top or the  button sligns the top edge of the bottom object to the bottom edge of the top object. This alignment is not available for log objects.

Spacing

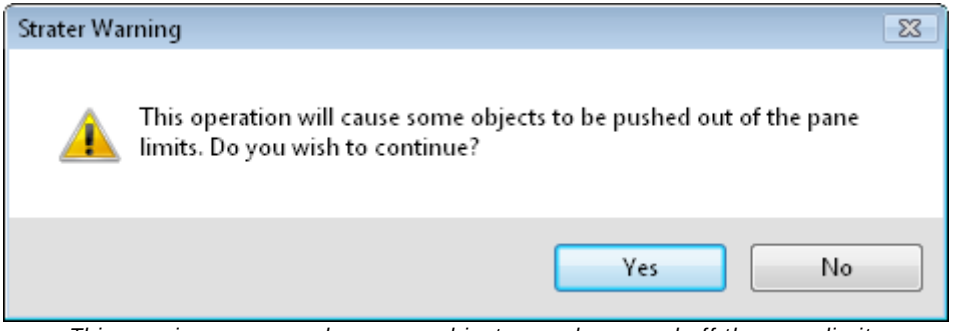
The *Spacing* option opens the **Spacing** dialog.



Set the spacing between selected objects.

Type a value in the *Spacing between selected objects* box and click *OK*. The object furthest to the left stays in the current location. All other objects move to the left, aligning the left edge of each additional object next to the right edge of the previous object with the value entered in the **Spacing** dialog between selected objects. This alignment is available for all objects.

When objects are positioned with the *Spacing* option, some objects may be moved so that the object is beyond the page boundary. In this case, a warning message will appear.



This warning appears when some objects may be moved off the page limit.

If you wish to continue with the *Spacing* operation, click *Yes* in the dialog. To select objects that have been moved off the page, click on the object in the **Object**

Manager and use the *Position/Size* toolbar to move the objects into a visible location. To cancel the *Spacing* operation, click *No* in the dialog.

Sizing Objects

Click the **Arrange | Size Objects** commands or the  buttons to resize the selected objects. All the selected objects are resized to the same height, width, or both, depending on which option is selected.

When resizing multiple objects, the sizing factor depends on the top most selected object shown in the **Object Manager**. If you want the sizing based upon a particular object, order the objects so it is the top most object in the display list. **Height** and **Both** sizing are not available for log objects because the height is dependent on the scale of the log or cross section pane.

Specify Width

Click the **Arrange | Size Objects | Specify Width** command to open the Width dialog.



*Set the size for each object in the **Width** dialog.*

Type the desired width in the *Specify width for each selected object* box and click *OK*. The width of all selected objects changes to the size typed in the dialog.

Resizing Objects

You can resize objects graphically with the mouse or keyboard. Selected objects appear with selection handles at the corners and sides of the object 's bounding box. Selected log items appear with selection handles at the sides of the bounding box for the log. The pointer changes to a two-headed arrow when it is moved over one of the selection handles. You can resize a single selected object or several selected objects using the selection handles.

To resize an object with the mouse:

1. Move the pointer over a selection handle.
2. Press and hold the left mouse button.
3. Move the pointer to a new position.
4. Release the left mouse button and the object is resized.

To resize an object with the keyboard:

1. Move the pointer over a selection handle using the ARROW keys.
2. Press and hold the SPACEBAR.
3. Use the ARROW keys to move the pointer to a new position.
4. Release the SPACEBAR and the object is resized.

Resizing Tips

- With objects other than logs, drag one of the four corner handles to size the object proportionally.
- Drag one of the side handles to stretch or compress the object in one dimension only.

NOTE: Log items can only be resized in the left-right direction (width). To change the height of log items, change the scale with *Scaling Depth Per Inch* in the borehole view properties or cross section view properties.

Grouping Objects

The **Arrange | Group** command is used to group several independent objects into one composite object. Alternatively, select multiple objects, right-click and select *Group*, or click the  button. Composite objects can be a combination of several types of objects and they can be moved or resized as a single object.

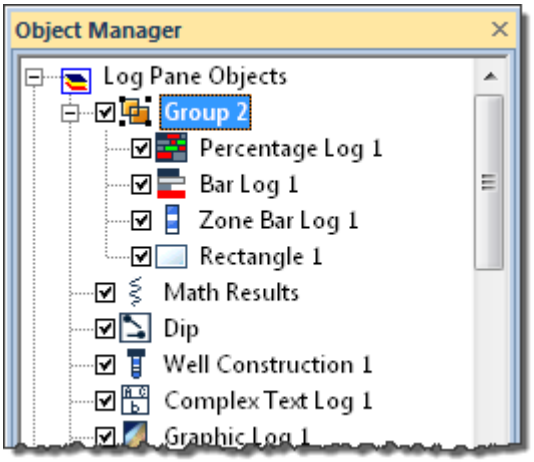
Only objects in the same pane can be grouped. Items in the *Header Pane* can be grouped with other items in the *Header Pane*. Items in the *Footer Pane* can be grouped with other items in the *Footer Pane*. Items in the *Cross Section Pane*, including logs, can be grouped with other items in the *Cross Section Pane*. Items in the *Log Pane*, including logs, can be grouped with other items in the *Log Pane*. Since logs can only be moved horizontally, when logs are grouped with other objects and the group is moved or resized, the log will only move or resize horizontally. The vertical

length or location of the log will not change. Linked scale bar objects cannot be grouped with other items.

To Group Objects

1. Select two or more objects.
2. Select **Arrange | Group** or right-click and select *Group.*
3. The objects are now grouped and can be moved as a single unit.
4. They appear as group in the **Object Manager**.

Only objects in the same pane can be grouped.



*Grouped objects are displayed in the **Object Manager**.*

Editing Grouped Objects

After objects are grouped together, the Group is displayed in the **Object Manager** as a group object and sub-objects. Sub-objects can be edited, re-arranged, or deleted in the **Object Manager**. Click on any of the group objects in the **Object Manager** to display and change the properties for that object in the **Property Manager**. A sub-object may also be deleted.

To move the location of individual items in the composite object, use the Arrange | Ungroup command. Move the item to the new desired location. Once you have completed moving the objects, use the **Arrange | Group** command to regroup the objects.

Ungrouping Objects

The **Arrange | Ungroup** command is used to separate objects that have been previously grouped into a composite object using the Group command. The **Arrange | Ungroup** command can also be used on imported files. Alternatively, right-click on the grouped object and select *Ungroup* or click the  button.

Individual objects in a grouped object cannot be moved in the view window, so use this command to first ungroup the items and then move an individual object. Objects do not need to be ungrouped to edit the properties.

To Ungroup Objects

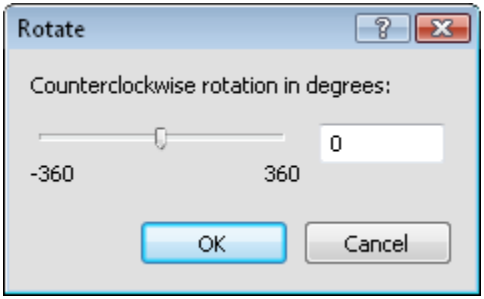
1. Select the grouped object in the **Object Manager** or in the view window.
2. Click the **Arrange | Ungroup** command, right-click and select *Ungroup,* or click the  button.
3. The objects are no longer grouped and can be moved independently.

Rotating Objects

Click the **Arrange | Rotate** command or right-click on an object and select *Rotate* to rotate a selected object in the view window by a specified number of degrees.

Rotate By Angle

To rotate an object, select the object, click **Arrange | Rotate**, and then type the number of degrees to rotate the object into the **Rotate** dialog. Alternatively, you can move the slider button to change the rotation. Positive numbers rotate the object in a counterclockwise direction and negative numbers rotate the object in a clockwise direction.



Type the number of degrees or drag the slider to select the appropriate rotation and click OK.

Click OK and the objects are rotated.

Free Rotate

Select an object and click the **Arrange | Free Rotate** command, click the  button, or right-click on the object and choose *Free Rotate* to rotate objects in the view window with the mouse. After clicking the command, the pointer changes to a  to indicate that the program is in rotate mode. To rotate an object, click on the screen,

press and hold the left mouse button, and drag the mouse. As the object is rotated, the degrees of rotation are indicated in the status bar and the object's outline is displayed in the rotated view with a dashed line. To fix the position of the rotated object, release the mouse button.

Exit Rotate Mode

To exit the free rotate tool either press the ESC key or click any button in the toolbars.

Chapter 25

Importing, Exporting, Saving, and Printing

Introduction to Importing and Exporting

Strater supports several file formats to aid in the exchange of data and graphics with other applications. Files from other applications can be imported into **Strater** as stand-alone images to add additional detail to your borehole, map, or cross section. **Strater** files can also be exported to a variety of formats for use in other programs. For example, you can export boreholes or cross sections from **Strater** as metafiles or images and import them into other software. The clipboard provides another easy way to move maps to other Windows applications.

Import

Click the **File | Import** command, click the  button, or press CTRL+I on the keyboard to import a graphic or other object, such as a company logo or location map into any pane in the borehole view, map view, or cross section view.

The Import Dialog

Use the **File | Import** command to insert an image or other common graphic file into an existing **Strater** project.

Look In

The *Look in* field shows the current folder. Click the down arrow to choose a new folder. Click on the folders to change directories.

The buttons to the right of the *Look in* field allow you to create new folders and change the view of the file list.

File List

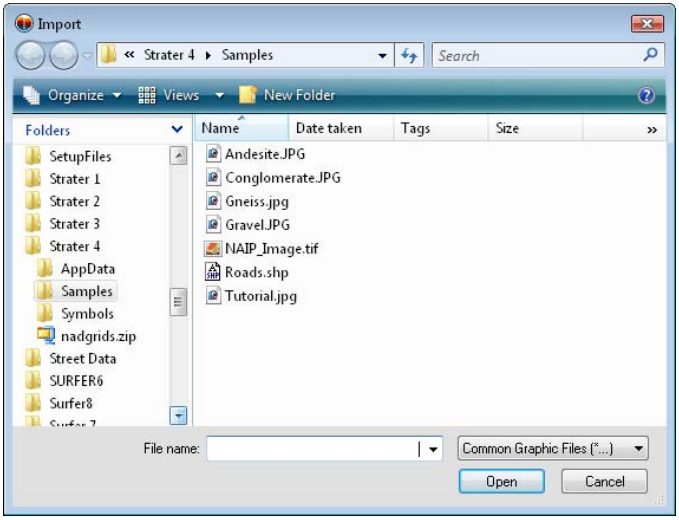
The *File list* displays files in the current folder. The current folder is listed in the *Look in* field. The *Files of type* field controls the display of the file list. To see all files in the folder, choose All Files (*.*) from the *Files of type* list. Double-click on a file to open it or single click the file and then click the *Open* button.

File Name

The *File name* field shows the name of the selected file. You can also type a path and file name into the box to open a file

Files of Type

The *Files of type* field shows the file format to be opened. To change the file format click the down arrow and select the file type from the list. All Files (*.*) display all files in a folder.



Select the file to import in the ***Import*** *dialog.*

Importing an Object

1. Click the **File | Import** command.
2. In the **Import** dialog, select the file to import and click *Open*.
3. The object is positioned at the center of the active pane in the cross section view and borehole view and at the center of the page in the map view. To move the object, click and drag the object to the desired location.
4. To resize the object, click on the object and drag the corner selection handle to the desired size, or use the **Position / Size** toolbar.



Set the width in the W *box and the height in the* H *box for the imported object.*

Copy/Cut and Paste Objects into Any Pane

You can copy and paste (or cut and paste) almost any object, including logs from other **Strater** projects, directly into the header, footer, or log panes. These objects include Word or Excel documents, images in common formats, and objects from other Golden Software products, such as **Surfer**® and **Grapher**® . Some properties of the text might not follow with the *Paste* command, such as font color. If this occurs, double-click inside the pasted text box to format the text within **Strater**.

Use the **Edit | Paste** command or click the  button to copy the clipboard contents into the current document. The objects to be copied must first be placed in the

clipboard using the **Edit | Cut** or **Edit | Copy** commands of **Strater** or some other application. The clipboard contents remain on the clipboard until something new is cut or copied to the clipboard. In the view window, the pasted objects are placed in the center of the viewable area.

Paste Special

The **Edit | Paste Special** command pastes objects from the clipboard into a view window. With the **Edit | Paste Special** command, you have the option of specifying the format to use when pasting the object into **Strater**. Use the **Edit | Paste Special** command for selecting one of several formats for pasting the clipboard contents.

Import File Formats

Formats available with the **File | Import** command in the view windows:

AN? ACR-NEMA Medical Image	PDF Adobe Acrobat
BLN Golden Software Blanking File	PLT Golden Software PlotCall
BMP Windows Bitmap	PLY Stanford PLY
BNA Atlas Boundary	PNG Portable Network Graphics
DICOM3 Medical Image	PNM/PPM/PGM/PBM Image
DDF SDTS TVP	RGB/RGBA/BW SGI-RGB Image
DLG USGS Digital Line Graph	SHP ESRI Shapefile
DXF AutoCAD Drawing	SID LizardTech MrSID Image
E00 ESRI ArcInfo Export Format	SUN/RAS Sun Raster Image
ECW ERMapper	TAR.GZ DDF SDTS TVP
EMF Windows Enhanced Metafile	TAR DDF SDTS TVP
GIF Image	TGA Targa (TrueVision)
GSB Golden Software Boundary	TIF Tagged Image
GSI Golden Software Interchange	VTK Visualization Toolkit
JPG Compressed Bitmap	WMF Windows Metafile
JPG-2000 Compressed Bitmap	X/XIMG AVS X-Image
MIF MapInfo Interchange Format	ZIP DDF SDTS TVP

Import Data

Strater allows you to import data from various data sources. You can maintain your data in other applications, such as a database, and import the tables you need into **Strater** to create boreholes. Any changes made to the data in the original application can be updated in **Strater** with the **File | Reload Data** or **File | Reload All** commands. Data imported into **Strater** can be edited and transformed. When changes are made to data in **Strater** the original data external to **Strater** is not changed. Refer to Chapter 3 – Data and Data Tables for additional information on importing data.

Export

Click the **File | Export** command, click the  button, or CTRL+E on the keyboard to export either a borehole view, map view, or cross section view into a variety of formats.

To save a file as a **Strater** template .TSF use the **Save As** command. To save a file in .SDG format use the **Save** or **Save As** options.

The Export Dialog

Click the **File | Export** command to export a borehole, cross section, or map view. The **Export** dialog appears.

Save In

The *Save in* field shows the current directory. Click the down arrow to see the directory structure. Click on the folders to change directories.

Folders/View

The buttons to the right of the *Save in* field allow you to create new folders and change the view of the file list.

Files List

The *Files* list displays the files using the extension specified in the *Save as* type box. A file can be overwritten by selecting it from the file list.

File Name

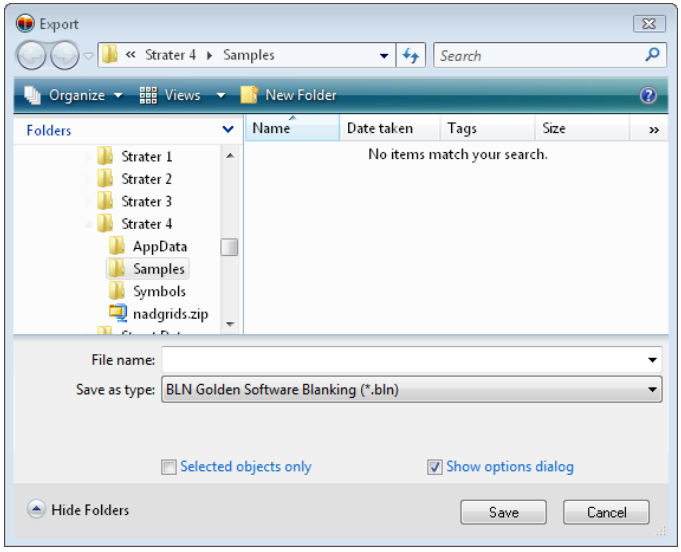
The *File name* box displays the name of the selected file. Type the path and file name of the file to be exported.

Save As Type

The *Save as* type box specifies the format of the file to be exported.

Selected Objects Only

Check the *Selected objects only* box to export selected objects rather than the entire plot.



Export any borehole view, map view, or cross section view to any of the supported formats.

Show Options Dialog

Check the *Show options dialog* box to display the options dialog for the selected format after clicking the *Save* button.

Exporting Files

You can export files by typing a name into the *File name* box and then selecting the file type in the *Save as type* list. For example, typing MYPLOT in the *File name* box and choosing *Tagged Image (TIFF)* from the *Save as type* list results in MYPLOT.TIF. There is no need to enter an extension because it is automatically added. If a file extension is typed into the box along with the file name, the file type is determined by the typed extension. For example, if MYPLOT.DXF is typed in the *File name* box the file is in AutoCAD DXF format no matter what is set in the *Save as type* field.

When the *Save* button is clicked an additional dialog box opens where you select specific options associated with the file to save. The contents of the export file dialog varies with the file type selected for the export.

Exporting Pages

If your borehole is in *Page View* mode, **Strater** exports each individual page as a separate file. Each page is named automatically. For example, you have a borehole in

page view that has five pages. The export file type is AutoCAD DXF, and the selected file name is BHMW1.DXF. **Strater** creates each page as BHMW1-Page1.DXF, BHMW1-Page2.DXF, etc. The exception is if you export to a vector PDF, the PDF file will be a single PDF document containing all of the pages in the view window.

If the borehole view is in *Full View*, the whole borehole is exported as one file.

Export Units

When exporting a map view to a file type that support real world coordinates, such as .DXF, .SHP, and .MIF, the coordinates are in map coordinates when only a single map exists in the map view. The map coordinates are determined by the map's target coordinate system. If other objects, such as text, legends, or drawn objects are in the map view, the map is exported in page units. Values increment up and to the right.

When exporting a cross section view or borehole view to a file type that supports real world coordinates, the Y values are depth coordinates. The X values are in the same units as the Y values. The furthest point to the left in the view window is assigned a value of 0. Values increment up and to the right.

Export File Formats

Use the following links for additional information on the export file dialogs for each file type:

BLN Golden Software Blanking File	MIF MapInfo Interchange Format
BMP Windows Bitmap	PDF (Vector and Raster)
BNA Atlas Boundary	PNG Portable Network Graphics
DXF AutoCAD Drawing	PNM/PPM/PGM/PBM Image
EMF Windows Enhanced Metafile	RGB/RGBA/BW SGI-RGB Image
EPS Encapsulated Postscript	SHP ESRI Shapefile
GIF Image	SUN/RAS Sun Raster Image
GSB Golden Software Boundary	TGA Targa (TrueVision)
GSI Golden Software Interchange	TIF Tagged Image
JPG Compressed Bitmap	WMF Windows Metafile
JPG-2000 Compressed Bitmap	X/XIMG AVS X-Image
LAS (Export to LAS command)	

Export Data

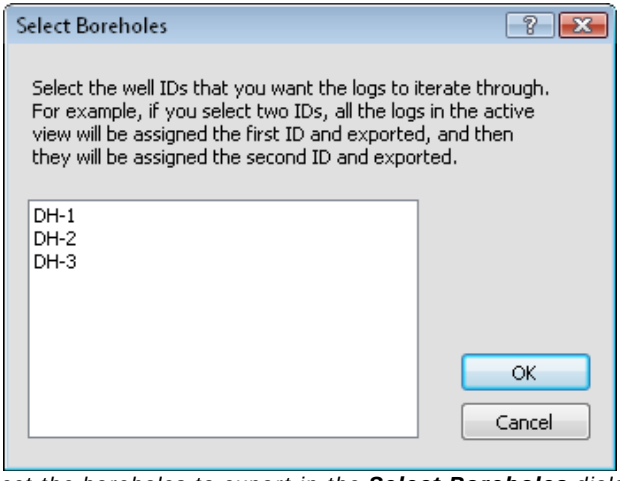
With a table view selected, click the **File | Export** command to export the current table into one of several common data file types. Refer to Chapter 3 – Data and Data Tables for additional information on exporting data.

Export Multiple Logs

Click the **File | Export Multiple Logs** command to export multiple logs using the current borehole view. The **Select Boreholes** dialog appears, displaying a list of all available boreholes in the project. Click on each borehole that you want to export and click *OK*. You can export boreholes with different starting or ending borehole depths, and different scaling values.

To export multiple borehole logs:

1. Open or create a **Strater** project that contains multiple boreholes in the table views.
2. Click the **File | Export Multiple Logs** command.
3. In the **Select Boreholes** dialog, select the boreholes you wish to export. Use the CTRL key on the keyboard to select multiple items. Use the SHIFT key to select a group of items.



*Select the boreholes to export in the **Select Boreholes** dialog.*

4. Click *OK* in the **Select Boreholes** dialog.
5. Set the directory location, *File name,* and *Save as type* in the **Multi-Export** dialog. The *File name* is the base file name. The well ID is appended to the *File name* that

is typed into the dialog. For instance, if *Lithology Log* is typed in, you may see *Lithology Log-DH1, Lithology Log-DH2,* etc in the output directory.

6. Click *Save.*
7. If necessary, set any options in the export options dialog that appears. The export files are created.

Vector PDF Output

When the *Save as type* is set to *PDF (Vector),* a single PDF file is created. Each borehole is started on a new page. For longer boreholes, multiple pages may exist for each borehole.

Export to LAS

The **File | Export to LAS** command creates an LAS file from the selected line/symbol, bar, crossplot, percentage, tadpole, or classed post log. The LAS file follows the LAS 2 format, so it is compatible with most programs.

To use the **Export to LAS** command,

1. Select the log to export. Multiple logs can be selected and exported to the same LAS file as long as all of the selected logs use the same Hole ID and all selected logs are one of the supported log types.
2. Click the **File | Export to LAS** command.
3. The **Save As** dialog is displayed with the *Save as type* automatically set to *LAS Files*. Type a *File name* and click *Save*.

If the logs in the view window are not linked to tables and columns that contain data, an error message appears after typing a name in the **Save As** dialog and clicking *Save*. Click *OK* on the error. Set all of the logs to a table and column that contain data and click the **File | Export to LAS** command again.

After typing a *File name* and clicking *Save*, the **LAS Export** dialog appears.

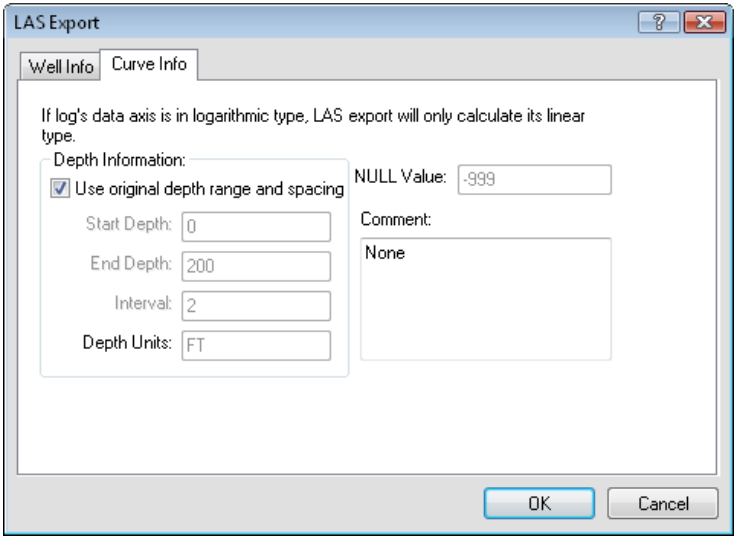
Curve Info Tab

The **Curve Info** tab contains all the information about the logs being exported.

Use Original Depth Range And Spacing

Strater automatically determines the *Start Depth, End Depth, Interval,* and *Depth Units* for the log being exported. Most of the time, these values are the same as those

in the View Properties. You can overwrite these values to any values desired. If any columns used to display the curves have units assigned, the units are written to the LAS file. Check the *Use original depth range and spacing* option to export all logs with the *Start Depth, End Depth*, and *Interval* values the same as the original data. Uncheck this box to manually set the values to any desired values.



*Fill in the depth information and any comments on the **Curve Info** page.*

Start Depth

The *Start Depth* is the first value being exported to the LAS file. The default value is the *Starting Borehole Depth* for the selected borehole view or the original starting depth in the table associated with the log. To change the value in the LAS file, highlight the existing value and type the desired value.

End Depth

The *End Depth* is the last value being exported to the LAS file. The default value is the *Ending Borehole Depth* for the selected borehole view or the original ending depth in the table associated with the log. To change the value in the LAS file, highlight the existing value and type the desired value.

Interval

The *Interval* is the spacing for the depth values in the exported LAS file. One measurement will be recorded at each *Interval*. To change the *Interval*, highlight the existing value and type a new value.

With multiple logs, **Strater** examines all of the selected logs and finds each log's maximum increment value. If a log has identical increment values (i.e., maximum increment value is the same as minimum increment value), then the increment value from the first such log found is used as the initial *Interval*. If the increment values are

not identical for a log, then the maximum increment of this log is compared with those of other logs, and the maximum increment value among all logs is selected as the initial *Interval*.

Depth Units

The *Depth Units* is the units for the depth log. The value is determined by the *Depth Units* in the View Properties. This option cannot be changed in the export process. To change the option, cancel the export, change the *Depth Units* on the **View** tab in the **Property Manager** and reexport the file.

NULL Value

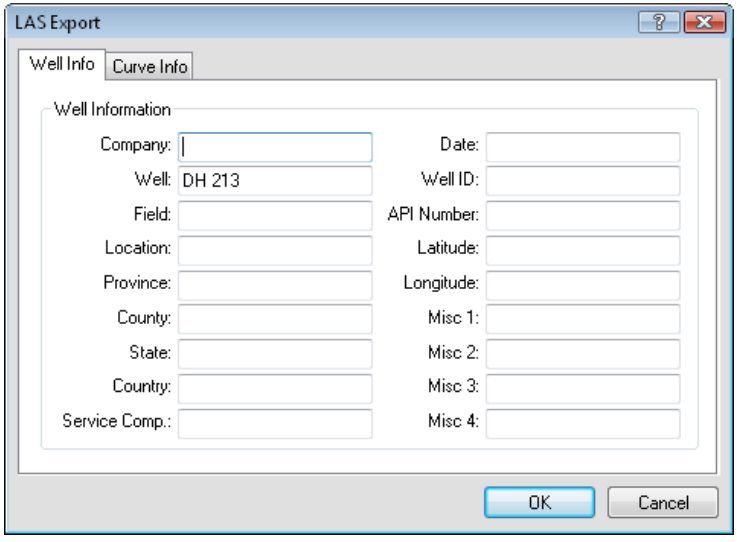
The *NULL Value* is the value in the log that should be used to indicate that the value is not recorded. This is the *NULL* of the project, as shown on the **View** tab in the **Property Manager**.

Comments

Enter any comments in the *Comments* section. These are added to the top of the LAS file.

Well Info Tab

The **Well Info** tab contains information about the specific borehole being exported.



*Set the options for the well on the **Well Info** page.*

Company

Enter the company name in the box next to *Company*. This is an optional entry and does not need to be input.

Well

The *Well* name is automatically entered from the *Hole ID Filter* for the selected log. To change the *Well*, highlight the existing text and type the desired well name. This is an optional entry and does not need to be input.

Field

Enter the field name in the box next to *Field*. This is an optional entry and does not need to be input.

Location

Enter the location name in the box next to *Location*. This is an optional entry and does not need to be input.

Province

Enter the province name in the box next to *Province*. This is an optional entry and does not need to be input.

County

Enter the county name in the box next to *County*. This is an optional entry and does not need to be input.

State

Enter the state name in the box next to *State*. This is an optional entry and does not need to be input.

Country

Enter the country name in the box next to *Country*. This is an optional entry and does not need to be input.

Service Company

Enter the service company name in the box next to *Service Comp.*. This is an optional entry and does not need to be input.

Date

Enter the date in the box next to *Date*. This is an optional entry and does not need to be input.

Well ID

Enter a well identification in the box next to *Well ID*. This is an optional entry and does not need to be input.

API Number

Enter the API number in the box next to *API Number*. This is an optional entry and does not need to be input.

Latitude

Enter the latitude value in the box next to *Latitude*. This is an optional entry and does not need to be input.

Longitude

Enter the longitude value in the box next to *Longitude*. This is an optional entry and does not need to be input.

Miscellaneous Comments

Enter any miscellaneous comments in the boxes next to *Misc 1, Misc 2*, *Misc 3,* and *Misc 4.* These are optional entries and do not need to be input.

OK and Cancel

Click *OK* to create the LAS file with the selected options. Click *Cancel* to not export the file and return to the view window.

Copy View

Click the **Edit | Copy View** command to place a copy of the entire page on the clipboard. All objects from the current view (header pane, log or cross section pane, and footer pane) are copied from a borehole view or cross section view. All objects in the page boundary are copied from a map view. The original object remains in the view. Use this command to duplicate objects in a different location in the same view, or copy the objects into a different view or application. The copied objects can later be pasted with the **Paste** or the **Paste Special** commands.

Only one set of data may be placed in the clipboard at any time. The next **Cut**, **Copy**, or **Copy View** command replaces the contents of the clipboard.

Saving Files

Click the **File | Save** command, the  button, or CTRL+S on the keyboard to save **Strater** .SDG files with the current file name. If the file has not yet been saved, the Save As dialog is displayed so you can give the file a name and folder location.

To save a borehole design as a **Strater** template .TSF file, use the **Save As** command.

To save a file in other formats select **File | Export**.

Save As

Click the **File | Save As** command or the  button to save a new project, save a modified project with a new file name, or save a project as a **Strater** template .TSF file format. the **Save As** dialog opens.

Save In

The *Save in* field shows the current folder. Click the down arrow to change the folder.

Button Shortcuts

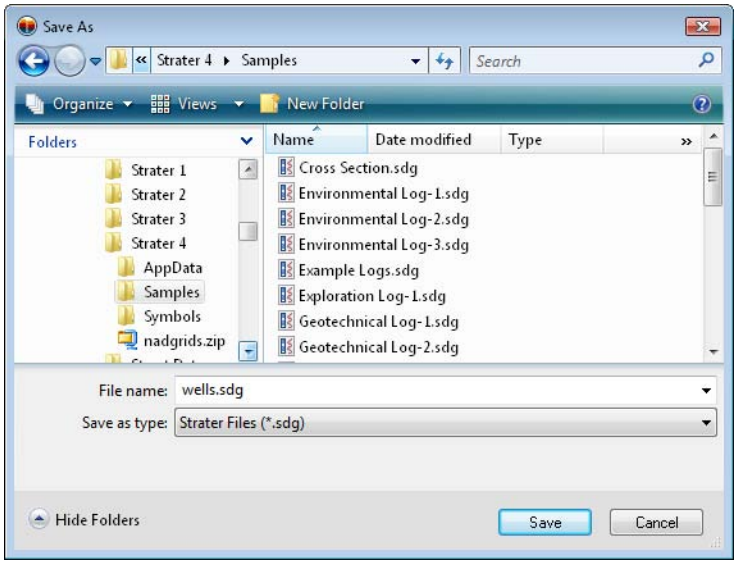
The buttons to the right of the *Look in* field allow you to create new folders and change the view of the file list.

File List

The *File list* displays the files using the extension specified in the *Save as type* box. A file can be overwritten by selecting it from the file list.

File Name

The *File name* box displays the name of the selected file, or you can enter the path and file name of the file to be saved.



Type a File name *to save the* ***Strater*** *file to a new name.*

Save As Type

Select the file format in the *Save as type* list. If you would like to save another file type, for example a bitmap, use **File | Export**.

Save and Cancel

Click the *Save* button to save the file with the selected options. Click the *Cancel* button to not save the file and return to the view window.

Templates

Once a borehole view or cross section view is designed, you can reuse the design in other projects by saving the file as a template. Templates allow you to create, save, and load borehole view designs, cross section view designs, or entire projects to be reused in other projects or by other **Strater** users. Template files have the option of storing a single borehole view or cross section view. Or, the template can store all of the view windows, schemes, and the table layout without any actual data. Template .TSF files are stand-alone files from the main **Strater** project .SDG files.

Creating Templates

Templates can be created by either opening an existing project and saving it as a template, or by starting with an empty borehole view or cross section view, creating the view design, and saving it as a template.

To create a new, empty borehole view or cross section view window:

- Click the **File | New | Borehole View** command or the  button,
- Click the **File | New | Cross Section View** command or the  button, or
- Right-click in the View Manager and select *New Borehole View* or *New Cross Section View.*

When the view window opens, design the view by opening data files and creating the various objects with all of the properties that should be saved to the template. If you do not have data for the logs, you can design the borehole view in design mode.

Saving Templates

You can save a project as a template from either design or active mode. A saved template is stored in the exact format in which it was saved.

To save only a single borehole view or cross section view window, right-click on the view window name in the **View Manager** and select *Save Template of Current View.* In the **Save Active View To Template File** dialog, type a *File name* that indicates the view window type being saved and any other information needed for identification. Click *Save* and the file is saved to a .TSF file format with only the selected borehole view or cross section view window. No data layout, schemes, or other view windows are saved.

To save the entire project as a template, click the **File | Save As** command. In the Save As dialog, type a *File name* that indicates the entire project is being saved and set the *Save as type* to *Strater Template Files (*.tsf).* Click *Save* and the file is saved to a .TSF file format with all view windows, schemes, and table formats. No actual data is saved. Data tables are created matching the original layout, but without any actual data. . If there are multiple tables in the template they are all saved, even those that are not currently represented in the view windows. All schemes in the project are also saved in the template.

Loading Templates

To load an existing template file, click the **File | Open** command or right-click in the **View Manager** and select *Load Template*. View windows in the template are loaded into new view windows in the project. Tables are automatically created. with the format of the data in the template for full project templates. You are prompted to load data in the template wizard or, you can import data into the tables, edit the logs to reflect the data, and create additional objects if necessary.

Once a template has been loaded into a new **Strater** window, the appearance of the view window with the imported template remains unchanged if the original source template is changed elsewhere. In order to use any changes made to the original template, you must open that template into a new view window.

Only one template can be used in each view window. You can open multiple templates into multiple view windows and save them all in a single project file with the **File | Save As** command.

Active Mode and Design Mode

View windows in full project templates are loaded in active mode, when there is data in any of the tables attached to the view window. If no data appears in any of the tables attached to a view window, the view window will be in design mode.

View only templates are loaded in active mode if there is data in any of the tables attached to the view window. View only templates are loaded in design mode if no data appears in any of the tables referenced in the template.

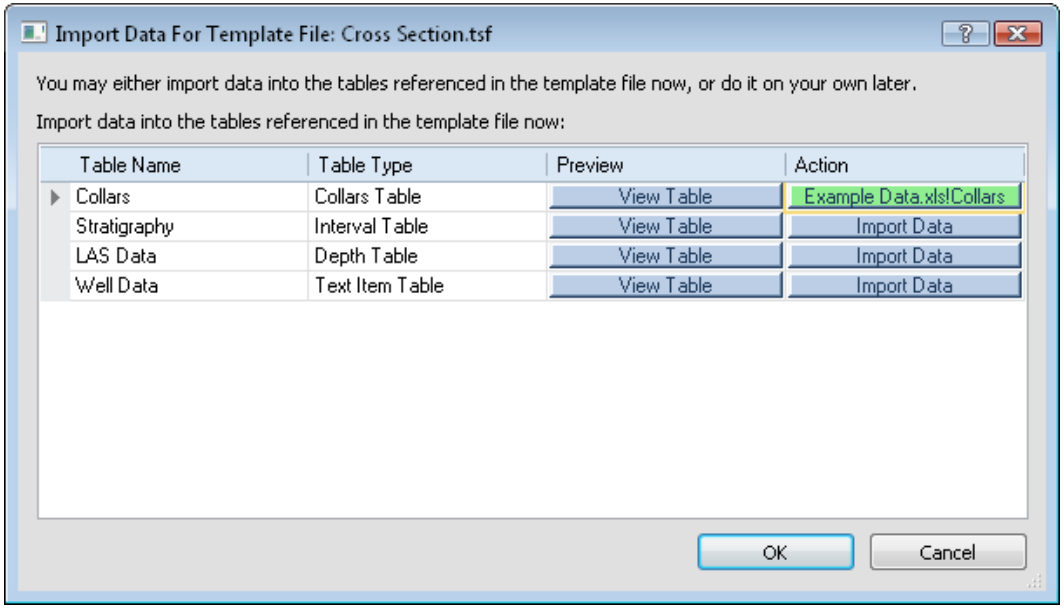
Click on the various tables and use the **File | Import** command to import data into each table. Click the **Log | Design Mode** command or the  button to switch to active mode after data has been imported into the project. Click on the view windows and click on **View | View Properties** command. Set the *Hole ID Filter* for the borehole view on the **View** tab in the **Property Manager**.

Template Information

If there is a template associated with a borehole view, it is listed in the Borehole **View** Properties. If the *Template Name* field is blank, a template is not used for this borehole view. Otherwise, the *Template Name* contains the name of the template used in the project.

Template Wizard

The template wizard loads a full project template into the current project. To use the template wizard, click the **File | Open** command and select a full project template file. Alternatively, right-click in the **View Manager** and select *Load Template*. After loading the view windows and creating the table layout, the **Import Data For Template File** dialog appears, prompting for the data files to import into the new tables.



*Import new data into each table in the **Import Data For Template File** dialog.*

Table Name

The *Table Name* column lists the name of each table created by the template.

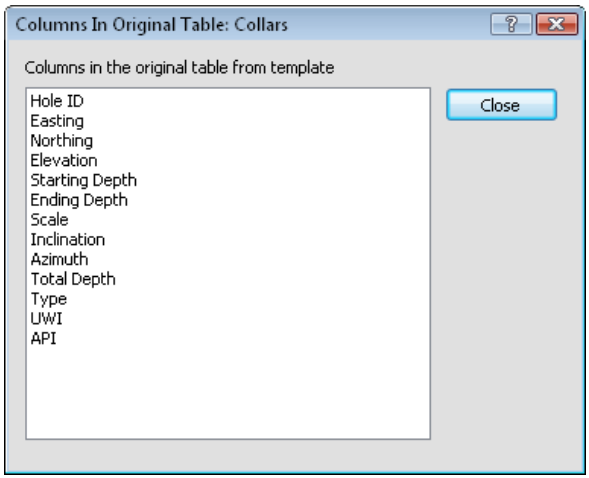
Table Type

The *Table Type* column lists each table's type created by the template. This tells the user what type of data should be loaded into each table.

With **Strater 1** templates, *Unknown* will appear in the *Table Type* list, as **Strater 1** did not record the type of table needed for templates.

Preview

Click the *View Table* button next to each table to see the columns created by the template. After clicking the *View Table* button, the **Columns In Original Table** dialog opens. All columns created by the template for the selected table are listed in the dialog.



*All columns in the selected table are displayed in the **Columns In Original Table** dialog.*

Action

When the *Action* button is blue and includes the *Import Data* text, no data is associated with the selected table. Click the *Import Data* button to open the **Import Data** dialog. To import the selected file into the template created table, check the *Import data into current table* box in the **Import Data** dialog. Click *Open* and step through the data import process. The imported data will be included in the selected table.

When the *Action* button is green, the text will indicate the table name (and sheet for an Excel file), that is being imported into the selected table.

If data exists in other tables, leave the *Import Data* button and click *OK*. No data is imported into the selected table. The table can be deleted and the logs referenced to other existing tables.

OK or Cancel

Click *OK* to load the data into the selected tables. Click *Cancel* to create the tables with no data imported.

Printing

Another method to export information from the plot window is to print the file. Files can be printed to any Windows printer, including various PDF file printer drivers.

Page Setup – View Windows

Click the **File | Page Setup** command or click the  button to set the page properties for the active borehole view, map view, or cross section view. The **Page Setup** dialog is different than the **Page Setup** dialog for a table view.

The **File | Page Setup** command in the borehole view and cross section view allows you to change the size of the page, margins, header pane, log or cross section pane, and footer panes, and the separation between panes. The page size and margins can be set to any value. It is preferable to use **Page Setup** before designing a log or cross section. For the map view, the **Page Setup** dialog controls the page size and margins.

Page Setup and Full View

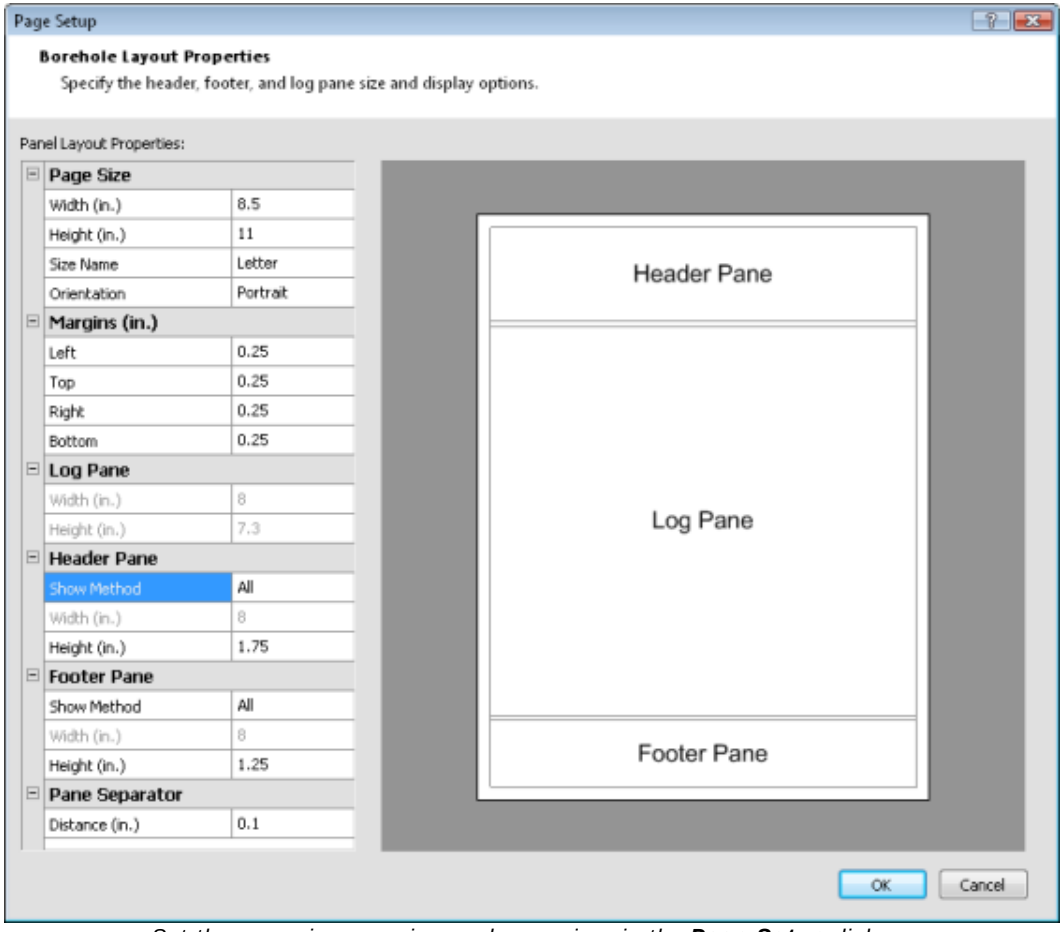
The **Page Setup** command can be used from a borehole view or cross section view in full view. Note that the **Page Setup** layout only displays the log pane options in page view mode. The log pane size of the full view is controlled by the **Borehole View Properties**. To change the page size in full view, change the *Starting Borehole Depth, Ending Borehole Depth,* and *Scaling Depth Per Inch* in the borehole view properties or cross section view properties before printing.

Page Setup Dialog

The **Page Setup** dialog lists the setup options on the left. Each section of options can be opened or closed by clicking the ⊞ or ⊟ button next to the section name. The right side of the dialogs displays a representation of the current page settings.

Page Size

Set the *Width (in.), Height (in.), Size Name,* and *Orientation.* To change the *Width (in.)* or *Height (in.)*, highlight the existing value and type a new value. Alternatively, let the *Size Name* and *Orientation* automatically change the values. To change the *Size Name* and *Orientation*, click on the existing option and select the desired option from the list. There are numerous standard paper sizes listed in the *Size Name* list. If you would like to use a custom page size, select *Custom* from the *Size Name* list. Then, set the *Width (in.)* and *Height (in.)* to the desired size.



*Set the page size, margins, and pane sizes in the **Page Setup** dialog.*

Margins#

Select the *Left, Top, Right,* and *Bottom* page margins that surround printed area. For a borehole view and cross section view, the margin encloses all three panes. To change a margin value, highlight the existing value and type the desired size. Sizes are in page units.

Setting the Borehole View Pane Options#

The log or cross section, header, and footer panes have visibility, height, and width settings.

Log Pane or Cross Section Pane

The *Log Pane* and *Cross Section Pane* settings are read-only and cannot be changed because the log pane and cross section pane must always be visible. The *Width (in.)* and *Height (in.)* of the *Log Pane* or *Cross Section Pane* is determined by subtracting the header, footer, pane separator, and margin values from the page size values.

Header Pane

You can change the display of the header pane by changing the *Show Method* option. Available options are *None, All, First page only, Last page only,* or *First and last page*. To change the header pane display, click on the existing option and select the desired option from the list. *None* turns off the display of the header pane on all pages. No header pane is shown. *All* turns on the display of the header pane on all pages. *First page only* displays the header on only the first page of a multiple page borehole view or cross section view. *Last page only* displays the header on only the last page of a multiple page borehole view or cross section view. *First and last page* displays the header on both the first and last pages, but no other pages. To use the *First page only, Last page only*, or *First and last page* options, the *Log Display Mode* option in the Borehole View Properties or Cross Section View Properties must be set to *Page View*.

The *Width* of the header pane is determined by subtracting the *Left* and *Right* margins from the page *Width*. The *Height* of the header pane is in page units and can be set to any value, such that the log pane height is at least two inches.

Footer Pane

You can change the display of the footer pane by changing the *Show Method* option. Available options are *None, All, First page only, Last page only,* or *First and last page*. To change the footer pane display, click on the existing option and select the desired option from the list. *None* turns off the display of the footer pane on all pages. No footer pane is shown. *All* turns on the display of the footer pane on all pages. *First page only* displays the footer on only the first page of a multiple page borehole view or cross section view. *Last page only* displays the footer on only the last page of a multiple page borehole view or cross section view. *First and last page* displays the footer on both the first and last pages, but no other pages. To use the *First page only, Last page only*, or *First and last page* options, the *Log Display Mode* option in the Borehole View Properties or Cross Section View Properties must be set to *Page View*.

The *Width* of the footer pane is determined by subtracting the *Left* and *Right* margins from the page *Width*. The *Height* of the footer pane is in page units and can be set to any value, such that the log pane height is at least two inches.

Pane Separator

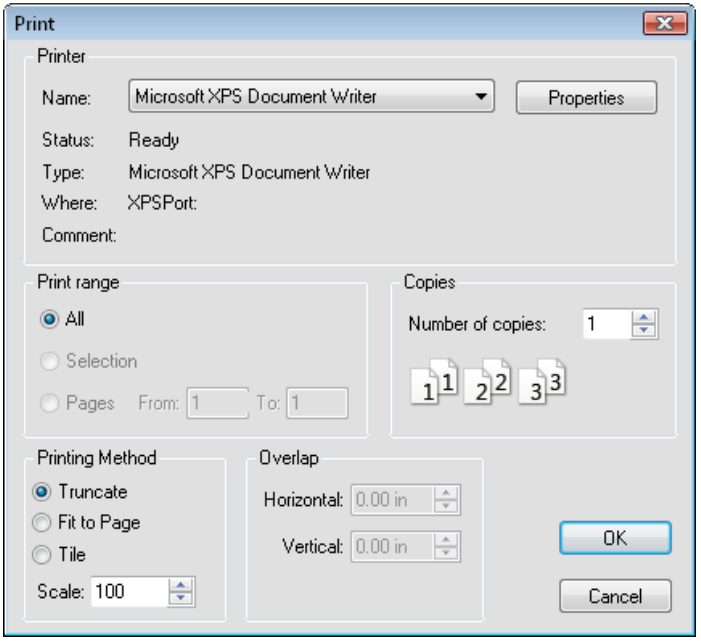
Use the *Distance (in.)* field to set the size of the gap between the panes in page units. The default size is 0.10 inches. To change the value, highlight the existing value and type any value, such that the log pane height is at least two inches.

Changing the Page Setup in an Existing Project or Template

If a page size is changed in the **Page Setup** dialog, two changes may occur. If the page size is smaller than the original, the header and footer rectangles are automatically resized, as is the log pane. If the page size is greater than the original, the header and footer sizes are retained and the log pane is expanded to fill the space.

Print – View Windows

Click the **File | Print** command, click the  button, or press CTRL+P on the keyboard to print the current contents of the view window. If a borehole view is active the print function will print the borehole. To control the display of the page, refer to the **File | Page Setup** command. The **File | Print** command in the table view opens the **Print** dialog.



*Set the options in the **Print** dialog to control printer settings.*

Printer

The *Printer* options specify which printer to use and displays general information on the selected printer.

Name

The default printer is listed in the *Name* field. If more than one printer is installed on the computer, use the down arrow to the right of the name field to select a different printer.

Properties

The *Properties* button controls the printer settings. For information on specific printer

settings, see the owner's manual for the printer.

Print Range

The *Print range* options control how the pages are printed.

- *All* prints all the pages that contain objects.
- *Selection* prints the selected objects only. This option is only available when objects are selected in the view window before clicking the **File | Print** command.
- *Pages* prints the selected pages in the *From* and *To* boxes. Enter the starting page in the *From* box and the ending page in the *To* box. This option is only available when printing a borehole or cross section view in the *Page View* that contains multiple pages. Set the *Page View* on the **View** tab in the **Property Manager.**

Copies

Copies specify the number of copies to print. If two or more copies of multiple page documents are printed, check the *Collate* box to separate the copies into packets. These options are disabled if the current printer does not support them.

Printing Method

The *Printing Method* options control how the borehole view is printed on the page.

- *Truncate* clips objects that extend past the page outline. Note that the file will not print to the edge of the page since most printers have internal margins.
- *Fit to Page* reduces the size of the plot so that it fits within the specified page size.
- *Tile* breaks the drawing into page size pieces and generates multiple pages of output. Each page overlaps adjacent pages by the amount specified in the *Horizontal* and *Vertical Overlap* fields.
- *Scale* is used with the *Truncate* and *Tile* print methods to reduce or increase the overall size of the drawing. 100 percent is actual size, 200 percent is twice as large, and 50 percent is half as large.

Tip

To print each page of a log on a separate piece of paper with the header and footer on each page, set the *Log Display Mode* to *Page View* on the **View** tab in the **Property Manager** and print using the *Truncate* printing method. To print the entire log from start to finish as one long log without any breaks, set the *Log Display Mode* to *Full View* on the **View** tab in the **Property Manager** and print using the *Tile* printing method.

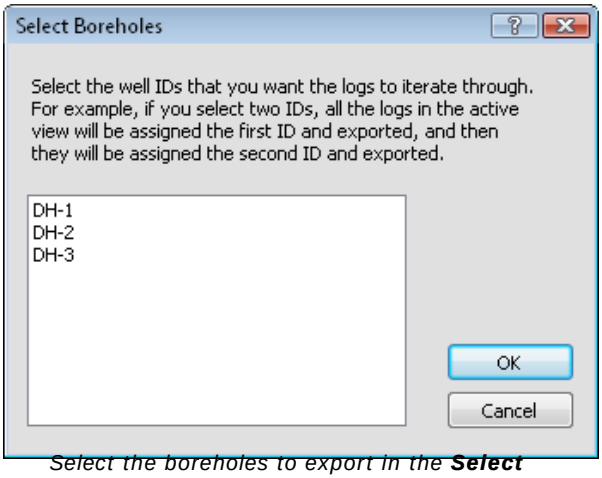
If the borehole is printed on multiple pages and the ending depth tick number on one page is the same as the starting depth tick number on the subsequent page, both tick marks will appear and be numbered.

Print Multiple Logs

The **File | Print Multiple Logs** command displays the **Select Boreholes** dialog, where all available boreholes in the project are listed. Click on each borehole that you want to export and click *OK*. You can export boreholes with different starting or ending borehole depths, and different scaling values.

To print multiple borehole logs:

1. Open or create a **Strater** project that contains multiple boreholes.
2. Click the **File | Print Multiple Logs** command.
3. In the **Select Boreholes** dialog, select the boreholes you wish to print. Use the CTRL to select multiple items and use the SHIFT key to select a group of items.
4. Click *OK* in the **Select Boreholes** dialog.
5. Set options in the **Print** dialog and click *OK*.



*Select the boreholes to export in the **Select Boreholes** dialog.*

All of the selected boreholes are printed to the printer using the properties of the existing borehole view.

Printing Tables

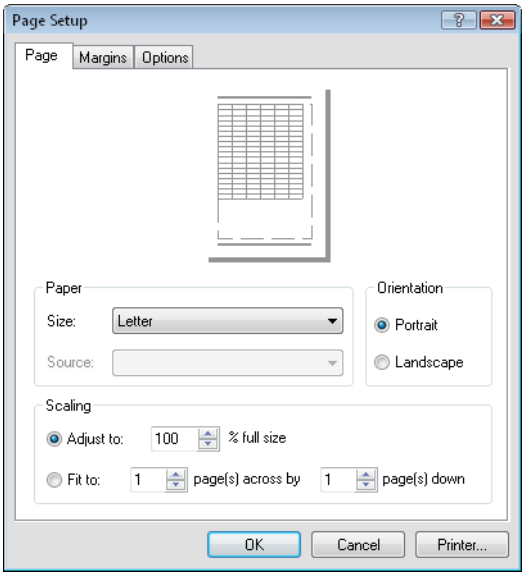
A method to export information from the table is to print the file. Files can be printed to any Windows printer, including various PDF file printer drivers.

Page Setup - Table View

The **File | Page Setup** command for a table view is different than the **Page Setup** for a borehole view, map view, or cross section view. The **File | Page Setup** command in the table view opens the **Page Setup** dialog. The **Page Setup** dialog has three pages of options: **Page**, **Margins**, and **Options**.

Page Tab

Use the **Page** options to set paper size, source, orientation, and scaling.



*Change page setup properties in the **Page Setup** dialog **Page** page.*

Paper

Use the *Paper* section to choose the paper *Size* and *Source* for the active printer.

Size

Click the down arrow next to the paper *Size* to change the size of the paper. The paper size options available for your printer are listed in the drop-down list.

Source

If your printer has multiple print trays, choose the paper *Source* by clicking the down arrow.

Orientation

The *Orientation* section controls whether the page is set to *Portrait* or *Landscape* mode. Select *Portrait* to have a vertical page. Select *Landscape* to have a horizontal page.

Scaling

The *Scaling* section controls the printed size of the worksheet. There are two options with *Scaling: Adjust to* and *Fit to*.

Adjust To

The *Adjust to ___ % full size* option sets the percent of full size that the worksheet will print. The arrow buttons are used to scroll up or down from 100% (full size), or values can be typed into the box. The *Adjust to ___ % full size* setting is independent of the *Fit to* option.

Fit To

The amount of data in the worksheet determines how many pages are required to print the worksheet. The *Fit to __ page(s) across by __ page(s) down* option tells the program to print the worksheet at 100% scale or less. This option does not automatically scale the printed worksheet greater than 100%. This option is most useful when the worksheet is large and the number of printed pages needs to be limited.

Printer

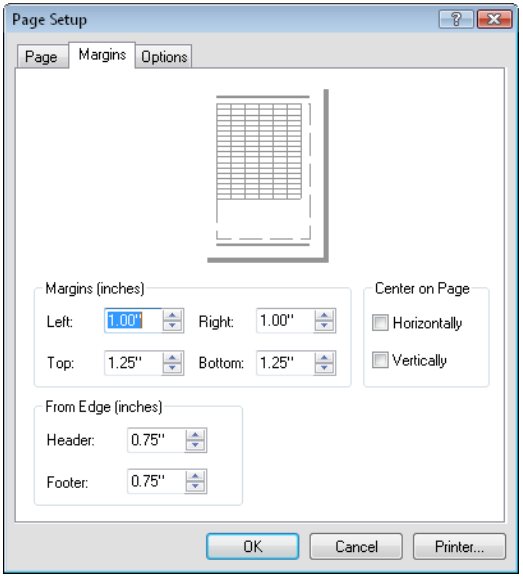
The active printer can be changed by clicking the *Printer* button at the bottom of the **Page Setup** dialog.

Margins Tab

Use the **Margins** page to set page margins, header and footer positions, and centering.

Margins

Use the *Margins (inches)* group to set the page margins for all sides of the printed page. Set the *Left*, *Right*, *Top*, and *Bottom* values in inches to any limits the printer will allow. The margins are for the worksheet printout and are independent of the settings used for *Headers* or *Footers*.



*Change page margin properties on the **Page Setup** dialog **Margins** page.*

Center on Page

The *Center on Page* group options automatically center the printout *Horizontally*, *Vertically*, or both. If neither option is selected, the worksheet prints in the upper left corner of the page.

From Edge (inches)

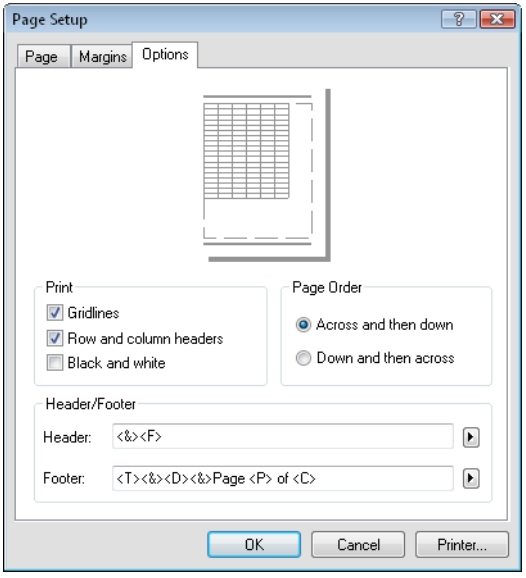
Headers and *Footers* are the only items that print outside of the margins. The *From Edge (inches)* group options controls how far the *Header* or *Footer* is printed from the edge of the page. If these values are greater than the *Top* or *Bottom* margins, it is possible that the worksheet data can print over the header or footer. The text that is printed for the header and footer is controlled on the Options page.

Printer

The active printer can be changed by clicking the *Printer* button at the bottom of the **Page Setup** dialog.

Options Tab

Use the **Options** page to set gridlines, page order, and content of headers and footers on worksheet prints.



*Change page option properties in the **Page Setup** dialog **Options** page.*

Print

The *Print* section controls how the worksheet information is printed.

Gridlines

Check the *Gridlines* option to draw grid lines separating each column and row.

Row and Column Headers

Check the *Row and column headers* option to print the column letters and row numbers of the worksheet.

Black and White

If cells contain color backgrounds (set from the **Format | Format Cells** command), check the *Black and white* option to print the worksheet in only black and white.

Page Order

The *Page Order* section controls the order in which multiple pages are printed. The *Across and then down* option prints from left to right first, and then moves down and prints left to right again. The *Down and then across* option prints the worksheet from top to bottom first, and then moves to the right and prints top to bottom again.

Header/Footer

The *Header/Footer* group controls the type of information included in the worksheet data print out. The plot window does not have header/footer options. The *Header* appears at the top of the page, and the *Footer* appears at the bottom of the page. The header and footer are spaced from the edge of the page based on the *From Edge* option o, the Margins page. Descriptive text can be typed in the *Header* and *Footer* boxes, or click the arrows to the right of the boxes and click the items in the drop-down list.

Automatic header/footer codes:

Code	Description
<F>	Inserts the file name. The drive and path are not included.
<P>	Insert the page number for each page. When several pages are printed, the order of printing is controlled from the *Page Order* section.
<C>	Inserts the total number of pages that are required to print out the worksheet with the specified scaling parameters.
<D>	Prints the current date.
<T>	Prints the current time.
<&>	Inserts a *Left/Center/Right Separator.* Separates the header and footer text so it is spread out across the page. Too many separators can actually push text off the page. If this happens, remove the <&> separator, and use spaces instead

Printer

The active printer can be changed by clicking the *Printer* button at the bottom of the worksheet **Page Setup** dialog.

Examples

For a six page document, <&><&>Page <P> of <C> would print (on the right side of the first page):

```
                                Page 1 of 6
```

Enter Joe Smith<&>< F><&><D> to print out a name, file name, and date:

```
  Joe Smith          COLORADO.DAT
                     01/05/10
```

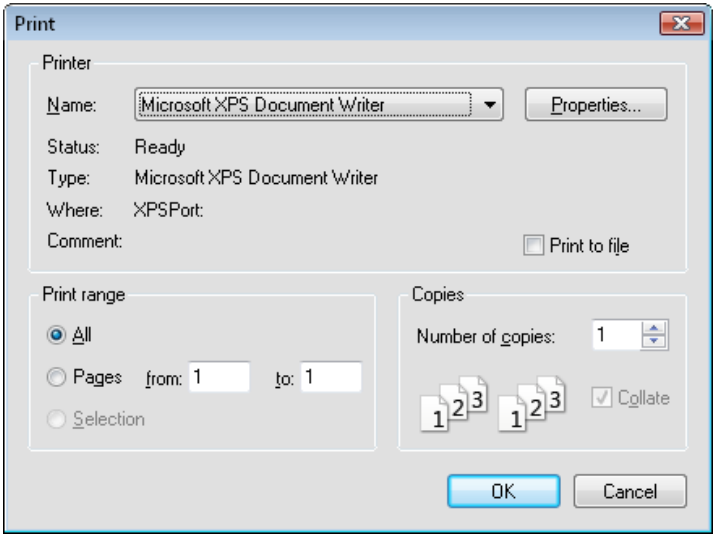
To print centered text use the "&" operator one time, such as <&>< F>.

```
                 FILENAME.DAT
```

Print – Table View

Click the **File | Print** command, click the  button, or press CTRL+P on the keyboard to print the current contents of the workspace. If a data table is active, the data table will be printed. To control the display of data on the page, refer to the File | Page Setup command.

The **File | Print** command in the table view opens the **Print** dialog.



*The **Print** dialog controls the printer settings when printing a table.*

Printer

The *Printer* options specify which printer to use and displays general information on the selected printer.

Name

The default printer is listed in the *Name* field. If more than one printer is installed on the computer, use the down arrow to the right of the name field to select a different printer.

Properties

The *Properties* button controls the printer settings. For information on specific printer settings, see the owner's manual for the printer.

Print to File

Check the box next to the *Print to file* option to print the data to a .PRN file. .PRN files are ASCII text files. When this option is checked, click *OK* in the **Print** dialog after setting other printing options. The **Print to File** dialog will open. Enter a path and file name in the **Print to File** dialog and click *Save* to create the file.

Print Range

The *Print range* options control how the pages are printed.

- *All* prints all the pages that contain objects.
- *Pages* prints the selected pages in the *from* and *to* boxes. Enter the starting page in the *from* box and the ending page in the *to* box.
- *Selection* prints the selected worksheet cells only.

Copies#

Copies specify the number of copies to print. If two or more copies of multiple page documents are printed, check the *Collate* box to separate the copies into packets. These options are disabled if the current printer does not support them.

Collate

Check the *Collate* box to collate the pages when multiple page documents are printed two or more times.

Chapter 26

Options, Defaults, and Customizations

Options

Click the **Tools | Options** command to change the program options, such as ruler display when to update, default line, fill, symbol, font, or format properties. These properties are shared by all objects that use the specific format. For example, if you change the line color, all new line/symbol logs, drawn polygons, polylines, and borders will use the new line color. Use the **Options** dialog to set preferences for general options (general and update settings), environment options (display, rulers, and grids settings), and defaults (line, fill, symbol, font, and format settings). Change the listed option as desired and click *OK* to save your changes.

Click the ⊞ button to the left of an option to expand the three sections (*General, Environment, Default Properties*) in the **Options** dialog to display the options. Click the ⊟ button to the left of an option to condense the detailed options. The table below shows what is controlled in each section.

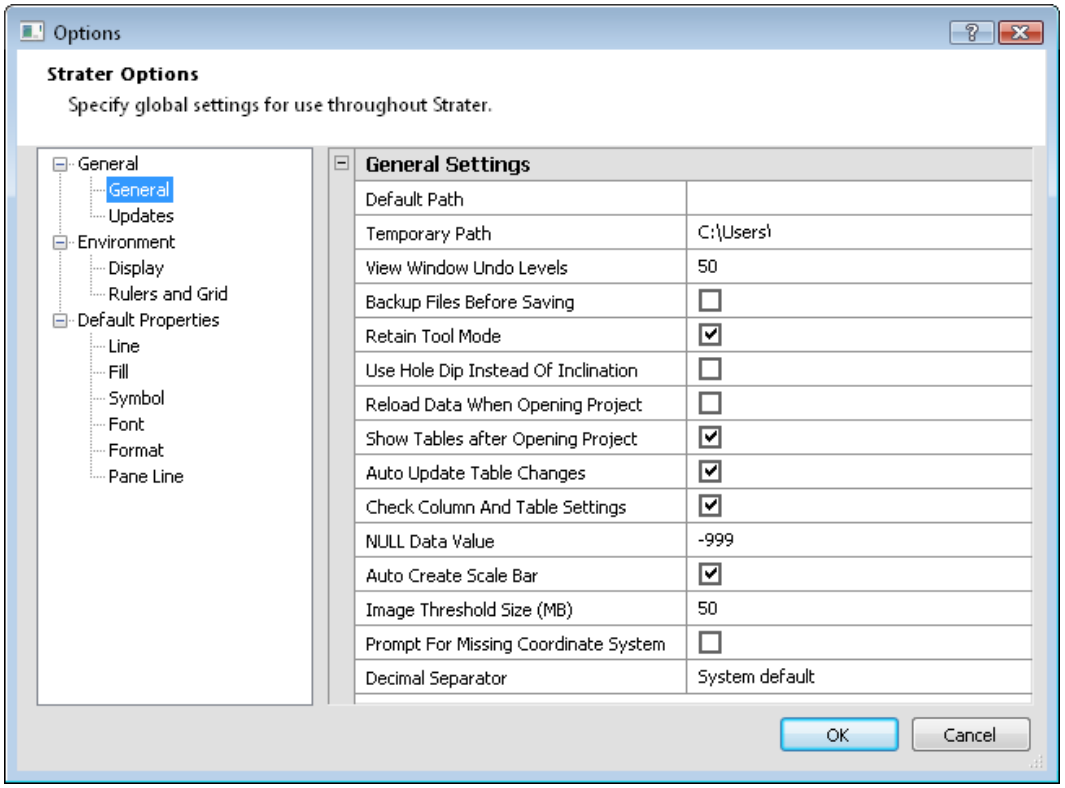
General	Set general view features such as undo levels and update settings.
Environment	Sets basic environment feature settings for display and rulers and grids.
Default Properties	Sets basic default properties for Line, Fill, Symbol, Font, Format, and Pane Line options.

Options - General Settings

You can set defaults such as file open/save paths and undo levels, etc. in the *General Settings* section of the Options dialog. Click the **Tools | Options** command to open the **Options** dialog. On the left side of the dialog, click on *General* to set the general settings. Changes made in the **Options** dialog affect all subsequent documents. Existing documents and settings are not changed.

Default Path

Use the Default Path to set the initial default path for opening and saving files. Click in the box and click the … button to select the desired path.



Set general options, like undo levels, null data values, and many other options on the General Settings *page.*

Temporary Path

The default *Temporary Path* is the temporary file for the current user (*C:\Documents and Settings\[current user name]\Local Settings\Temp* for XP or *C:\Users\[current user name]\AppData\Local\Temp* for Vista and 7). To change the temporary path click the ... button to select the desired path.

View Window Undo Levels

The *View Window Undo Levels* lists the number of undo actions that are available to a user. The maximum number of undo actions is 100. The default value of undo actions is 50. Increasing this value increases the amount of memory required by the program to store actions in the undo buffer. To change the number, highlight the existing value and type a new value or click the to increase or decrease the value.

Backup Files Before Saving

The *Backup Files Before Saving* option determines if all files are backed up before saving. Check the box if you want files backed up. Uncheck the files if you do not want to create a backup file.

Retain Tool Mode

The *Retain Tool Mode* determines if commands are persistent until another tool is selected or ESC is pressed on the keyboard. If this box is not checked, after using a tool once, the current tool reverts to the selection tool. If this box is checked, you can repeatedly use a tool. Press ESC on the keyboard to end persistent use mode. When *Retain Tool Mode* is not checked, you can hold the SHIFT key when you select a tool from the toolbar or menu to use it multiple times.

For instance, click the **Draw | Rectangle** command. Draw a rectangle and finish it. After finishing the rectangle, if the *Retain Tool Mode* option is checked, the drawing mode is still active. This allows you to easily create multiple objects in a sequence or to zoom in or out repeatedly. To end the repeated mode, press ESC on the keyboard.

Use Hole Dip Instead Of Inclination

The *Use Hole Dip Instead Of Inclination* option determines if hole inclination values are measured as dip or as inclination. When this option is checked, *Dip* is used. When this option is unchecked, *Inclination* is used. Both *Dip* and *Inclination* measure the angle the borehole is oriented in degrees. *Inclination* varies from 0 to 180. 0 indicates vertical pointing down, 90 indicates horizontal, and 180 indicates vertical pointing up. *Dip* varies from -90 to 90. -90 indicates vertical pointing down, 0 indicates horizontal, and +90 indicates vertical pointing up.

When the *Use Hole Dip Instead Of Inclination* is checked, the *Inclination Column* options are changed to *Dip Column.*

Reload Data When Opening Project

Check the *Reload Data When Opening Project* option if you want project data automatically reloaded for all data tables when you open the project. The default is unchecked, which indicates data is not automatically reloaded.

If you want some data reloaded and others not, unlink the tables in the Table Browser by clicking on the table name, selecting the name of the linked data in the *Data Sources* section and pressing *Delete*.

Occasionally, a *Wells* layer will not update properly, leaving a deviation path for the well, but removing the well symbol when changing the visibility of an individual well in the **Object Manager**. When this happens, there are two things that can be done to make the wells appear correct:

- Click on the *Wells* layer and click the **Deviation Path** tab in the **Property Manager**. Uncheck the box next to the *Show Deviation Path* option. Recheck the box and the well will appear correctly.
- Click the **Tools | Options** command. Click on *General* on the left side of the dialog. On the right side, check the box next to *Reload Data When Opening Project*. Close the file and reopen it. The wells will display properly.

Show Data Tables after Opening Project

The *Show Data Tables after Opening Project* option determines whether all data tables are visible when a project is opened. The default is checked, which indicates all data tables are visible. If you uncheck the box, only the borehole views, map views, and cross section views will appear when you open the file. If tables are not visible, select **Window | Show All Tables** to display all data tables.

Auto Update Table Changes

The *Auto Update Table Changes* option determines if the borehole view is automatically updated when changes are made to the project's data tables. Updates occur when the borehole view tab is selected. The default option is checked, which automatically updates the view with changes. This is recommended. If you wish to not have the borehole view automatically updated, uncheck this box.

Check Column and Table Settings

Check the *Check Column and Table Settings* box to display a warning message if all log items do not have tables and columns defined when switching from design mode to active mode. Uncheck this box if you do not wish to see a warning message when all data is not defined after activating a borehole.

NULL Data Value

The *NULL Value* is treated as missing data and can be defined as any number. This null value is used in all new projects. The specified null values do not show in any logs. In addition, entries with letters or symbols (e.g. N, S, E, W, or °) do not show in the logs. The null value defined in the Borehole View Properties *Project Properties* section overrides the *NULL Data Value.*

Auto Create Scale Bar

The *Auto Create Scale Bar* option is used to automatically create a scale bar in the header when you create a log item that supports scale bars. The default is checked. Uncheck this check box if you do not want a scale bar automatically created.

If the header pane is less than 0.75 inches, the scale bar is not created regardless of this option setting, as there is not room in the header pane for the scale bar. Increase the size of the header pane with the Page Setup command to automatically create scale bars.

Image Threshold Size

The *Image Threshold Size (MB)* is the maximum size, in megabytes, of an imported image. If an image exceeds that size it will be stored in a tiled image format that uses minimal internal memory but can result in some performance degradation. Increase this size (up to a maximum of 1000000 MB) based on the amount of your computer's internal RAM. Lower this value if you are experiencing very sluggish performance, "Out of memory" errors, or crashes when using large images. Any images already imported must be re-imported to change their internal storage format. the default image threshold size is 50 MB.

Prompt For Missing Coordinate System

The *Prompt For Missing Coordinate System* option controls whether **Strater** prompts for a coordinate system if an unreferenced base map is loaded. Check this option to enable the prompt for a coordinate system. Uncheck this option to disable the dialog prompt.

Decimal Separator

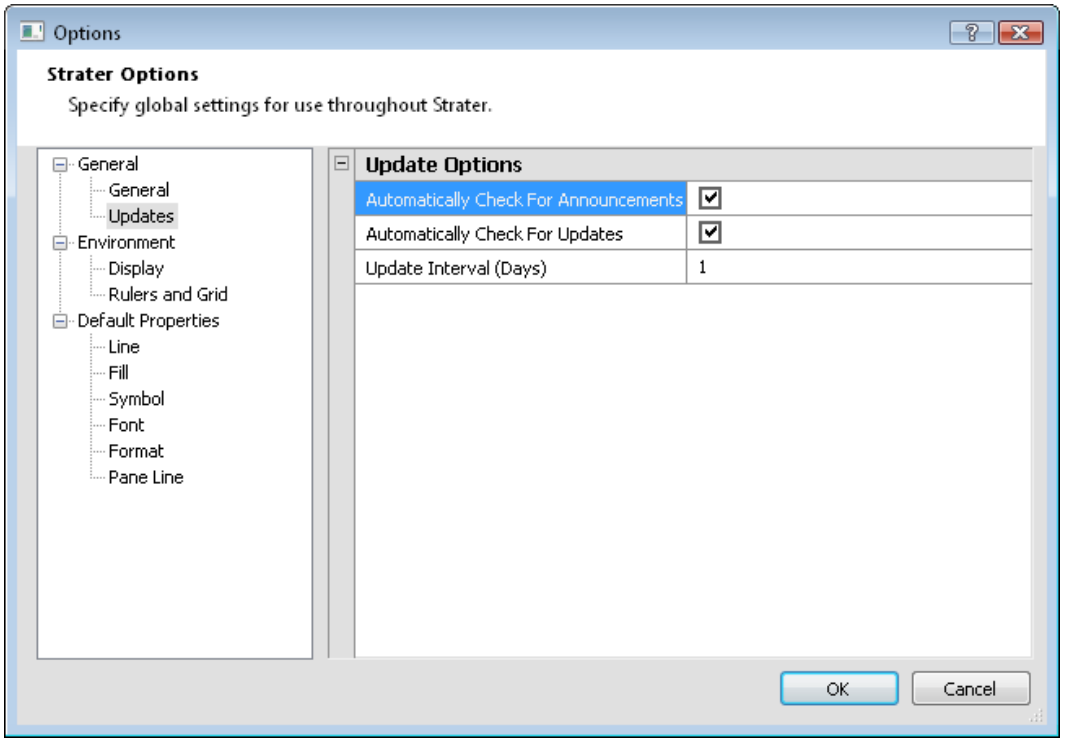
The *Decimal separator* controls which character is used to separate the whole number portion from the decimal portion in a number. To change the *Decimal separator*, click on the existing option and select the desired option from the list. Available options are: *System default*, *Period,* and *Comma*. The default is to use the *System default*. *System default* defers treatment of decimal separators to Windows. The *Period* option displays a period (.) to separate the numbers before and after the decimal. The *Comma* option display a decimal comma (,) to separate the numbers before and after the decimal. When this option is changed, the **Strater** file that is open will display the selected character for the decimal separator.

When using *System default*, the setting is controlled by Windows. To set the Windows local, in the Windows Control Panel, under *Region and Language*, set the *Format*. In locale's where the period is the separator, it will be used in **Strater**. In locale's where

the comma is the separator, it will be used in **Strater**. All .SDG and .TSF files will use the format specified by Windows. This means that older files may appear differently depending on the format. Some changes may be in axis labels.

Options - Update Options

You can set how often the program checks for updates in the *Update Options* section of the Options dialog. Click the **Tools | Options** command to open the **Options** dialog. On the left side of the dialog, click on *Updates* to set the update options.



Set the update frequency on the Updates *page in the* ***Options*** *dialog.*

Automatically Check For Announcements

Check the *Automatically Check For Announcements* option to allow Golden Software to automatically check for program and company announcements. This could include information about a new product release, tips for use of Golden Software programs, special offers, or an update to the program.

Automatically Check For Updates

Check *Automatically Check For Updates* to allow Golden Software to automatically check for program updates (i.e. **Strater** 4.0 to **Strater** 4.1) according to the user defined time interval. After the specified time, the program will link to the Golden Software server to see if any program updates are available. Program updates include fixes to errors or problems that are found in the program. It is recommended that you keep this box checked so that your version of **Strater** is always up to date.

Update Interval (Days)

Specify the update time interval in days by entering a number in the *Update Interval (Days)* option. This option can be set to a value between one and 100. **Strater** will automatically check for updates after the specified interval of time has passed.

Options - Display

You can set defaults such as tab style, antialiasing options, and whether the splash screen is shown in the *Display* section of the **Options** dialog. Click the **Tools | Options** command to open the **Options** dialog. On the left side of the dialog, click on *Display* to set the display options.

User Interface Options

Click the ⊞ next to *User Interface* to set the user interface options.

Show Splash Screen at Startup

Check the *Show Splash Screen At Startup* box to turn on the display of the **Strater** splash screen when you start the program. Uncheck this box to turn off the display of the splash screen when starting the program.

User Interface Style

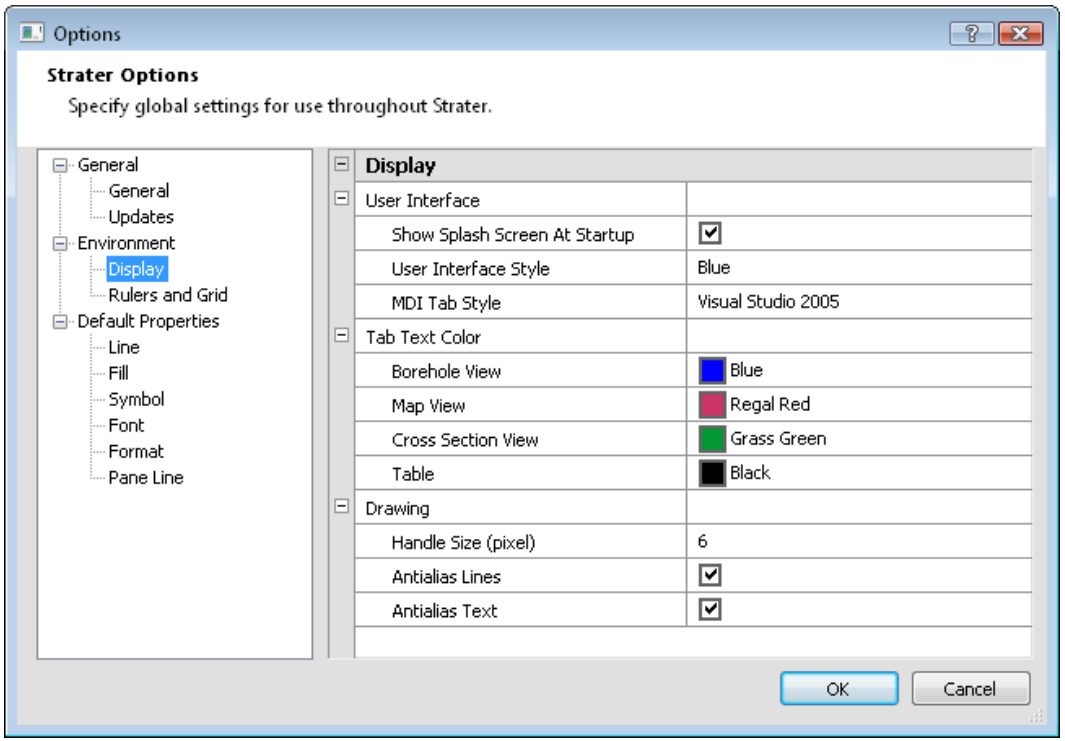
Click in the *User Interface Style* field to choose among three different Microsoft user interface styles. The options are *Black, Blue,* and *Silver*.

MDI Tab Style

Click in the *MDI Tab Style* field to choose among different tab styles. The options are *None, 3D, One Note,* and *Visual Studio 2005*. The borehole view, map view, cross section view, and table windows, have a tab appearance when multiple views are open.

Tab Text Color

Click the ⊞ next to *Tab Text Color* to set the text color of the various tab windows. By default, the text identifying each window has a separate color based on the type of window: borehole views are blue, map views are regal red, cross section views are grass green, and tables are black. To change the color associated with any window type, click on the color box next to the window type name. Select a new color by clicking on a color in the color palette. You can create new colors by clicking the *Custom* button at the bottom of the color palette.



Set the display options on the Display *page of the* ***Options*** *dialog.*

Drawing Options

Click the ⊞ next to *Drawing* to set the drawing options.

Handle Size

The *Handle Size (pixel)* box controls the width and height of the selection handles that appear around selected objects in pixels. The handle size setting range is from zero to 20 pixels. A setting of 20 will create large size selection handles. A setting of zero will

create no selection handles. The default setting is a handle size of six pixels. The handle size scales with zoom.

Antialias Lines

Antialias Lines allows redraw to diminish jagged edges and create a smooth appearance for all lines in the plot window.

Antialias Text

Antialias Text allows redraw to diminish jagged edges and create a smooth appearance for all text and symbols in the plot window.

Options - Rulers and Grid

Set ruler and grid properties on the **Rulers and Grid** page in the **Options** dialog. Rulers appear along the top and left edge of the view windows, and are used to position and align objects. Rulers use the current page units. Click the **Tools | Options** command to open the **Options** dialog. On the left side of the dialog, click on *Rulers and grid* to set the options.

Page Units

Page Units are the units used to measure distances on the printed page. Set *Page Units* to *Inches* or *Centimeters*. The location of the cursor on the page is listed in page units in the status bar.

Display Rulers

Check the *Display Rulers* box to show the rulers in the borehole view, map view, and cross section view. Uncheck the box to remove the rulers from the display.

Display Grid

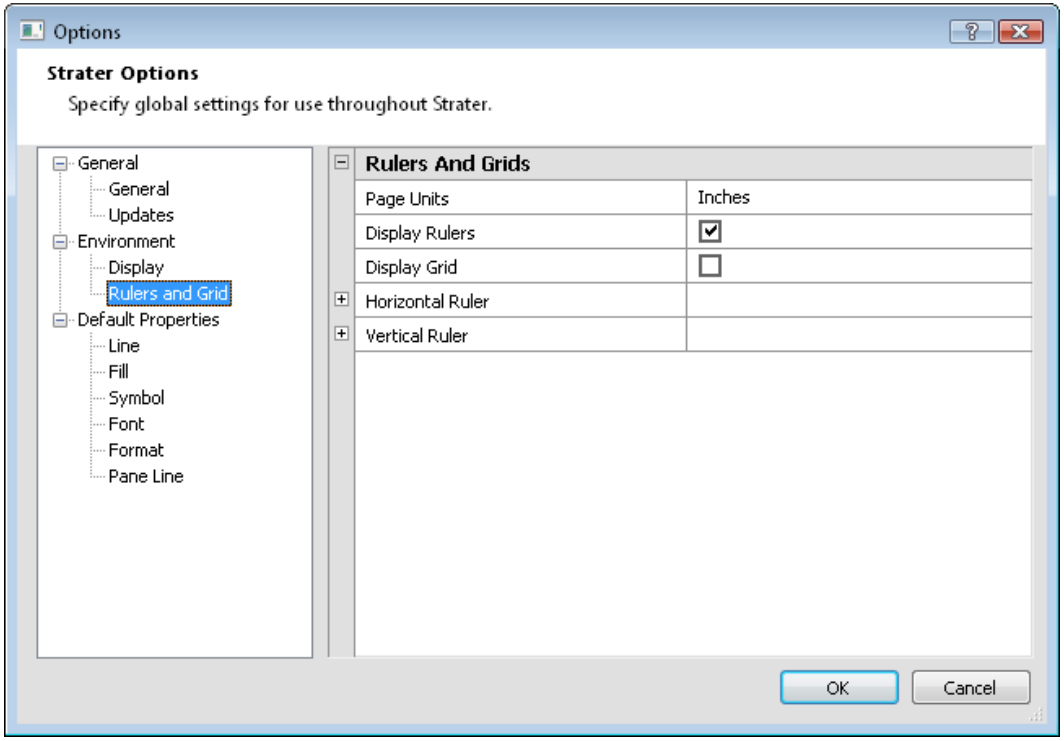
Check the *Display Grid* box to enable a grid of dots in the borehole view, map view, and cross section view that are based on the selected *Page Units*. Uncheck the box to remove the display of grid dots.

Horizontal Ruler and Vertical Ruler

The *Horizontal Ruler* and *Vertical Ruler* sections are used to set ruler and grid properties. Click the ⊞ to the left of *Horizontal Ruler* or *Vertical Ruler* to open the section.

- Set the *Ruler Divisions* to the number of divisions per page unit on the ruler.

- Set the *Grid Divisions* to the number of divisions per page unit on the drawing grid.
- Check the box next to *Snap To Ruler* to cause the cursor to snap to the ruler divisions as objects are drawn or moved. This allows objects to be easily aligned with the ruler division marks. Check this box to snap the cursor to the ruler divisions. Uncheck this box to disable the automatic snapping.
- Check the *Show Position* option to indicate the cursor position as lines on the rulers.
- The ruler tick color can be set by choosing a color from the *Division Mark Color* list. Click the colored square to open the palette and click a new color. Click the *Custom* button to find or create a custom color.
- The ruler label color can be set by choosing a color from the *Label Color* list. Click the colored square to open the palette and click a new color. Click the *Custom* button to find or create a custom color.



Set page units and ruler settings on the Rulers and Grids *page in the* ***Options*** *dialog.*

Options - Defaults

You can set defaults such as line and fill color in the *Defaults* section of the **Options** dialog. Click the **Tools | Options** command to open the **Options** dialog. On the left side of the dialog, click on the desired default option to set the properties.

The *Defaults* section has the following sub-sections:

Defaults : Line

Click *Line* on the left side of the dialog to display the *Line Properties* on the right side of the dialog. Use the *Line Properties* options to set the default Line Properties. The default line is a solid black line with 0.000 inch width.

Defaults : Fill

Click *Fill* on the left side of the dialog to display the *Fill Properties* on the right side of the dialog. Use the *Fill Properties* to set the default Fill Properties. The default fill is set to no fill pattern.

Defaults : Symbol

Click *Symbol* on the left side of the dialog to display the *Symbol Properties* on the right side of the dialog. Use the *Symbol Properties* to set the default Symbol Properties. The default format is a filled black circle with 0.100 inch size.

Defaults : Font

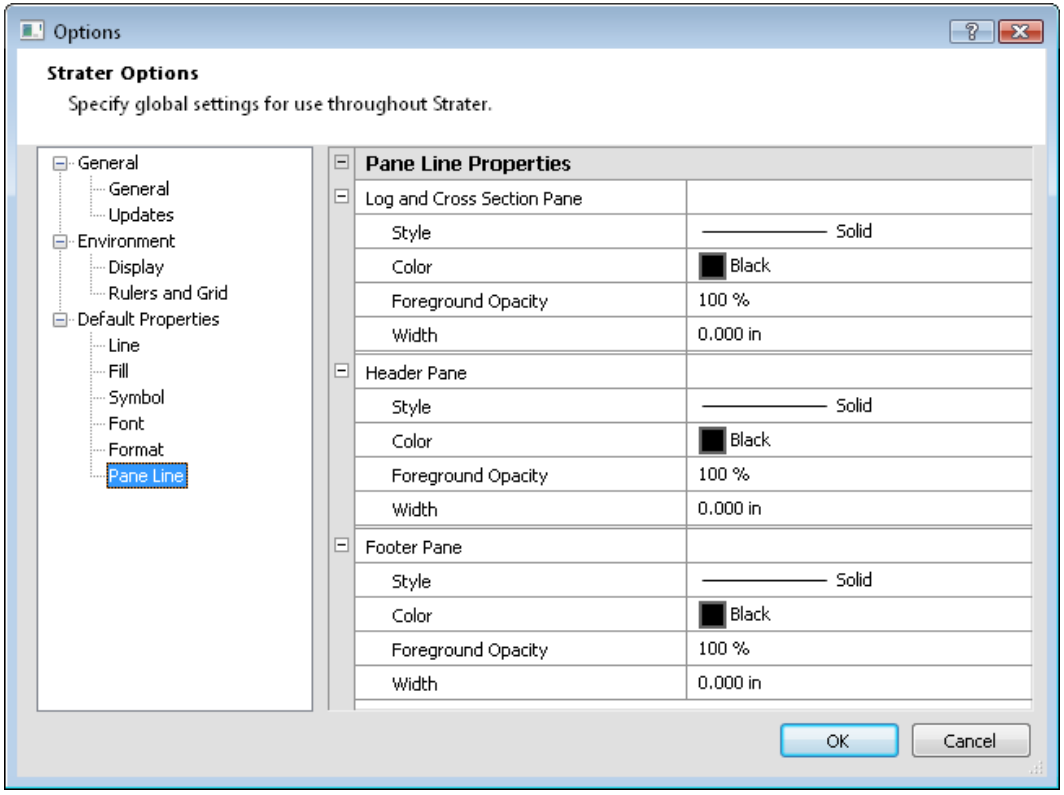
Click *Font* on the left side of the dialog to display the *Font Properties* on the right side of the dialog. Use the *Font Properties* to set the default Font Properties. The default format is Arial 10.

Defaults : Format

Click *Format* on the left side of the dialog to display the *Format Properties* on the right side of the dialog. Use *Format Properties* to set the numeric display of numbers. The default format is *Compact* with 14 digits.

Defaults : Pane Line

You can set line property defaults for the *Log and Cross Section Pane*, *Header Pane*, and *Footer Pane* in the *Pane Line Properties* section of the **Options** dialog. Click the **Tools | Options** command to open the **Options** dialog. On the left side of the dialog, click on *Pane Line* to set the default pane line properties.



Set the pane line properties on the Pane Line *page of the* ***Options*** *dialog.*

Log and Cross Section Pane

Click the ⊞ next to *Log and Cross Section Pane* to set the line properties for the log pane in the borehole view and the cross section pane in the cross section view. The line *Style*, *Color*, *Foreground Opacity*, and *Width* can be set. Refer to the Line Properties page for additional information.

Header Pane

Click the ⊞ next to *Header Pane* to set the line properties for the header pane in the borehole view and cross section view. The line *Style*, *Color*, *Foreground Opacity*, and *Width* can be set. Refer to the Line Properties page for additional information.

Log and Cross Section Pane

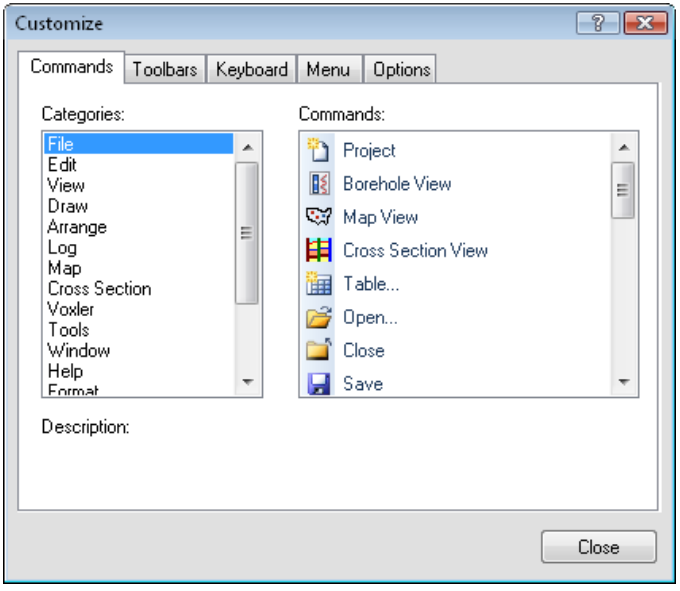
Click the ⊞ next to *Footer Pane* to set the line properties for the footer pane in the borehole view and cross section view. The line *Style, Color, Foreground Opacity,* and *Width* can be set. Refer to the Line Properties page for additional information.

Customizations

Customize **Strater** toolbars, menus, and keyboard shortcuts by selecting **Tools | Customize** or by right-clicking on a toolbar and selecting *Customize*.

Commands

You can use the **Commands** tab in the **Customize** dialog to add buttons to toolbars and commands to menus. The **Customize** dialog is opened by selecting **Tools | Customize** or by right-clicking on the toolbars and selecting *Customize*.



*Use the Commands tab in the **Customize** dialog to add buttons to toolbars and commands to menus.*

Categories

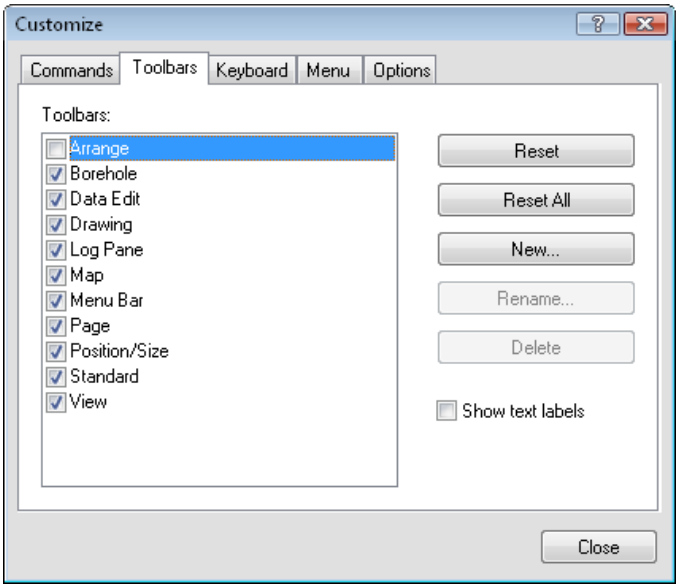
The Commands page lists menu titles (*File*, *Edit*, etc.) in the *Categories* list. You can also show all commands in **Strater** by selecting *All Commands*. Select a Category to display its current contents in the *Commands* field.

Description

When a command is selected, an explanation of the command appears in the *Description* section.

Toolbars

Use the **Toolbars** tab in the **Customize** dialog to control the toolbar display. Open **Customize** by selecting **Tools | Customize** or by right-clicking on the toolbars and selecting *Customize*.



Use the Toolbars *tab in the* ***Customize*** *dialog to customize the toolbar display*

Toolbar Display

The *Toolbars* field displays all currently existing toolbars, regardless of whether the toolbar is currently visible. A check mark indicates the toolbar is visible. Remove the check mark to hide a toolbar. The *Menu Bar* cannot be hidden.

Resetting a Toolbar

To reset the changes to a toolbar click the toolbar name and click the **Reset** button.

Resetting All Toolbars and Menus

If you would like to reset changes to all toolbars and menus, click the **Reset All** button.

Creating New Toolbars

You can create a new toolbar by clicking the *New* button. Enter a name for the new toolbar into the **Toolbar Name** dialog. The new toolbar is created without any buttons. Open the *Commands* page and drag commands into the new toolbar to add buttons. There is a limit of 10 custom toolbars.

Renaming Toolbars

Only toolbars created with the **New** button can be renamed. To rename a toolbar click the existing toolbar name and then click the **Rename** button. Enter a new name into the **Toolbar Name** dialog.

Deleting Toolbars

Only toolbars created with the **New** button can be deleted. To delete a toolbar click the existing toolbar name and then click **Delete**.

Show Text Labels

To add text labels to toolbars, select a toolbar and then check the *Show text labels* box.

Keyboard

Use the **Keyboard** tab in the **Customize** dialog to assign keyboard shortcuts to commands. To open the Customize dialog select **Tools | Customize** or right-click on a toolbar and select *Customize*.

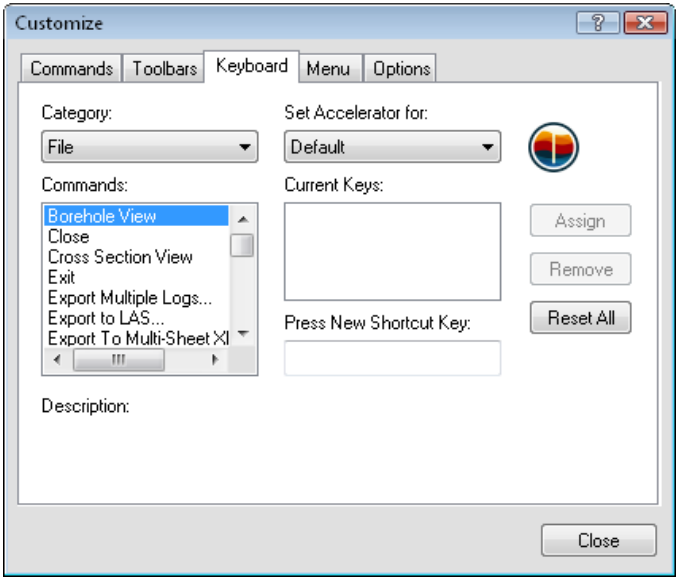
Category, Commands, and Description

Menu titles (*File*, *Edit*, etc.) are listed in the *Category* field. When a category is selected, the *Commands* list displays the current commands within the category. Also, when a command is selected, an explanation of the command appears in the Description section, below the *Commands* field.

You can also list all commands by selecting *All Commands* at the bottom of the *Categories* list.

Accelerator Menu Application

You can choose to assign the accelerator (keyboard shortcut) to the *Strater*, *Worksheet*, or *Default* menus in the *Set Accelerator* for list.



Use the Keyboard *tab in the* ***Customize*** *dialog to customize keyboard shortcuts.*

Current Shortcut Keys

When a command is selected in the *Commands* list, the accelerator keys are listed in the *Current Keys* list. The *Current Keys* list only displays accelerators for the current group of menus selected in the *Set Accelerator* for list.

Press New Shortcut Key

To create a shortcut, select a command, place the cursor in the *Press New Shortcut Key* field, type the shortcut on your keyboard, and then click **Assign**. If a shortcut is already assigned to a command a description below the *Press New Shortcut Key* field appears and the **Assign** button is disabled.

Removing Shortcuts

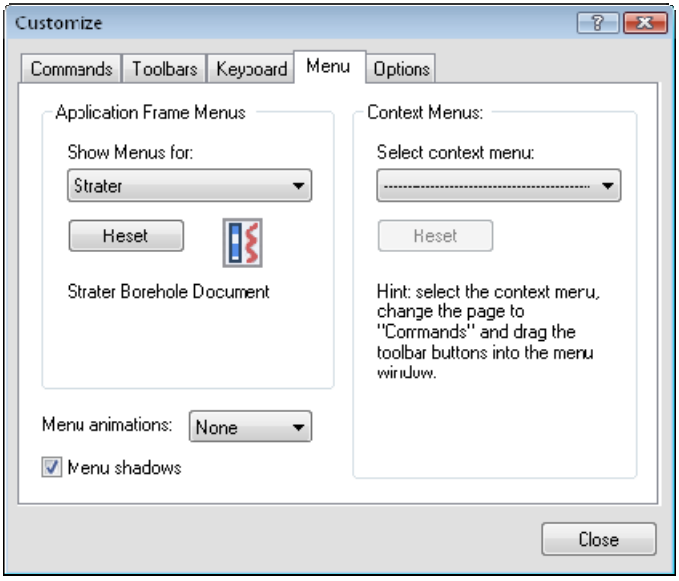
To remove a shortcut,select the shortcut in the *Current Keys* list and click **Remove**.

Resetting Shortcuts

To reset all shortcuts to the defaults, click **Reset All**.

Menu

You can use the **Menu** page in the **Customize** dialog to control the menu display. To open the **Customize** dialog select **Tools | Customize** or right-click on the toolbars and select *Customize*.



Use the Menu *tab in the* ***Customize*** *dialog to customize menu commands*.

Show Menus For

You can choose to display *Strater*, *Worksheet*, or *Default Menu* menus. Click **Reset** to reset the menu to its original settings.

Menu Animations

When clicking a menu you can choose to have the menu *Unfold*, *Slide*, or *Fade*. Select *None* if you do not want any menu animation. Select *Default* to return to the default animation.

Menu Shadows

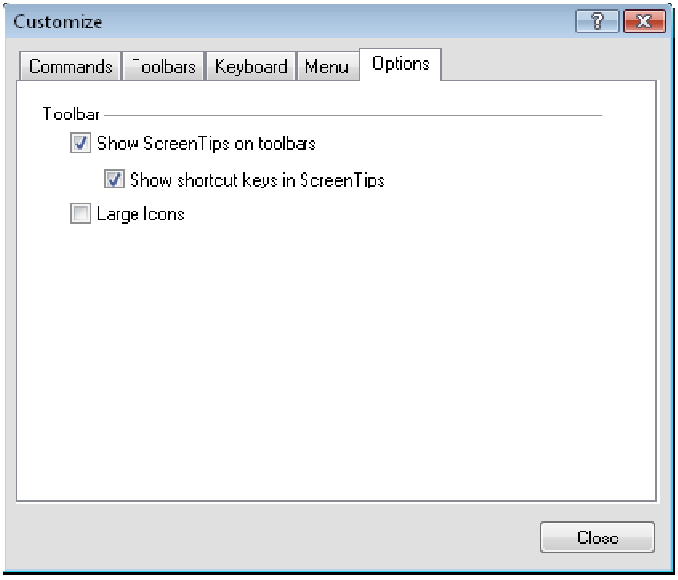
Check *Menu shadows* to display a drop shadow around open menus.

Context Menus

Context menus are the menus displayed when right-clicking in the window. You can customize these menus in **Strater**. Select a menu from the *Select context menu* drop-down list. Add or remove items from the selected menu. Click **Reset** to restore the default context menus.

Options

Use the *Options* page in the **Customize** dialog to control the screen tip and icon display. To open the Customize dialog select **Tools | Customize** or right-click on the toolbars and select *Customize*.



Use the Options *tab in the* ***Customize*** *dialog to customize icons and screen tips*.

Screen Tips

Check the *Show Screen Tips on toolbars* option to display a button function when you place the cursor over the button.

Show Shortcut Keys

To display shortcut keys in the screen tip, check the *Show shortcut keys in Screen Tips*.

Large Icons

Check the *Large Icons* box to display large toolbar icons.

Adding Buttons and Commands to Toolbars and Menus

To add a button or command to a toolbar or menu:

1. Select **Tools | Customize** or right-click on the toolbars and select *Customize*.
2. Click the **Commands** tab
3. Select a category from the *Categories* list
4. Select a command from the *Commands* list
5. If you are adding a toolbar button, drag the command to a toolbar.
6. If you are adding a menu command, open the menu by clicking on the menu name and then drag the command to the menu.

Adding Commands to a Context Menu

1. Click a context menu name in the *Select context menu* list.
2. When the context menu is open, click the ***Commands*** tab in the **Customize** dialog.
3. On the **Commands** page, select a command in the *Commands* list and drag it into the open context menu.

Removing Commands From a Context Menu

1. Click a context menu name in the *Select context menu* list.
2. In the context menu, right-click on the name of the command you wish to remove and click the **Delete** button.

Removing Buttons and Commands

To remove a button or command, right-click the button or command and select *Delete* while the *Customize* dialog is open.

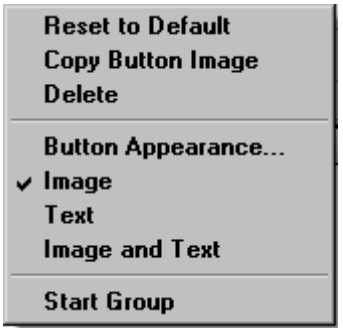
Resetting Toolbars and Menus to the Defaults

To reset all toolbars and menus to the defaults, click the **Toolbars** tab and click **Reset All**.

Additional Customization – Button Appearance

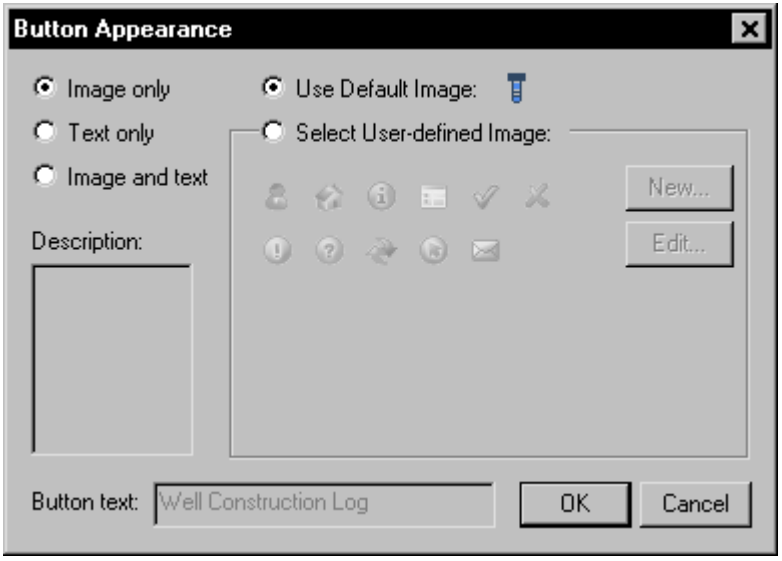
When the **Customize** dialog is open, right-click on an existing toolbar button or menu to set customizing options for individual icons.

- Select *Reset to Default* to set the toolbar button or menu item to the default.
- Select *Copy Button Image* to copy the button or menu item graphic. This command is disabled if the menu item does not contain a graphic.
- Select *Delete* to remove a menu command or toolbar button.



Additional customizing options are available when you select an icon and right-click.

Select *Button Appearance* to open the **Button Appearance** dialog to set the button text and graphic display.



*The **Button Appearance** dialog allows you to create, edit, and change the appearance of buttons in **Strater**.*

There are three settings for graphic and text appearance: *Image*, *Text*, and *Image and Text*.

	When a button is selected it is in *Image* mode and there is a black box surrounding the graphic.
	When a button is selected in *Text* mode its description appears instead of a graphic.
	When a button is selected in *Image and Text* mode both the graphic and text appear.

*Use the **Button Appearance** dialog to select the appearance of each individual button. The black box disappears when the **Customize** dialog is closed.*

To display the graphic only, click *Image*. To display text only, click *Text*. To display both the graphic and text, click *Image and Text*. Some of these display options may be disabled, depending on the selected menu command or button.

Button Text

Specify the text description in the *Button Text* area.

Select User-defined Image

The *Select User-defined Image* area displays current button images available for use or editing.

New

When *Select User-defined image* is checked, click **New** to open the **Edit Button Image** dialog with a blank array.

Edit

Select an image to edit in *Select User-defined Image* and click *Edit* to open the **Edit Button Image** dialog. The selected image appears in the dialog.

Additional Customization –Edit Button Image

The **Edit Button Image** dialog allows you to create a new image or edit a current image.

Picture

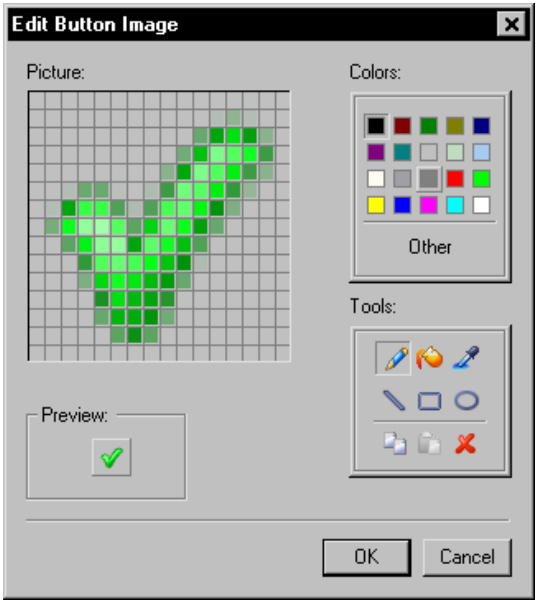
Change the color of the pixels in the *Picture* area to create a new image or edit a current image.

Preview

The image created in the *Picture* area is displayed at screen size in the *Preview* area. This is a preview of what the image will look like when used in the program.

Colors

Use the *Colors* area to specify a color to change the pixels of the picture and create or edit a button image. Click *Other* to open the Colors dialog.



*Use the **Edit Button Image** dialog to create a new button or edit an existing button.*

Tools

Choose from one of the preset *Tools* to help create or edit a button image. The tools available include:Pencil, Fill, Select Color, Line, Rectangle, Ellipse, Copy, Paste, and Clear.

Click **OK** to save your image. Click **Cancel** to exit the **Edit Button Image** dialog without saving any changes.

Chapter 27

Coordinate Systems and Map Projections

Introduction to Coordinate Systems

A coordinate system is a method of defining how a file's point locations display on a map. Different types of coordinate systems exist that control how the coordinates are shown on the map. In **Strater**, a map can be unreferenced in local coordinates, referenced to a geographic lat/long coordinate system, or referenced to a known projection and datum.

A local coordinate system generally is considered unreferenced. A local system has a location that begins numbering at an arbitrary location and increments numbers from this location. This is frequently referred to as a *Cartesian coordinate system*.

A *Geographic coordinate system* uses a spherical surface to define locations on the earth. Geographic coordinate systems are commonly called unprojected lat/long. **Strater** has several predefined geographic coordinate systems available. Each system has a different datum. The same latitude and longitude value will plot in different locations depending on the datum.

A *Projected coordinate system* consists of a projection and a datum. Each projection distorts some portion of the map, based on the ellipsoid and datum specified. Coordinates can be lat/long, meters, feet, or other units. Different projections cause different types of distortion. It is recommended that you do not use projected coordinate systems if you do not need to convert between coordinate systems or if all your data are in the same coordinate system.

Map Coordinate System Overview

In **Strater**, map layers and maps can have an associated coordinate system. All coordinate systems defined by the map layers are converted "on the fly" to the map's target coordinate system. This allows maps with different coordinate systems to be easily combined in **Strater**.

The standard procedure for creating maps in a specific coordinate system are:

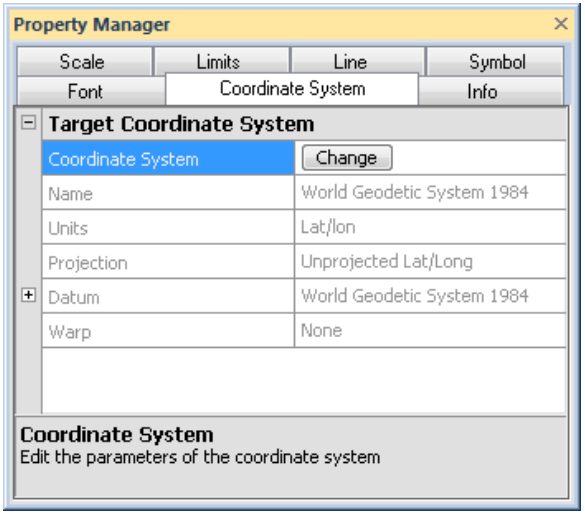
1. Create the map by clicking the **Map | Create Well Map** or **Map | Base Map** command.

2. Click on the map layer to select it. In the **Property Manager**, click on the **Coordinate System** tab.
3. If the *Coordinate System* is not correct, click the *Set* button next to *Coordinate System*. The **Assign Coordinate System** dialog opens.
4. Make any changes in the dialog. This is the existing coordinate system for the map layer. When finished making changes, click *OK*.
5. To change the coordinate system for the map, click on the *Map* object in the **Object Manager**.
6. In the **Property Manager**, click on the **Coordinate System** tab.
7. If the *Coordinate System* is not correct, click on the *Change* button next to *Coordinate System* to set the desired target coordinate system. When finished, click *OK*.
8. The entire map is now displayed in the desired target system.

Strater does not require a map projection be defined. Maps can be created from non-referenced map layers, working in the same manner as previous versions of **Strater** worked to create unreferenced maps. If you do not specify a source coordinate system for each map layer, it is highly recommended that you do not change the target coordinate system for the *Map*. Changes to the target coordinate system for the map can cause the unreferenced map layers to appear incorrectly.

Map - Coordinate System

Maps can be displayed in any coordinate system. The map is displayed in the coordinate system defined as the *Target Coordinate System* for the map. A coordinate system normally has a defined projection and datum. If some map layers are using a different source coordinate system than the map's target coordinate system, the map layer is converted to the map's *Target Coordinate System*. The map's *Target Coordinate System* is the new coordinate system that you want to use to project your X, Y coordinate data.



*Specify the map coordinate system on the **Coordinate System** page.*

The **Coordinate System** page is located in the **Property Manager** when a *Map* object is selected.

Coordinate System Page

Click the *Change* button next to *Coordinate System* to open the **Assign Coordinate System** dialog. This dialog lets you set the desired target coordinate system. This is the coordinate system in which you want the map to be displayed.

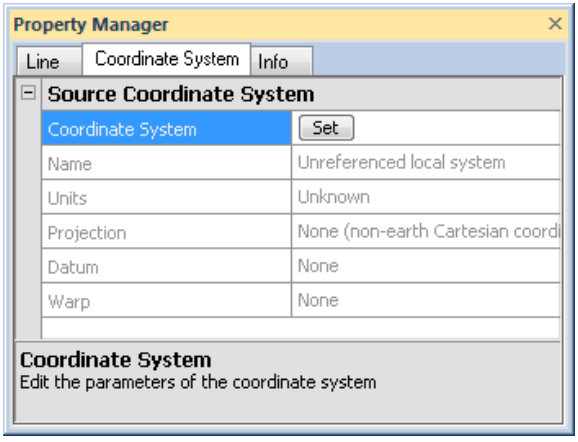
Map Limits and Changing Coordinate Systems

If the map has custom limits and an unreferenced coordinate system, changing the coordinate system will change the map limits to the default limits.

If the map has custom limits and is currently referenced, changing the coordinate system will not change the map limits to the default limits. Instead, the axis limits are converted to the new coordinate system and properly limited in the new coordinate system.

Source Coordinate System - Map Layer

Maps can be created from data loaded in a table view or base map files in any coordinate system. The *Source Coordinate System* is the coordinate system for the collars table data or base map used to create a map layer. A coordinate system normally has a defined projection and datum. If some map layers are using a different source coordinate system than what you want the map to display, the map layer is converted to the map's *Target Coordinate System*.



*Specify the map layer coordinate system on the **Coordinate System** page.*

Coordinate System Page

The **Coordinate System** page is located in the **Property Manager** when a base or well layer object is selected.

Coordinate System

Click the *Set* button next to *Coordinate System* to open the **Assign Coordinate System** dialog. This dialog lets you set the source coordinate system. This is the coordinate system for the original data or base map.

Displaying Data with Different Coordinate Systems in a Single Map

Strater allows you to display map layers from any coordinate system in a single map. To do so, you need to assign the coordinate system for each map layer. Then, change the desired target coordinate system for the map.

The standard procedure for creating maps in a specific coordinate system are:

1. Create the map by clicking on the **Map | Create Well Map** or **Map | Create Base Map** command.
2. Click on the map layer to select it.
3. In the **Property Manager**, click on the **Coordinate System** tab.
4. If the *Coordinate System* is not correct, click the *Set* button next to *Coordinate System*. The **Assign Coordinate System** dialog opens.
5. Make any changes in the dialog. This is the existing coordinate system for the map layer. When finished making changes, click *OK*.
6. Add the second map to the first using the **Map | Add Well Layer** or **Map | Add Base Layer** command.
7. After the second map layer appears, click once on it to select it.
8. In the **Property Manager**, click on the **Coordinate System** tab.
9. If the *Coordinate System* is not correct, click the *Set* button next to *Coordinate System*. The **Assign Coordinate System** dialog opens.
10. Make any changes in the dialog. This is the existing coordinate system for the second map layer. This coordinate system can be different from the first map layer and has no effect on the first map layer. When finished making changes, click *OK*.
11. To change the coordinate system for the map, click on the *Map* object.
12. In the **Property Manager**, click on the **Coordinate System** tab.
13. If the *Coordinate System* is not correct, click on the *Change* button next to *Coordinate System* to set the desired target coordinate system. When finished, click *OK*.
14. The entire map is now displayed in the desired target coordinate system.

Coordinate System Notes

Currently, imported metafiles do not change coordinates. When the coordinate system changes from the source coordinate system, the metafile is removed from the map view. When the coordinate system changes back to the metafile's coordinate system, the metafile reappears. To have metafile coordinate system changed, the metafile needs to be broken apart. To do this, click once on the metafile to select it. Click the **Arrange | Ungroup** command. The metafile becomes a collection of lines, text, polygons, and images.

Text is stretched slightly in the horizontal and vertical directions (before rotation) so that the text will occupy the same overall space as it did before being geotransformed. This can cause the individual characters to be spaced slightly closer together or further apart than the characters appeared before the coordinate system conversion. The text is still in the correct geographic location as it appeared before the transformation.

Image base maps do change coordinates when the map target coordinate system changes. **Strater** does not cache the image in the transformed georeferenced coordinates. This means every time the zoom is changed, or the map is scrolled, or the map properties change, the image is re-transformed. With large images, this may lead to slow redraw times.

Assign Coordinate System Dialog

The **Assign Coordinate System** dialog is from the map view by clicking on a map layer or the *Map* object. It links a map layer or map to a specific coordinate system. Once a coordinate system is defined for a file, a Golden Software Georeference .GSR2 file is created. This file contains all the relevant coordinate system information that **Strater** needs to import the file in the proper coordinate system in the future.

Projection Categories

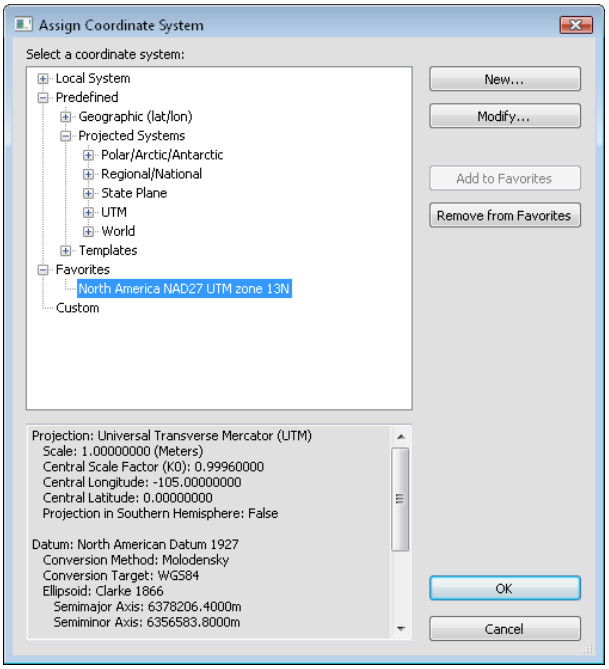
Click the ⊞ button to expand the options in the **Assign Coordinate System** dialog. Click the ⊟ button to collapse the options.

Local System

Expand *Local System* to select the *Unreferenced local system,* which contains a *Projection* of None, a *Datum* of None, and a *Warp* of None. For example, you may have a data set with an arbitrary coordinate system (i.e. not real world X, Y coordinates). You would assign this data to a *Local System*, if a coordinate system is necessary.

Predefined

Expand the *Predefined* section by clicking the ⊞ button. The *Predefined* section includes all coordinate systems that have been predefined for **Strater**.



*Assign a projection to your file or map layer in the **Assign Coordinate System** dialog.*

Geographic (lat/lon)

Expand *Geographic (lat/lon)* to select a Latitude/Longitude coordinate system and datum that fits your needs. Detailed information about each projection is listed at the bottom of the dialog when the system is selected. If your data are currently in a form of lat/lon, you would want to select one of the options in *Geographic (lat/lon)*.

Projected Systems

Expand *Projected Systems* to select a predefined *Polar/Arctic/Antarctic, Regional/National, State Plane, UTM,* or *World* coordinate system. Detailed information about each projection is listed to the right when the datum is selected.

Templates

Expand the *Templates* section to select a predefined template. Click the desired template and press the *Modify* button to change the properties. Once modified, the new coordinate system is added to the *Custom* section.

Favorites

Select a coordinate system and click the *Add to Favorites* button to add a coordinate system to your *Favorites* list. Alternatively, right-click on a selected coordinate system and choose *Add to Favorites* from the menu. Select a coordinate system and click the *Remove from Favorites* button to remove a coordinate system from your *Favorites* list. By default, no favorite coordinate systems are specified. It is recommended that systems that you use frequently and *Custom* systems that you intend to use more than once be added to the *Favorites* section for ease of navigation.

Custom

Expand *Custom* to see the custom coordinate system you have defined for the current file. *Custom* systems can be defined by clicking the *New* button. By default, no custom coordinate systems are specified. Custom coordinate systems are only listed in the dialog when the file using the custom coordinate system is open.

If a *Custom* coordinate system is defined and intended to be used more than once, it is highly recommended that the system be added to the *Favorites* section by clicking the *Add to Favorites* button.

Modify Coordinate System

Select any coordinate system from the *Select a coordinate system* list. Click the *Modify* button to open the Define Coordinate System dialog. Alternatively, right-click on the coordinate system and choose *Modify* from the menu. Modify any properties and click *OK*. The modified coordinate system is added to the *Custom* list.

If the *Modify* button is unavailable, make sure that a specific coordinate system is selected. If a category of systems, such as *Predefined* or *Geographic (lat/lon)* is selected, the *Modify* button is unavailable.

New Custom Coordinate System

Click the *New* button to open the **Define Coordinate System** dialog and define a custom projection and datum. Alternatively, right-click on an existing coordinate system and choose *New* to create a new projection based off the selected projection. The new custom projection and datum will be listed in the *Custom* section with the name you defined.

Add to Favorites

Click the *Add to Favorites* button to add a projection to your *Favorites* list. Alternatively, right-click on a coordinate system and choose *Add to Favorites.* This is very useful if you frequently use the same projection, such as World Geodetic System 1984. This is also useful for *Custom* systems that will be used on multiple project files. Adding the projection to the *Favorites* list makes selecting the projection easier in the future.

If the *Add to Favorites* button is unavailable, make sure that a specific coordinate system is selected. If a category of systems, such as *Predefined* or *Geographic (lat/lon)* is selected, the *Add to Favorites* button is unavailable.

Remove from Favorites

Select a coordinate system in the *Favorites* list and click the *Remove from Favorites* button to delete the system. Alternatively, right-click on a coordinate system in the *Favorites* section and choose *Remove.* The coordinate system is removed from the *Favorites* section.

If the *Remove from Favorites* button is unavailable, make sure that a specific coordinate system is selected in the *Favorites* list. If a category of systems, such as *Predefined* or *Geographic (lat/lon)* is selected or if a coordinate system is selected in a category other than *Favorites*, the *Remove from Favorites* button is unavailable.

Example 1: Select a Predefined Coordinate System (i.e. UTM)

1. In the **Assign Coordinate System** dialog, click the ⊞ button to the left of *Predefined*.
2. Click the ⊞ button to the left of *Projected Systems.*
3. Click the ⊞ button to the left of *UTM*.
4. Click the ⊞ button to the left of *WGS84*.
5. Select *WGS84 UTM zone 13N*.
6. Click *OK*. The projection for this data is now set to WGS84 UTM zone 13N.

Example 2: Create and Select a Custom Coordinate System (i.e. Lambert Conformal Conic)

1. In the **Assign Coordinate System** dialog, click the *New* button to open the **Define Coordinate System** dialog.
2. Change the *Name* to *Lambert Conformal Conic Custom*.
3. From the *Projection* list, select *Lambert Conformal Conic*.
4. Make any necessary changes to the *Parameter* or *Values* in the *Projection* section.
5. Make any necessary changes to the *Datum* section.
6. Click *OK* and the *Lambert Conformal Conic Custom* projection is added to the *Custom* section.
7. Click the custom projection and click *OK* to apply the projection to the data.

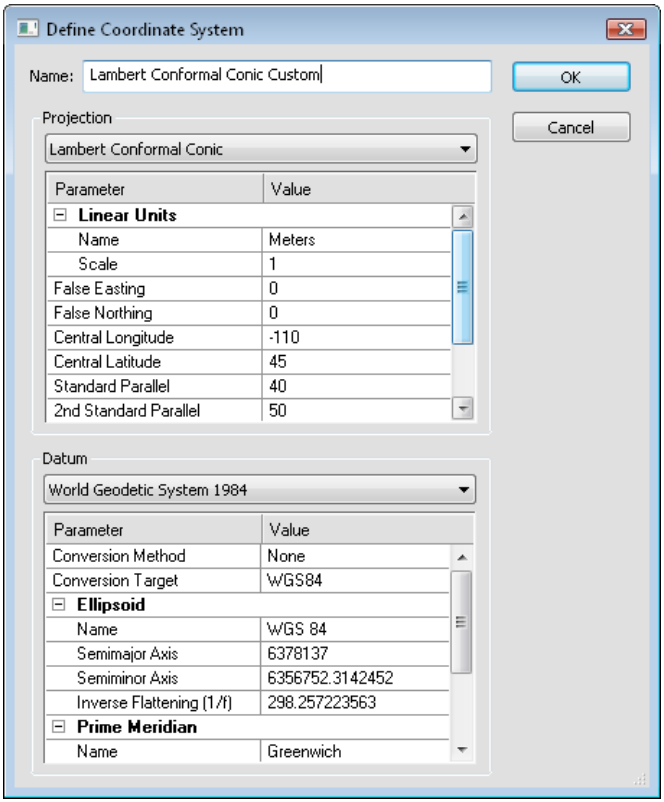
Example 3: Saving a Custom Coordinate System

1. In the **Assign Coordinate System** dialog, click the ⊞ button to the left of *Custom.*

2. Select the coordinate system in the *Custom* section and click the *Add to Favorites* button.
3. Click the ⊞ button to the left of *Favorites* to open the *Favorites* section. The custom projection is saved here.
4. Click *OK* to close the dialog.

Define Coordinate System Dialog

Click the *New* or *Modify* buttons in the Assign Coordinate System dialog to open the **Define Coordinate System** dialog. The **Define Coordinate System** dialog allows you to create a *Custom* coordinate system. Select a *Projection*, enter the projection *Parameters*, and specify a *Datum*. Click *OK* and the new coordinate system will be added to the **Assign Coordinate System** dialog *Custom* list for future use.



*Define a custom coordinate system in the **Define Coordinate System** dialog.*

Name

Specify a custom name for the new coordinate system in the *Name* box.

Projection

Select a projection from the *Projection* list. Specify custom *Parameter* and *Value* options. *Unprojected Lat/Long* does not have *Parameter* and *Value* options to specify.

The projection options include: *Unprojected Lat/Long, Albers Equal Area Conic, Azimuthal Equidistant, Bonne, Cassini, Eckert IV, Eckert VI, Equidistant Conic, Equidistant Cylindrical, Gnomonic, Hotine Oblique Mercator, Lambert Azimuthal Equal Area, Lambert Conformal Conic, Mercator, Miller Cylindrical, Mollweide, Oblique*

Mercator, Orthographic, Polyconic, Robinson, Robinson-Sterling, Sinusoidal, Stereographic, Transverse Mercator, Universal Transverse Mercator (UTM), and *Van Der Grinten.*

Datum

Select a datum from the *Datum* list. Specify custom *Parameter* and *Value* options to fit your needs.

OK or Cancel

Click *OK* to create your new custom coordinate system. The coordinate system will be listed in the *Custom* section of the **Assign Coordinate System** dialog for this file. If you want to save the custom coordinate system for future use, add the custom coordinate system to the *Favorites* section. Click *Cancel* to return to the **Assign Coordinate System** dialog without creating a custom coordinate system.

Example 1: Defining a Custom Coordinate System

1. In the **Assign Coordinate System** dialog, click the *New* button to open the **Define Coordinate System** dialog.
2. Change the *Name* to *Lambert Conformal Conic Custom*.
3. From the *Projection* list, select *Lambert Conformal Conic*.
4. Make any necessary changes to the *Parameter* or *Values*.
5. Make any necessary changes to the *Datum* section.
6. Click *OK* and the *Lambert Conformal Conic Custom* projection is added to the *Custom* section.
7. In the **Assign Coordinate System** dialog, select the custom projection and click *OK*.

Example 2: Saving a Custom Coordinate System

1. In the **Assign Coordinate System** dialog, click the ⊞ button to the left of *Custom*.
2. Select the coordinate system in the *Custom* section and click the *Add to Favorites* button.
3. Click the ⊞ button to the left of *Favorites* to open the *Favorites* section. The custom projection is saved here.
4. Click *OK* to close the dialog.

Introduction to Map Projections

Maps are usually seen in a flat, two-dimensional medium such as a drawing on paper or an image on a computer screen. Since the surface of the Earth is curved, or three-dimensional, the visual elements on the surface must somehow be transformed from three dimensions to two in order to display a map of the Earth's surface. Projections are a mathematical process by which the visual elements are transformed from three dimensions to two.

One of the simplest forms of projection is analogous to shining a light through a translucent globe onto a piece of paper and tracing the outlines. Other forms of projection may involve dozens of complex mathematical equations. Since no two-dimensional representation of a three-dimensional surface can be accurate in every regard, a variety of different projections have been developed to suit different purposes. Some projections are accurate in terms of area but not in scale, some are accurate in terms of scale but not in shape, and so on. The selection of an appropriate projection for a map depends on which characteristics of a map are most important or most desirable for a given project or audience.

Strater supports several of the projections that are most often used in modern cartography and related fields. **Strater's** map view window allows you to assign a coordinate system to a map layer, using the *Source Coordinate System* for each map layer, and convert the entire map to another system using the Target Coordinate System.

There are many excellent textbooks and publications on this subject, and we do not attempt to explain projections in full detail here. If you need or want more information, you might consider reading the references that provide good introductory discussions of map projections.

Types of Projections

Most forms of projection operate by projecting Earth coordinates onto a geometric shape that can be easily flattened to a two-dimensional image. This mathematical transformation is commonly referred to as a map projection. A map projection systematically projects locations from the surface of the spheroid to represent positions on the geometric shape.

Three geometric shapes are frequently used:

Type of Shape	How it works	Characteristics of Projection	Examples of Projection
Cylinder	Earth coordinates may be projected onto a cylinder. The cylinder is cut lengthwise and unrolled to make a two-dimensional map. This type of projection is called a cylindrical projection.	• Lines of longitude are parallel to each other. • Lines of latitude are parallel to each other. • Lines of longitude are at right angles to lines of latitude. • Regions near the equator or selected standard parallels are minimally distorted. • Regions near the poles are highly distorted.	Cassini, Equidistant Cylindrical, Hotine Oblique Mercator, Mercator, Miller Cylindrical, New Zealand Map Grid, Oblique Mercator, Transverse Mercator, and Universal Transverse Mercator

Type of Shape	How it works	Characteristics of Projection	Examples of Projection
Cone	Earth coordinates may be projected onto a cone. The point of the cone is usually directly above the pole and the sides of the cone pass through the globe at two user-defined latitudes, called the Standard Parallels. At the standard parallels, there is no difference between the east-west and north-south scales. The cone is cut from tip to base and unrolled to make a two-dimensional map. This type of projection is called a conic projection.	• Lines of latitude form concentric arcs. • Lines of longitude are straight and radiate outward from the tip of the imaginary cone.	Albers Equal Area, Equidistant Conic, Lambert Conformal Conic, Polyconic, and Bonne
Plane	Earth coordinates may be projected directly onto a flat plane. This type of projection is called an azimuthal projection. Projections of this type are recommended for maps of polar regions because cylindrical and conic projections generally either have severe distortion in polar regions or are unable to project coordinates in polar regions.	• The side of the Earth that is facing away from the center of the projection is not visible.	Azimuthal Equidistant, Gnomonic, Orthographic, Stereographic, and Lambert Azimuthal Equal Area

Type of Shape	How it works	Characteristics of Projection	Examples of Projection
Other	Projections in this category are pseudocylindrical, pseudoconic, or based on some other mathematical projection or mathematical tables.		Eckert IV, Eckert VI, Mollweide, Robinson, Robinson-Sterling, Sinusoidal, State Plane*, Unprojected Lat/Long, and Van der Grinten

* The State Plane Coordinate System uses Transverse Mercator, Lambert Conformal Conic, or Hotine Oblique Mercator, depending on the zone.

Characteristics of Projections

Some projections are imbued with characteristics that tell us if certain types of measurements (e.g. measurements of distance, area, etc.) are accurate on the projected map. Some of these characteristics include the following:

Type of Projection	Characteristic of Projection	Drawbacks	Example Projections
Equal Area	A *equal area* projection is when the area of any given part of the map is preserved. This means that the any object that covers the same area on the Earth as any other part of the map will be the same size. For example, if a one inch diameter circle on the map covers a 100 mile diameter circle on the Earth's surface, then we know that a one inch diameter circle anywhere else on the map is known to cover another 100 mile diameter circle on the Earth. In maps of smaller regions, shapes may not be obviously distorted.	In order for a projection to be equal area, however, consistency in the shapes, scales, and/or angles across the map must be sacrificed. Meridians and parallels may not intersect at right angles.	Albers Equal Area, Bonne, Eckert IV, Eckert VI, Lambert Azimuthal Equal Area, Mollweide, and Sinusoidal

Type of Projection	Characteristic of Projection	Drawbacks	Example Projections
Conformal	A *conformal* projection preserves local shapes. This means that when the local angles for points on the map are represented accurately. This means that the angles between any given point and any nearby points are accurate, but are not necessarily accurate for widely separated points on the map. A side effect is that conformal projections preserve the precise perpendicular intersections between parallels and meridians on the map. When mapping smaller areas, relative shape is preserved.	In order for a projection to be conformal, however, consistency in the surface areas, shapes, and/or scales across the map must be sacrificed. An area enclosed by a series of arcs may be greatly distorted.	Hotine Oblique Mercator, Lambert Conformal Conic, Mercator, Oblique Mercator, State Plane Coordinate System, Transverse Mercator, and Universal Transverse Mercator
Equidistant	A *equidistant* projection is when the scale between at least one specific origin point on the map with respect to every other point on the map is represented accurately.	In order for a projection to be equidistant, however, consistency in the surface areas, shapes, and/or angles across the map must be sacrificed.	Azimuthal Equidistant, Equidistant Cylindrical, Equidistant Conic, and Cassini
Azimuthal	A *azimuthal* projection is when the direction of (or angle to) all points on the map are accurate with respect to the center point of the projection.	In order for a projection to be azimuthal, areas, shapes, and angles may be sacrificed at areas not close to the center of the map.	Azimuthal Equidistant, Gnomonic, Lambert Azimuthal Equal Area, Orthographic, and Stereographic

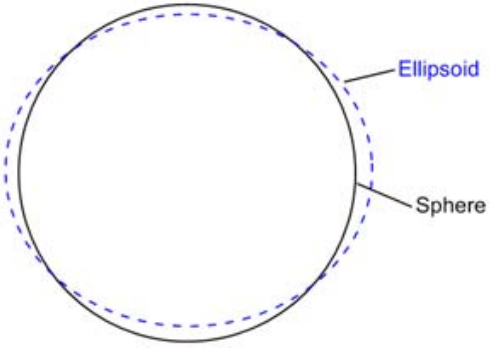
Type of Projection	Characteristic of Projection	Drawbacks	Example Projections
Other	Some projections try to minimize the effects of all distortions and as a result do not minimize any one distortion in particular.		Polyconic, Robinson and Robinson-Sterling, Unprojected Lat/Long, and Van der Grinten

In addition to the characteristics described above, some projections have highly specialized characteristics that may be useful in certain applications. For example, on maps made with a Mercator projection, all lines of constant direction (rhumb lines) are known to be straight, thereby making such maps very desirable as navigational charts.

Ellipsoids

For maps of the Earth where accuracy is not of particular concern, we can safely assume that the Earth is perfectly spherical in shape. For small-scale maps, the difference between a sphere and ellipsoid is not detectable on the map.

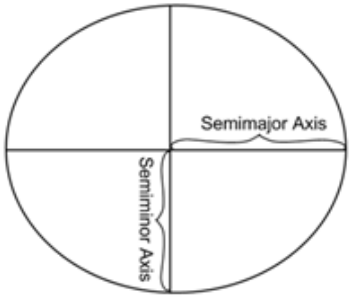
However, the Earth is actually somewhat ellipsoidal (or egg-shaped), approximately 1/300th wider than it is tall, assuming a vertical orientation with respect to the axis of rotation. This shape needs to be taken into account to produce larger scale maps of any significant accuracy.



This is an example of an ellipsoid (dashed blue line) superimposed on a sphere (solid black line).

While an ellipsoid is a closer approximation of the Earth's shape than a sphere, the Earth's surface is not entirely uniform in curvature, so any ellipsoidal representation of the Earth is still only an approximation. This being the case, cartographers have historically used a number of slightly different ellipsoidal representations in attempts to produce more accurate maps of different regions of the Earth.

Ellipsoids are defined by the ellipse being used and by the amount of rotation of the ellipse. An ellipse has two axes. The longer axis is the *Semimajor Axis*. The shorter axis is the *Semiminor Axis*. Rotating the ellipse around the semiminor axis creates the ellipsoid.



The diagram shows the semimajor and semiminor axes on an ellipse.

In **Strater**, the ellipsoid can be defined by the *Semimajor Axis* and the *Semiminor Axis* or by the *Semimajor Axis* and the *Inverse Flattening (1/f)* value. The flattening value ranges from zero to 1, so the *Inverse Flattening (1/f)* value must be larger than 1. The flattening value is determined by:

$$f = (\text{Semimajor Axis} - \text{Semiminor Axis})/\text{Semimajor Axis}$$

In the Assign Coordinate System dialog, click the *New* button to define a new coordinate system. In the Define Coordinate System dialog, the *Datum* group allows you to specify parameters for the datum. The *Ellipsoid* can be customized in terms of *Name, Semimajor Axis, Semiminor Axis,* and *Inverse Flattening (1/f)*. The *Semimajor Axis, Semiminor Axis,* and *Inverse Flattening* ratio should be set in meters. If you do not understand ellipsoids and datum definitions, it is recommended you use the defaults. For more information on these subjects, see the projection references.

Datums

Since coordinates on the Earth's surface can be recorded under widely varying assumptions about the shape and size of the Earth and the locations of the poles and prime meridian, cartographers have developed a standard for identifying the frame of reference for a coordinate system. This standard is called the *datum*. Because the frames of reference differ, a coordinate recorded in one datum usually has slightly different latitude and longitude values from the same point recorded in any other datum.

Some datums are designed to provide a marginally accurate representation of coordinates spanning the entire Earth, while other datums are designed to provide more accurate results in a particular region at the expense of lesser accuracy in other parts of the world. For example, the *South American Datum of 1969 (SA69)* is tailored to provide good results for maps of the South American continent and surrounding areas, but, as a consequence, provides poor results for the rest of the world.

When combining data from multiple sources into a single map, it is important that all of the coordinate systems being combined specify the projection and datum accurately. Since each datum has slightly different latitude and longitude values for the same coordinates, mixing coordinates from multiple datums together without fully defining the datum introduces inaccuracies into the map. **Strater** will automatically convert different source coordinate systems from different datums to the target coordinate system.

A *datum conversion* can be used to convert coordinates from one datum to another. Click the *Coordinate System* to open the **Assign Coordinate System** dialog. Click *New* to define a new projection and datum. The Define Coordinate System dialog has the *Conversion Method* and *Ellipsoid* parameters necessary to allow you to define a coordinate system with a custom datum.

Several different *Conversion Methods* may be used for converting coordinates from one datum to another:

Molodensky	The *Molodensky* method is the most widely used method of datum conversion. It adjusts latitude and longitude coordinates by taking into account the displacement between two datum's ellipsoids on all three axes. It does not take into account any rotational differences between the two ellipsoids.
Bursa-Wolfe	The *Bursa-Wolfe* method is similar to the *Molodensky* method, but in some instances it produces more accurate results because it takes into account both displacement and rotational differences between two ellipsoids. **Strater** supports the *Bursa-Wolfe* method for conversions from the WGS84 datum to the following datums: World Geodetic System 1972, DHDN-1, DHDN, Australian Geodetic 1984, ANS84, MRT - Everest Modified, Switzerland - CH1903, NTF France - Paris Meridian, and Pulkovo 1942 - Hungary.

Strater supports conversions for over 200 different predefined datums.

Custom Datum Definition

Click the *New* button in the Assign Coordinate System dialog to open the Define Coordinate System dialog. Use the *Datum* group to define a custom datum and specify the exact datum parameters and values.

Datum

The *Datum* list contains predefined datums. Select a datum to populate the *Parameter* and *Value* columns. Customize the parameters and values as needed.

Conversion Method

The *Conversion Method* controls the method of datum conversion and the conversion parameters. The conversion methods include *Molodensky*, *Bursa-Wolfe*, and *None*.

- The *Molodensky* method is the most widely used method of datum conversion. It adjusts latitude and longitude coordinates by taking into account the displacement between two datum's ellipsoids on all three axes. It does not take into account any rotational differences between the two ellipsoids.
- The *Bursa-Wolfe* method is similar to the *Molodensky* method, but in some instances it produces more accurate results because it takes into account both displacement and rotational differences between two ellipsoids.
- Choose *None* if the predefined methods do not suite your purpose. If you select <*custom*> from the *Ellipsoid Name* list, you can specify your own ellipsoid model parameters.

Conversion Parameter and Values

You can edit the conversion parameter and values directly by selecting the value you want to edit and typing a new value over it. Parameters vary depending on the selected *Conversion Method*.

Ellipsoid

The *Ellipsoid* group contains options for defining the ellipsoid. Use these settings to define the ellipsoid model that best approximates the curvature of the Earth's shape in the map region. If you do not understand ellipsoids and datum definitions, it is recommended you use the defaults.

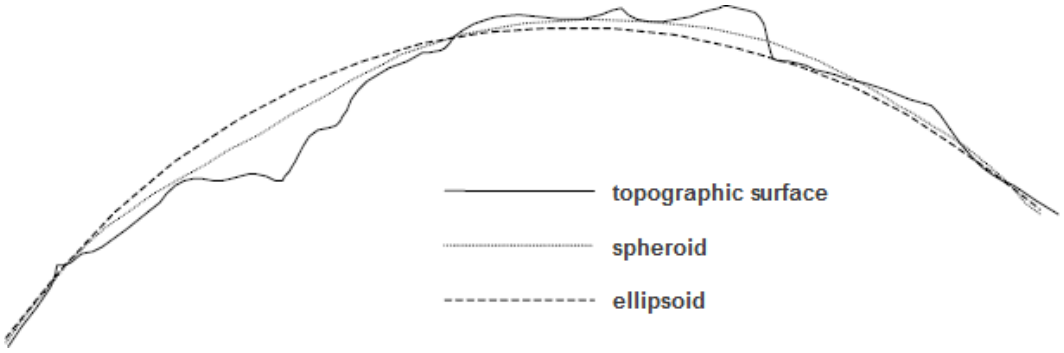
- The *Name* list contains a collection of ellipsoid models that cartographers have historically used in attempts to produce more accurate maps of different regions of the Earth. The *Name* list also contains the option to create a <*custom*> ellipsoid.
- The *Semimajor Axis* box can be edited to define the major axis.
- The *Semiminor Axis* box can be edited to define the minor axis.
- The *Inverse Flattening (1/f)* can be edited to define the flattening ratio.
- The *X Displacement, Y Displacement,* and *Z Displacement* are the axis displacements in meters.

Prime Meridian

The *Prime Meridian* section contains options for defining the prime meridian *Name* and *Prime Meridian Shift*. A meridian is a line of constant longitude running north-south on a map. The zero meridian or prime meridian is used as a reference line from which longitude east and west is measured. The prime meridian passes through Greenwich, England. The *Prime Meridian Shift* is the shift from the prime meridian, typically 0 degrees, in decimal degrees.

Understanding Local Datums

To understand how local datum transforms affect data, you need to understand the ellipsoid, the spheroid, and how both relate to the datum. The spheroid is the a perfect circular object, located at mean sea level. This is constant everywhere. Because of local variations in the gravitational field, the shape actually has local variations.



The image from Verhoogan, shows the variation in the geoid, ellipsoid, and actual topographic surface.

The ellipsoid is used to approximate the global differences. But additional differences exist because of the actual topographic surface. Local datums were created to locally account for these differences. The datum includes the ellipsoid, the prime meridian shift, and any offsets in the X or Y direction. Because local datums align the ellipsoid with a particular location on the earth's surface, local datums are not suitable for use outside the designed area.

In the **Define Coordinate System** dialog, you can choose how datums are converted from one datum to another. This is the *Conversion Method*. The *Molodensky* method is the most widely used method of datum conversion. It adjusts latitude and longitude coordinates by taking into account the displacement between two datum's ellipsoids on all three axes. It does not take into account any rotational differences between the two ellipsoids. The *Bursa-Wolfe* method is similar to the *Molodensky* method, but in

some instances it produces more accurate results because it takes into account both displacement and rotational differences between two ellipsoids. **Surfer** supports the *Bursa-Wolfe* method for conversions from the WGS84 datum to the following datums: World Geodetic System 1972, DHDN-1, DHDN, Australian Geodetic 1984, ANS84, MRT - Everest Modified, Switzerland - CH1903, NTF France - Paris Meridian, and Pulkovo 1942 - Hungary.

Changing the datum incorrectly can cause maps to appear wrong or not appear at all. It is advised that changing the datum be done with caution and a basic understanding of the local datums is advised.

Types of Predefined Coordinate Systems

In the **Assign Coordinate System** dialog, the coordinate systems under *Predefined* are separated into different categories.

Geographic (lat/long) Coordinate Systems

In the **Assign Coordinate System** dialog, the *Geographic (lat/long)* category contains unprojected latitude and longitude coordinate systems. Coordinates are always in latitude and longitude. Each coordinate system has a different datum. Datums are defined for specific regions. Properties for each coordinate system and datum are listed in the dialog by clicking on the desired system.

Polar/Arctic/Antarctic Projection Systems

The *Polar/Arctic/Antarctic* category contains different projections that can be used near the north and south poles. Several different projections fit into this category: Lambert Conformal Conic, Orthographic, and Stereographic. Coordinates are always in latitude and longitude. The difference between the projections are in the definition of the false easting, northing, central longitude, central latitude, standard parallel or datum. Projections are defined for specific regions. Properties for each coordinate system and datum are listed in the dialog by clicking on the desired system.

Regional/National Projection Systems

The *Regional/National* category contains different projections that can be used for specific regions or countries of the world. Several different projections fit into this category: Albers Equal Area Conic, Azimuthal Equidistant, Cassini, Gnomonic, Hotine Oblique Mercator, Lambert Azimuthal Equal Area, Lambert Conformal Conic, Mercator, New Zealand Map Grid, Polyconic, Stereographic, Transverse Mercator, and UTM. Coordinates are in latitude and longitude, feet, meters, or occasionally other units. The difference between the projections are in the definition of the false easting, northing,

central longitude, central latitude, standard parallel or datum. Projections are defined for specific countries or specific regions. Properties for each coordinate system and datum are listed in the dialog by clicking on the desired system.

State Plane Coordinate Systems

The *State Plane* category contains both 1927 and 1983 systems. Coordinates are in either feet or meters. The difference between the 1927 and 1983 systems are in the definition of the false easting, northing, central longitude, central latitude, standard parallel or datum. Settings are defined for specific regions of individual states. Properties for each coordinate system and datum are listed in the dialog by clicking on the desired system.

UTM Coordinate Systems

The *UTM* category contains different systems separated by country, region, or type. Coordinates are in meters. The difference between the systems are in the definition of the false easting, northing, central longitude, central latitude, standard parallel or datum. Settings are defined for specific regions or individual countries. Properties for each coordinate system and datum are listed in the dialog by clicking on the desired system.

World Projection Systems

The *World* category contains different projections that can be used to display the map in a particular way. Several different projections fit into this category: Bonne, Eckert IV, Eckert VI, EPSG 3395 – Mercator, EPSG 3785 – Popular Visualisation CRS / Mercator, Equidistant Conic , Equidistant Cylindrical, Miller, Mollweide, Orthographic Western Hemisphere, Robinson and Robinson-Sterling, Sinusoidal, and Van Der Grinten. Coordinates are in latitude and longitude. The difference between the projections are in the definition of the false easting, northing, central longitude, central latitude, standard parallel or datum. Projections can be used for multiple countries or specific regions, depending on the projection type. Properties for each coordinate system and datum are listed in the dialog by clicking on the desired system.

Templates

The *Templates* section is an easy way to modify one of the predefined systems without needing to find the system in one of the other *Predefined* lists. To modify a coordinate system, click on the desired template coordinate system and click the *Modify* button.

Supported Projections

In this section the supported projections and different parameters of each projection, are discussed in detail.

Albers Equal Area Conic Projection

The Albers Equal Area Conic projection scale is constant along any given parallel and accurate along the two specified standard parallels. This projection is used in the National Atlas of the United States. The Albers Equal Area Conic projection is useful for equal area maps of low-aspect regions (regions that are wider than they are tall).



World Map
Albers Equal Area Conic Projection
Central Longitude: 0 Central Latitude: 0
Standard Parallel: 45 2nd Standard Parallel: 0

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to *meters*. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.

Parameter	Description
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. For example, the value -95.5 represents the geographic center of the United States, so the map of the U.S. is drawn upright.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value should be defined as the latitudinal center of the map you are going to produce. This value is only significant when you define *False Easting* and *False Northing* values.
Standard Parallel	Specifies the latitude of the first of two standard parallels, in degrees. The standard parallels typically are defined at approximately one-sixth of the distance inside the north and south limits of the map. For example, if your map latitude ranges from 30° to 36°, you could place your *Standard Parallels* at 31° and 35°. There are alternative methods for determining the best position of the standard parallels. Please see Snyder for more information.
2nd Standard Parallel	Specifies the latitude of the second of two standard parallels, in degrees. See above.

Azimuthal Equidistant Projection

The *Azimuthal Equidistant* projection is a planar projection. Directions and scale are true from the center point of the map. Shapes are true at the center of the map, but are distorted the further you move from the center. When using a polar view of this projection, all meridians are straight lines. When using an equatorial view, the central longitude and equator are straight lines, otherwise, only the central longitude is a straight line. This projection is typically used in polar hemispheric maps.



World Map
Azimuthal Equidistant Projection
Standard Parallel: 0 Central Longitude: 0

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to *meters*. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Standard Parallel	Specifies the central latitude of the projection in degrees. The *Standard Parallel* value typically should be defined as the latitudinal center of the map you are going to produce.

Bonne Projection

The Bonne projection is a pseudo-conical, equal area projection. The scale is constant along any given parallel, and accurate along the specified standard parallels. The Bonne projection is distortion-free along the central longitude and the parallels. This projection is used for continental and topographic mapping.



North America Map
Bonne Projection Central Longitude: -100
Standard Parallel: 40

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Standard Parallel	Specifies the central latitude of the projection in degrees. The *Standard Parallel* value typically should be defined as the latitudinal center of the map you are going to produce.

Cassini Projection

The Cassini projection is a cylindrical projection. The scale is accurate along the central longitude and along latitude lines perpendicular to the central longitude. This projection is useful for high-aspect regions (regions taller than they are wide).



Map of North America
Cassini Projection
Central Longitude = -100 Central Latitude = 40

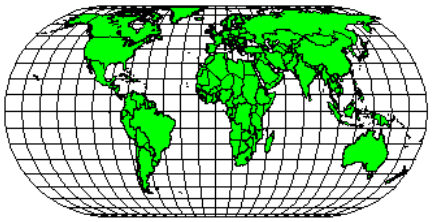
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.

Parameter	Description
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

Eckert IV Projection

The scale is constant along any given parallel and accurate along the parallels 40°30' north and south in the Eckert IV projection. This is a pseudo-cylindrical, equal area projection with the central longitude half the length of the equator. The poles are represented by lines half the distance of the equator as well. The meridians are semi-ellipses. Eckert IV is designed to produce aesthetically pleasing world maps.



World Map Eckert IV Projection
Central Longitude: 0

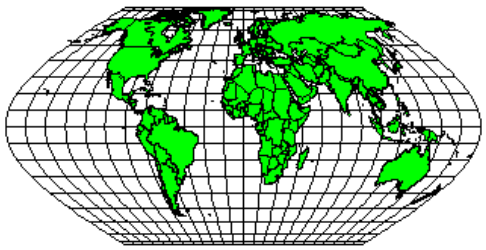
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.

Parameter	Description
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

Eckert VI Projection

The scale is constant along any given parallel, and accurate along the parallels 49°16' north and south in the Eckert VI projection. This is a pseudo-cylindrical, equal area projection with the central longitude half the length of the equator. The poles are represented by lines half the distance of the equator as well. The meridians are sinusoidal. The Eckert VI projection is useful for world maps.



World Map Eckert VI Projection
Central Longitude: 0

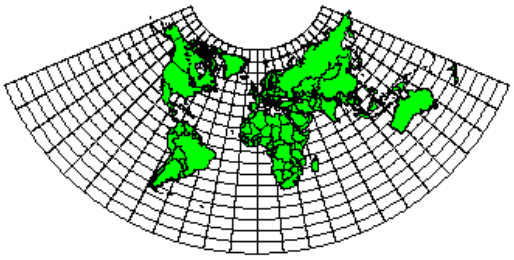
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.

Parameter	Description
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

Equidistant Conic Projection

There is no distortion in scale, shape, or area along the standard parallels in an Equidistant Conic projection. Scale is true along all longitudes and along the standard parallels. Direction is locally true along the standard parallels. This projection is useful for maps of low-aspect regions (regions that are wider than they are tall).



World Map Equidistant Conic Projection
Central Longitude: 0 Central Latitude: 0
Standard Parallel: 45 2nd Standard Parallel: 0

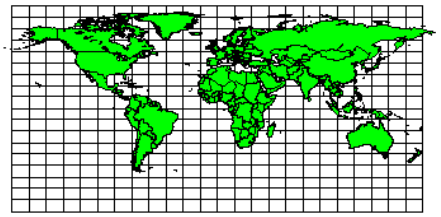
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.

Parameter	**Description**
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. For example, the value -95.5 represents the geographic center of the United States, so the map of the U.S. is drawn upright.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value should be defined as the latitudinal center of the map you are going to produce. This value is only significant when you define *False Easting* and *False Northing* values.
Standard Parallel	Specifies the latitude of the first of two standard parallels, in degrees. The standard parallels typically are defined at approximately one-sixth of the distance inside the north and south limits of the map. For example, if your map latitude ranges from 30° to 36°, you could place your *Standard Parallels* at 31° and 35°. There are alternative methods for determining the best position of the standard parallels. Please see Snyder for more information.
2nd Standard Parallel	Specifies the latitude of the second of two standard parallels, in degrees. See above.

Equidistant Cylindrical Projection

The coordinates are equidistant with respect to the center of the Equidistant Cylindrical projection. Distortion is minimal at the specified standard parallel and increases dramatically with distance north or south from this parallel. Typically, this projection is used with maps covering small areas.



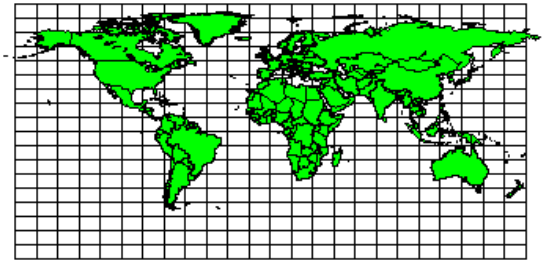
World Map Equidistant Cylindrical Projection
Central Longitude: 0 Standard Parallel: 0

Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. This value is only significant when you define *False Easting* and *False Northing* values, and has no apparent effect on the map.
Standard Parallel	Specifies the central latitude of the projection in degrees. The *Standard Parallel* value typically should be defined as the latitudinal center of the map you are going to produce.

Geographic Coordinate System

This is a simplistic cylindrical projection. If the coordinates in a **Surfer** map layer are stored in a geographic coordinate system (also known as Unprojected Lat/Long or latitude/longitude), the map is displayed on the screen by simply treating the longitudes as horizontal offsets and the latitudes as vertical offsets.



World Map
Unprojected Lat/Long

When plotting latitude/longitude coordinates, **Surfer** constructs the map coordinate system by first determining the latitude for the center of the map. Then the appropriate scale is determined for the east-west (longitude) relative to the north-south (latitude) dimension of the map. See latitude/longitude and Using Scaling to Minimize Distortion on Latitude/Longitude Maps for more information on relative scaling of latitude versus longitude.

The features of a geographic coordinate system (Unprojected Lat/Long) map are:

- Meridians (lines of constant longitude) are equally spaced and are drawn perpendicular to the parallels.
- Parallels (lines of constant latitude) are equally spaced over the entire map and are drawn perpendicular to the meridians. The further your map area is from the equator, the further apart the parallels are spaced.
- The spacing between meridians is different than the spacing between parallels except when the equator is at the north-south center of the map.
- At the center of the map, the scale is accurate in both the north-south and east-west direction.
- Scale is accurate in the north-south direction over the extent of the map.
- East-west scale increases towards the poles, and decreases towards the equator.

There are no parameters for this projection.

Gnomonic Projection

The Gnomonic projection is an azimuthal projection. It is represented as a plane tangent to the globe. At this point of tangency, which is called the standard parallel, all major characteristics are retained. When you move away from the standard parallel in any direction the map is not conformal, not equal-area, and distances are not true to scale. Only areas of less than a hemisphere can be shown and distortion increases noticeably as you move further from the standard parallel.



Antarctica Gnomonic Projection
False Easting: 0 False Northing: 0
Central Longitude: 19.0 Standard Parallel: 2.4

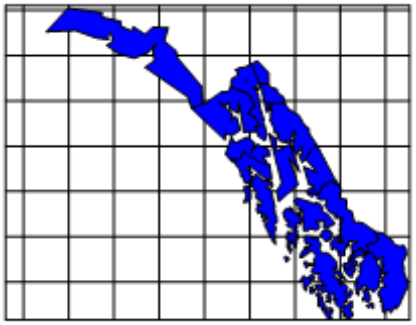
Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.

Parameter	Description
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. This value is only significant when you define *False Easting* and *False Northing* values, and has no apparent effect on the map.
Standard Parallel	Specifies the central latitude of the projection in degrees. The *Standard Parallel* value typically should be defined as the latitudinal center of the map you are going to produce.

Hotine Oblique Mercator Projection

The Hotine Oblique Mercator projection is a cylindrical, conformal projection. The scale is accurate along the chosen central line by the longitude/latitude settings below. This projection is useful for oblique areas (areas that do not follow lines of latitude and longitude), such as the Alaska panhandle because the central line does not have to follow a line of constant longitude. This projection is typically used with areas that are state or province sized and it is not suitable for maps of the world. There are two forms of the Hotine projection equation. The *Hotine Oblique Mercator* projection is defined by a point and an azimuth that defines a line (Alternate B, Snyder).



Alaska Panhandle Hotine Oblique Mercator Projection
Scale = 1
False Easting = 818676.73440112
False Northing = 575097.68887519
Central Scale Factor = .9999
Azimuth (Alpha) = -36.8698976
Central Latitude = 57

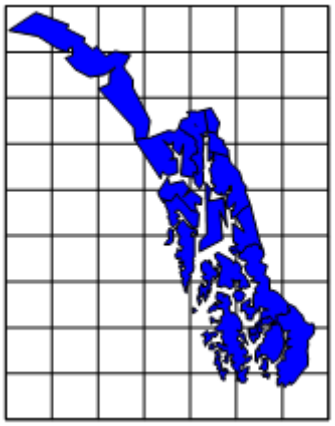
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	**Description**
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Scale Factor (KO)	Specifies the central scaling factor for the projection. This value is often set to 1.0, but may be set to another value for specific applications.
Azimuth (Alpha)	The angle in degrees in which to rotate the central line. Zero is north, and rotation is clockwise. This value cannot equal zero or a multiple of 90 degrees.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce, and should typically be defined as the center of the map.
1st Meridian	Defines one end of the X extent for the central line.
Rotate U/V to X/Y	u,v are unrectified coordinates that follow the central line of the projection. x,y are rectified rectangular coordinates. When True, u,v are rotated to x,y. See Snyder page 70.
Offset by U	When True, u coordinates are offset to remove the *Us* center component, to normalize the origin of the u axis. This is typically required for State Plane coordinate systems that use the Hotine Oblique Mercator projection method.

Hotine Oblique Mercator 2-Point Projection

The Hotine Oblique Mercator 2-Point projection is a cylindrical, conformal projection. The scale is accurate along the chosen central line by the longitude/latitude settings below. This projection is useful for oblique areas (areas that do not follow lines of latitude and longitude), such as the Alaska panhandle because the central line does not have to follow a line of constant longitude. This projection is typically used with areas that are state or province sized and it is not suitable for maps of the world. There are two forms of the Hotine projection equation. The *Hotine Oblique Mercator 2-Point* projection is defined by selecting two points to form a line (Alternate A, Snyder).



Aleutian Islands, Alaska
Hotine Oblique Mercator Projection
Scale = 1 False Easting = 0 False Northing = 0
Central Scale Factor = 1 Central Latitude = 0
Standard Parallel = 56 2nd Standard Parallel = 58
1st Meridian = -133 2nd Meridian = -135
Rotate U/V to X/Y = True
Offset by U = True

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	**Description**
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Scale Factor (KO)	Specifies the central scaling factor for the projection. This value is often set to 1.0, but may be set to another value for specific applications.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce, and should typically be defined as the center of the map.
Standard Parallel	Defines one end of the Y extent for the central line.
1st Meridian	Defines one end of the X extent for the central line.
2nd Standard Parallel	Defines the other end of the Y extent for the central line.
2nd Meridian	Defines the other end of the X extent for the central line.
Rotate U/V to X/Y	u,v are unrectified coordinates that follow the central line of the projection. x,y are rectified rectangular coordinates. When True, u,v are rotated to x,y. See Snyder page 70.
Offset by U	When True, u coordinates are offset to remove the *Us* center component, to normalize the origin of the u axis. This is typically required for State Plane coordinate systems that use the Hotine Oblique Mercator projection method.

Lambert Azimuthal Equal Area Projection

Scale on a Lambert Azimuthal Equal Area projected map is accurate only from the center to any other point on the map. Distortion is minimal near the center and increases with distance from the center. This projection is useful for continents, polar regions (hemispheres), or smaller regions. The Lambert Azimuthal Equal Area projection is not generally used for world maps due to extreme distortion outside the center of the map.



World Map
Lambert Azimuthal Equal Area Projection
Central Longitude: -90
Standard Parallel: 45

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

Parameter	Description
Standard Parallel	Specifies the central latitude of the projection in degrees. The *Standard Parallel* value typically should be defined as the latitudinal center of the map you are going to produce.

Lambert Conformal Conic Projection

In a Lambert Conformal Conic projection, scale is constant along any given parallel and accurate along the specified standard parallels. Scale is the same in all directions at any given point. This projection is useful for equal area maps of low-aspect regions (regions that are wider than they are tall). The pole is a point in the hemisphere containing the standard parallels and the graticules stretch to infinity in the other hemisphere. The Lambert Conformal Conic projection is used for many of the zones in the State Plane Coordinate System.



World Map
Lambert Conformal Conic Projection
Central Longitude: 0 Central Latitude: 0
Standard Parallel: 45 2nd Standard Parallel: 0

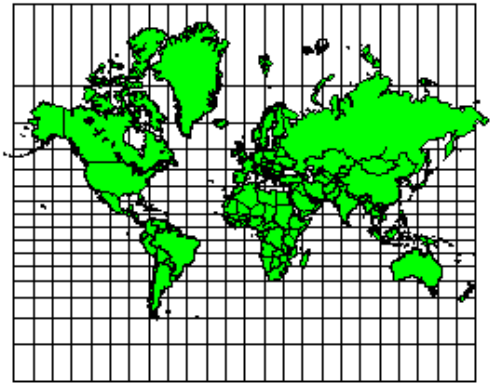
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	**Description**
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. For example, the value -95.5 represents the geographic center of the United States, so the map of the U.S. is drawn upright.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value should be defined as the latitudinal center of the map you are going to produce. This value is only significant when you define *False Easting* and *False Northing* values.
Standard Parallel	Specifies the latitude of the first of two standard parallels, in degrees. The *Standard Parallels* typically are defined at approximately one-sixth of the distance inside the north and south limits of the map. For example, if your map latitude ranges from 30° to 36°, you could place your *Standard Parallels* at 31° and 35°. There are alternative methods for determining the best position of the standard parallels. Please see Snyder for more information.
2nd Standard Parallel	Specifies the latitude of the second of two standard parallels, in degrees. See above.

Mercator Projection

The Mercator projection is a cylindrical projection and it is conformal. In a Mercator projection, scale is constant along any given parallel and accurate along the specified center latitude. Scale is the same in all directions near any given point. Distortion is minimal near the center parallel, but becomes extreme toward the poles. All lines of constant direction (rhumb lines) are known to be straight, thereby making this projection very desirable for producing navigational charts. A limitation of this projection is that coordinates at or near the poles cannot be projected due to constraints of the mathematical formulas used.



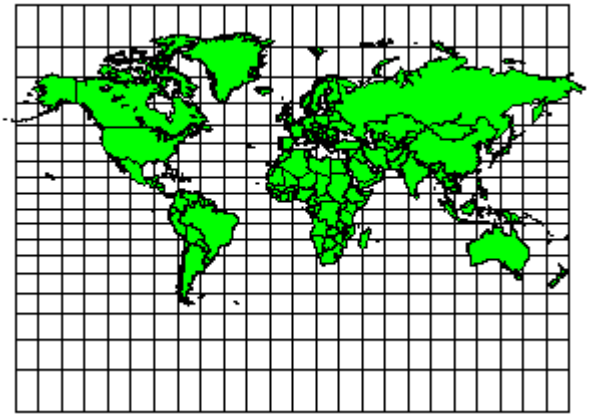
World Map Mercator Projection
Central Longitude: 0 Central Latitude: 0

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.

Parameter	Description
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce.

Miller Cylindrical Projection



World Map Miller Cylindrical Projection
Central Longitude: 0

Scale is constant along any given parallel and accurate along the equator in a Miller Cylindrical projection. Scale is the same in all directions near any given point. Miller Cylindrical projection maps use variable latitudinal scale as a way to minimize distortion as you move north or south from the equator. The method effectively corrects for the relative distances covered by one degree of longitude relative to one degree of latitude as you move away from the equator. Distortion is minimal near the equator, but becomes extreme toward the poles. Miller Cylindrical maps do not represent relative land areas accurately, but do approximate the relative shapes of individual land areas. Miller Cylindrical projection maps are useful for displaying the entire world.

Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	**Description**
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. This value should be defined as the longitudinal center of the map you are going to produce. This value is only significant when you define *False Easting* and *False Northing* values and it has no apparent effect on the map.

Mollweide Projection

The Mollweide projection is a pseudo-cylindrical, equal area projection. Scale is constant along any given parallel, and true along 40°44' north and south. The central longitude is half the length of the equator. This projection was designed to produce aesthetically pleasing world maps.



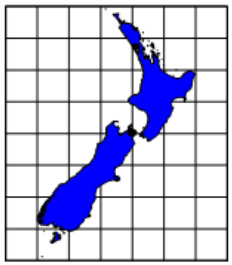
World Map
Mollweide Projection
Central Longitude: 0

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

New Zealand Map Grid

The New Zealand Map Grid projection is a modified cylindrical projection and is conformal. It is a sixth-order conformal modification of the Mercator projection using the International spheroid. Scale is constant along any given parallel and is highly accurate for New Zealand. Scale is the same in all directions near any given point. Distortion is minimal near 173° East, 41° South, and becomes more distorted the further from this location. This projection should only be used for large-scale maps of New Zealand and is not useful outside of New Zealand.



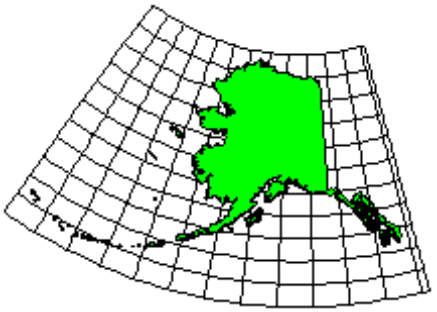
New Zealand Map Grid Projection
False Easting: 2510000
False Northing: 6023150
Scale = 1

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not change them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.

Oblique Mercator Projection

The Oblique Mercator projection is a cylindrical, conformal projection. The scale is accurate along the chosen central line by the longitude and latitude settings below (*1st Point* and *2nd Point*). This projection is used for oblique areas which are areas that do not follow lines of latitude and longitude, such as the Alaska panhandle. This projection is usually used with areas that are state or province sized. This projection is not suitable for maps of the world.



State of Alaska Oblique Mercator Projection
Scale = 1
Central Scale Factor (KO) = 1
1st Meridian = -132.27
Standard Parallel = 55.95

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
1st Meridian	Defines one end of the X extent for the central line.
Standard Parallel	Defines one end of the Y extent for the central line.
2nd Meridian	Defines the other end of the X extent for the central line.

Parameter	Description
2nd Standard Parallel	Defines the other end of the Y extent for the central line.
Central Scale Factor (KO)	Specifies the central scaling factor for the projection. This value is often set to 1.0, but may be set to another value for specific applications.

Orthographic Projection

The Orthographic projection is an azimuthal projection. In an Orthographic projection, scale is accurate at the center and along any circle circumscribed around the center. Distortion is nil at the center, and increasingly extreme with increasing distance from the center. This projection is useful for "view of globe" or "view from space" pictures of the Earth. A limitation of this projection is that the hemisphere facing away from the center of the projection is not visible. Objects near the edge of the visible hemisphere may be clipped.



World Map Orthographic Projection
Central Longitude: -90
Central Latitude: 45

Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	**Description**
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce.

Polyconic Projection

The Polyconic projection is useful for maps of continental or smaller regions. Generally, this projection is not used for world maps due to extreme distortion at any significant distance from the center of the projection. Only the central meridian is distortion-free. Notice in the sample map shown above that Africa is relatively undistorted, but the rest of the world is barely recognizable. Scale is true along the central longitude and along each parallel.



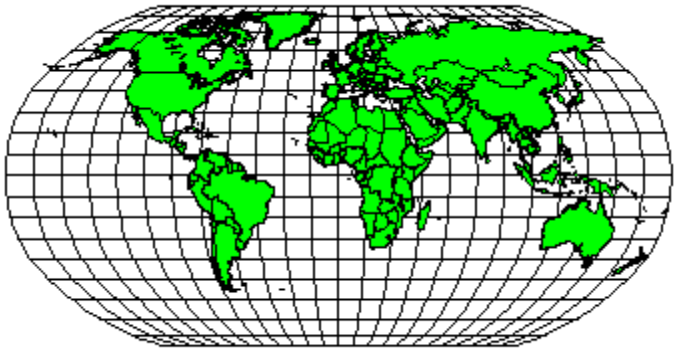
World Map
Polyconic Projection
Central Longitude: 0
Central Latitude: 0

Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce.

Robinson and Robinson-Sterling Projections

These projections are pseudo-cylindrical. Scale and area are always distorted by the Robinson and Robinson-Sterling projections. These projections are designed to produce aesthetically pleasing world maps.



World Map Robinson-Sterling Projection
Central Longitude:0

The Robinson and Robinson-Sterling projections produce visually similar results, but use two entirely different mathematical processes. As a result, the numeric values of the projected coordinates produced by these two methods are slightly different. For most applications, these differences are not significant.

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	Description
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. This option is only available for the Robinson-Sterling projection.

Sinusoidal Projection

The Sinusoidal projection is a pseudo-cylindrical, equal area projection. Scale is accurate along any given parallel and along the specified central longitude. This projection is useful for continental or world maps, particularly for high-aspect regions (regions taller than they are wide). To get good results with the Sinusoidal projection, the map must have coordinates between +/-180 degrees longitude and +/- 90 degrees latitude.



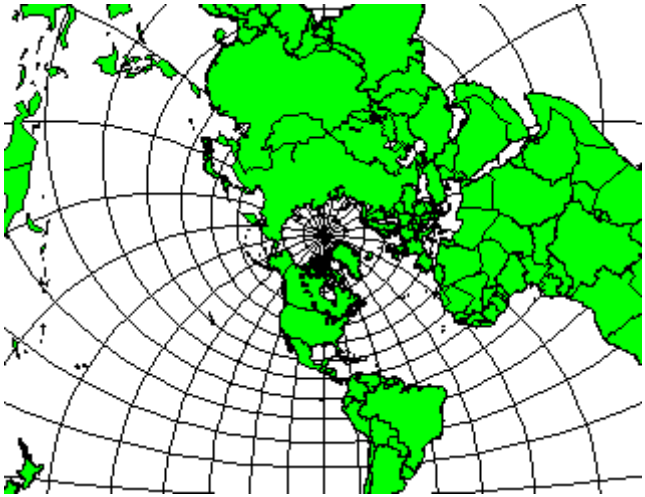
World Map
Sinusoidal Projection
Central Longitude: 0

Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

Stereographic Projection

The Stereographic projection is an azimuthal, conformal projection. In a Stereographic projection, scale is constant along any circle circumscribed around the center of the projection. Distortion is minimal at the center and becomes extreme with distance from the center. Generally, this projection is not used for regions larger than a continent or a hemisphere due to distortion effects. The Stereographic projection is often used for maps of the poles.



North America
(Other continents included to show distortion of objects far away from projection center)
Stereographic Projection
Central Longitude: -90 Central Latitude: 45

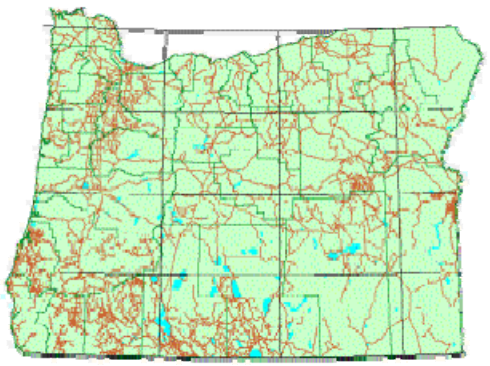
Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.

Parameter	Description
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Scale Factor (KO)	Specifies the central scaling factor for the projection. This value is often set to 1.0, but may be set to another value for specific applications.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce.

State Plane Coordinate System Projections

The State Plane Coordinate System (SPCS) divides the United States into a number of zones, and defines a different projection for each zone such that a suitable map of any given zone is plotted. SPCS is used mainly for intrastate views such as county or parish maps.



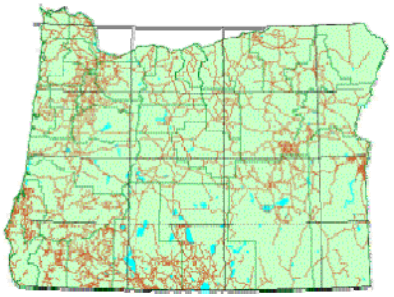
State of Oregon
State Plane Coordinate System of 1983
Projection for Oregon North Zone

Unlike most forms of projection where the datum may be specified separately, the SPCS is tied to a specific datum. There are two State Plane Coordinate Systems commonly used. The State Plane Coordinate System of 1927 uses the North American Datum 1927 (NAD27), while the State Plane Coordinate System of 1983 uses the North American Datum 1983 (NAD83).

Projection Parameters

Parameter	Description
Zone	Specifies which one of the predefined zone projections to use for this coordinate system.
Feet or Meters	Most SPCS have both a meters and feet option available in the predefined list.

Transverse Mercator Projection



State of Oregon
Transverse Mercator Projection
Central Latitude: 41.75
Central Longitude: -120.5

The Transverse Mercator projection is also known as the Gauss-Kruger projection or the Gauss Conformal projection. This projection is cylindrical and conformal. In this projection, scale is constant along any straight line that is parallel to the specified central meridian. Scale increases with distance from the central meridian. Distortion is minimal near the center of the projection and increases dramatically with distance from the center. Distortion is considerable when projecting coordinates that fall within a few degrees of the poles. This projection is useful primarily for mapping small regions no more than a few degrees across, particularly high-aspect regions (regions taller than they are wide). A limitation of this projection is that coordinates at or near the poles cannot be projected. An additional limitation is that regions larger than a quadrant (e.g. having greater than 90 degrees extent either vertically or horizontally) result in portions of the projected image folding over each other due to constraints of the mathematical formulas used. The projection is best used with areas that are no greater than 30 degrees wide or tall, and preferably with areas that are much smaller.

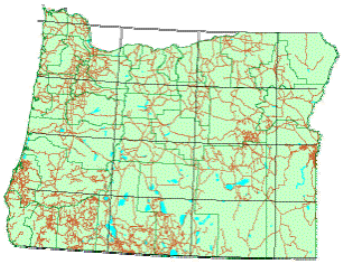
Projection Parameters

Parameter	**Description**
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.

Parameter	Description
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Scale Factor (KO)	Specifies the central scaling factor for the projection. This value is often set to 1.0, but may be set to another value for specific applications.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value typically should be defined as the latitudinal center of the map you are going to produce.

Universal Transverse Mercator (UTM) Projections

The Universal Transverse Mercator system, commonly known as UTM, divides the Earth into sixty discrete zones, each representing a vertical slice of the globe spanning six degrees of longitude. A Transverse Mercator projection is applied to each zone with the central meridian of the projection at the center of the given zone and the central latitude of the projection at the equator. This coordinate system is the basis for many standardized regional maps, such as tract or neighborhood maps by the US Census Bureau and topographic quadrangles by the US Geological Survey. UTM is not generally used for coordinates outside the range of -80 to +84 degrees latitude due to the distortion inherent in Transverse Mercator projections near the poles.



State of Oregon Universal Transverse Mercator Projection
Central Latitude: 41.75
Central Longitude: -120.5

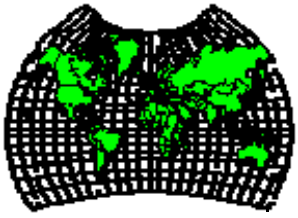
Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.

Parameter	Description
Central Scale Factor (KO)	Specifies the central scaling factor for the projection. This value is often set to 1.0, but may be set to another value for specific applications.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce. For example, the value -95.5 represents the geographic center of the United States, so the map of the U.S. is drawn upright.
Central Latitude	Specifies the central latitude of the projection in degrees. The *Central Latitude* value should be defined as the latitudinal center of the map you are going to produce.
Projection in Southern Hemisphere	Choose True if your map is in the southern hemisphere. Choose False if your map is in the northern hemisphere.

Van der Grinten Projection

This projection is typically used for maps of the world and the scale is accurate along the equator. This projection was used by the National Geographic for world maps. The central longitude and the equator are straight lines and the poles are greatly distorted.



World Map
Van der Grinten Projection
Central Longitude: 0

To get good results with the Van der Grinten projection, the map must have coordinates between +/-180 degrees longitude and +/- 90 degrees latitude. **Surfer** does not wrap around +/-180 degrees longitude. The example map is using world-proj.gsb as the base map. If you are using world-scale maps, the central longitude generally cannot be set far from 0 degrees since there is no wrap around in **Surfer**.

Projection Parameters

Parameter	Description
Name	Specifies the units used in the map.
Scale	Specifies the unit scale of the projected map, relative to meters. For example, a scale of one means one unit in the projected map equals one meter; a scale of two means two units in the projected map equal one meter; etc.
False Easting	Specifies the false easting, or horizontal offset, of the projected coordinates, in meters. *False Eastings* and *False Northings* are added to the underlying "projected" coordinates as a way to arbitrarily offset their internal XY coordinates after the projection. Unless you have a reason for using these offset values, do not use them. These values do not affect the latitude/longitude coordinates for the map, only the internal coordinates used to plot the map on the screen. If you use *False Easting* and *False Northing* offsets for a map, any subsequent boundaries you append to the map must also use these same offsets if you want the imported boundaries to be drawn in the correct relative position to the existing boundaries.
False Northing	Specifies the false northing, or vertical offset, of the projected coordinates, in meters. See above.
Central Longitude	Specifies the central longitude of the projection in degrees. The *Central Longitude* value typically should be defined as the longitudinal center of the map you are going to produce.

Golden Software Reference Files

If you have looked in a folder that contains data or boundary files created by **Strater** or other Golden Software programs, you may have noticed files with a .GSR2 extension in the folder. These Golden Software Reference files are created when you save a projected file from **Strater**. For example, if you create a map, assign a **Coordinate System**, when you export the map to some file formats, such as TIF, you will see both the filename.tif and filename.tif.gsr2 in the directory.

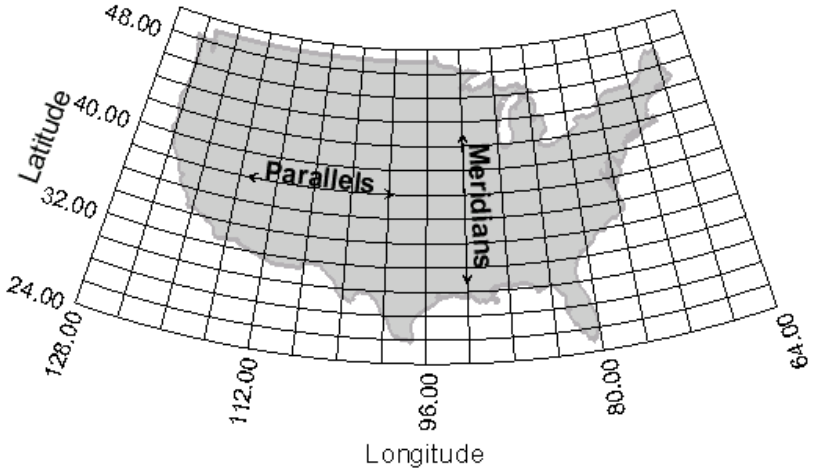
The Golden Software Reference files contain the projection settings used to project the data in Golden Software programs. Projection, datum, and georeference information are stored in the .GSR2 file. When you create a map from a file that has an associated .GSR2 file in **Strater**, the projection information is used when displaying the map. If the Golden Software Reference file is deleted, the boundary can be imported but it will not be projected properly.

Strater .SDG file format retains all of the information in a map, including projection information.

Latitude and Longitude Coordinates

Latitude and longitude are spherical coordinates used to locate a point on the earth. Many maps do not need to take the curvature of the earth into account. For maps covering relatively small land areas, such as a state or small group of states, the earth can be assumed to be flat. In these cases, the latitude/longitude coordinates can be plotted on a Cartesian coordinate system. Maps plotted in this way must use different scaling in the two dimensions to minimize distortion on the map.

Strater only plots latitude and longitude coordinates in decimal degrees. You can see Latitude and Longitude Coordinates in Decimal Degrees for information on converting degrees-minutes-seconds to decimal degrees.



Parallels define lines of constant latitude. Meridians define lines of constant longitude. This Albers projected map makes use of graticule lines to indicate the relationship.

Latitude

Latitude is the Y coordinate and defines north-south global position measured from the equator. Lines of constant latitude are called parallels because they define a series of rings parallel to the equator. Parallels run east-west, but define north-south position on the globe. Parallels are designated in degrees from 0° at the Equator to 90° at the poles. **Strater** uses the convention that parallels are positive north of the equator (north latitudes), and negative south of the equator (south latitudes). Designations

such as 45° indicate a position 45 degrees north of the equator, while -65° indicates a position 65 degrees south of the equator. At any position on the globe, the distance covered by a degree of latitude remains nearly constant.

Longitude

Longitude is the X coordinate and indicates east-west position on the globe. Lines of constant longitude are called meridians. Meridians lie at right angles to the parallels and are half-circles drawn from the North Pole to the South Pole. One meridian is designated as the prime meridian. The prime meridian most commonly in use in the United States runs through Greenwich, England, although there are several other prime meridians in use throughout the world. Longitude is measured 180° east and 180 degrees west from the prime meridian. In **Strater**, longitude is positive east (east longitude) of the prime meridian, and negative west of the prime meridian (west longitude). A designation such as -105° is used to indicate a location 105 degrees west of the prime meridian. Meridians converge at the poles so the distance covered by one degree of longitude decreases as you move north or south from the equator.

Latitude and Longitude in Decimal Degrees

Latitude and Longitude coordinates are often presented in degrees, minutes, and second, such as 39°25'30" (39 degrees, 25 minutes, 30 seconds). However, **Strater** can only plot values in decimal degrees. So, for example, 39°25'30" is referred to as 39.425 in **Strater**.

Converting from degrees, minutes, and seconds is actually quite easy. There are 60 minutes in one degree and 3600 seconds in one degree. To convert minutes and seconds to decimal degrees, divide minutes by 60, divide seconds by 3600, and then add the results to obtain the decimal equivalent.

Conversion Equation:

$$\text{Decimal Degrees} = \text{Degrees} + (\text{Minutes} / 60) + (\text{Seconds} / 3600)$$

Example

Consider the latitude value 39°25'30". This value needs to be converted to decimal degree in order to use it in **Strater**.

To convert 39°25'30" to decimal degrees:

1. First, convert minutes (25') and seconds (30") to their degree equivalents and add the results.

25'/60 = 0.4167

30"/3600 = 0.0083

0.4167 + 0.0083 = 0.425

2. Then, add this number to the number of degrees.

39 + 0.425 = 39.425

3. The final result is the decimal degree value.

39°25'30" = 39.425°

Using Scaling to Minimize Distortion on Latitude/Longitude Maps

When you display maps based on latitude and longitude coordinates extending over a large region, they might appear somewhat distorted. This occurs because one degree of latitude is not equivalent to one degree of longitude. For example, consider a base map of the state of California (CA2000.GSB).



This shows the map of California before and after scaling. The map on the right is scaled up in the Y dimension so the map does not appear compressed.

As an approximation, the distance covered by one degree of latitude at the equator is equal to the distance covered by one degree of latitude at the poles, and is approximately 69 miles. This distance between degrees of latitude remains nearly constant over the globe, although it does vary slightly because the earth is not a perfect sphere. However, the distance between a degree of longitude decreases from the equator to the poles. For any latitudinal position, you can determine the length, in miles, between degrees of longitude based on the formula:

Distance covered by 1° of longitude (in miles) = cosine (latitude) x 69.172.

This equation assumes a Clark 1866 reference ellipsoid. Note: For kilometers, you can substitute the number 111.3 for 69.172 in the formula above.

This table illustrates the change as you move from the equator to the poles.

Latitude	**Distance Covered by One Degree of Longitude**
0° (equator)	69.172 miles
30°	59.956 miles
60°	34.674 miles
90° (poles)	0 miles

So, how can you put this information to use? Remember that you are plotting degrees of latitude and longitude, but what you really want to show on the map are the correct distances. You must scale the longitude values correctly for the correct distances to be represented on the map. The scaling factor to apply for maps is based on the cosine of the latitude for the area you are working on.

To determine the scaling factors:

1. Determine the latitude for the parallel through the center of the map, and obtain the cosine for this latitude value. The center parallel in CA2000.GSB is approximately 37.27 degrees. The cosine of 37.27 is 0.80.
2. Click on the *Map* in the **Object Manager** to select it. The map properties are displayed in the **Property Manager**.
3. Click the Scale tab to set the X direction for the map. You can set either the *Length (Page Units)* value or the *Map Units Per Inch. (Centimeter)* value. The *X Scale* Map units is 1.72 inches in this example.
4. Uncheck the *Proportional XY Scaling* box.
5. Multiply the *X Scale Map Units Per Inch* value by the cosine of the latitude, and enter this number into the *Y Scale Map Units Per Inch* field. 1.72 (*X Scale Map Units Per Inch*) X 0.80 (cosine of latitude) = 1.38 (*Y Scale Map Units Per Inch*). Enter 1.38 into the *Map Units Per Inch* box under *Y Scale*.

The map is automatically updated.

Projection References

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Coordinate System Frequently Asked Questions

Q: Do I need to specify a coordinate system for every map layer in Strater?

A: You do not need to specify a coordinate system for your map layers in **Strater** if you are not going to be converting between different coordinate system or displaying layers with different coordinate systems. If all your map layers are in the same system, you do not need to specify the coordinate system.

Q: Why would I want to set the coordinate system for a map?

A: If your base maps and well location maps are in different coordinate systems, you will want to set the coordinate system for each map layer and the entire map. If you want to change the projection of your base map or well location map, you will want to set the coordinate system.

Q: My map disappears after defining a coordinate system! Now what can I do?

A: Most likely, the map layer that disappeared did not have a defined coordinate system. In the **Object Manager**, click on the map layer that has disappeared. In the **Property Manager**, click on the **Coordinate System** tab. Click the *Set* button and define the map layer's coordinate system. Click *OK*. The map should now appear correctly. See the Source Coordinate System page for more information.

Q: My axes do not show the correct coordinates. How can I make them show the coordinates I want?

A: If the map axes are showing incorrect coordinates, you may need to change your Target Coordinate System. Click on the *Map* object in the **Object Manager**. In the **Property Manager**, click on the **Coordinate System** tab. Click the *Change* button to define the map's target coordinate system. After making the change, click *OK*. The map axes will now appear in the desired coordinates.

Q: When I import a map from another program, does it import the projection information?

A: If the base map contained a reference file, **Strater** will automatically read the reference file and apply any information it finds to the map layer.

Q: When I change the target coordinate system, my map limits change.

Strater retains the map size, but the limits change when the target coordinate system changes.

Q: I need additional information about coordinate systems. Do you have any references that can help?

A: A good starting place is the references on the Projection References page. Many other good resources are available either online or in printed documentation.

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