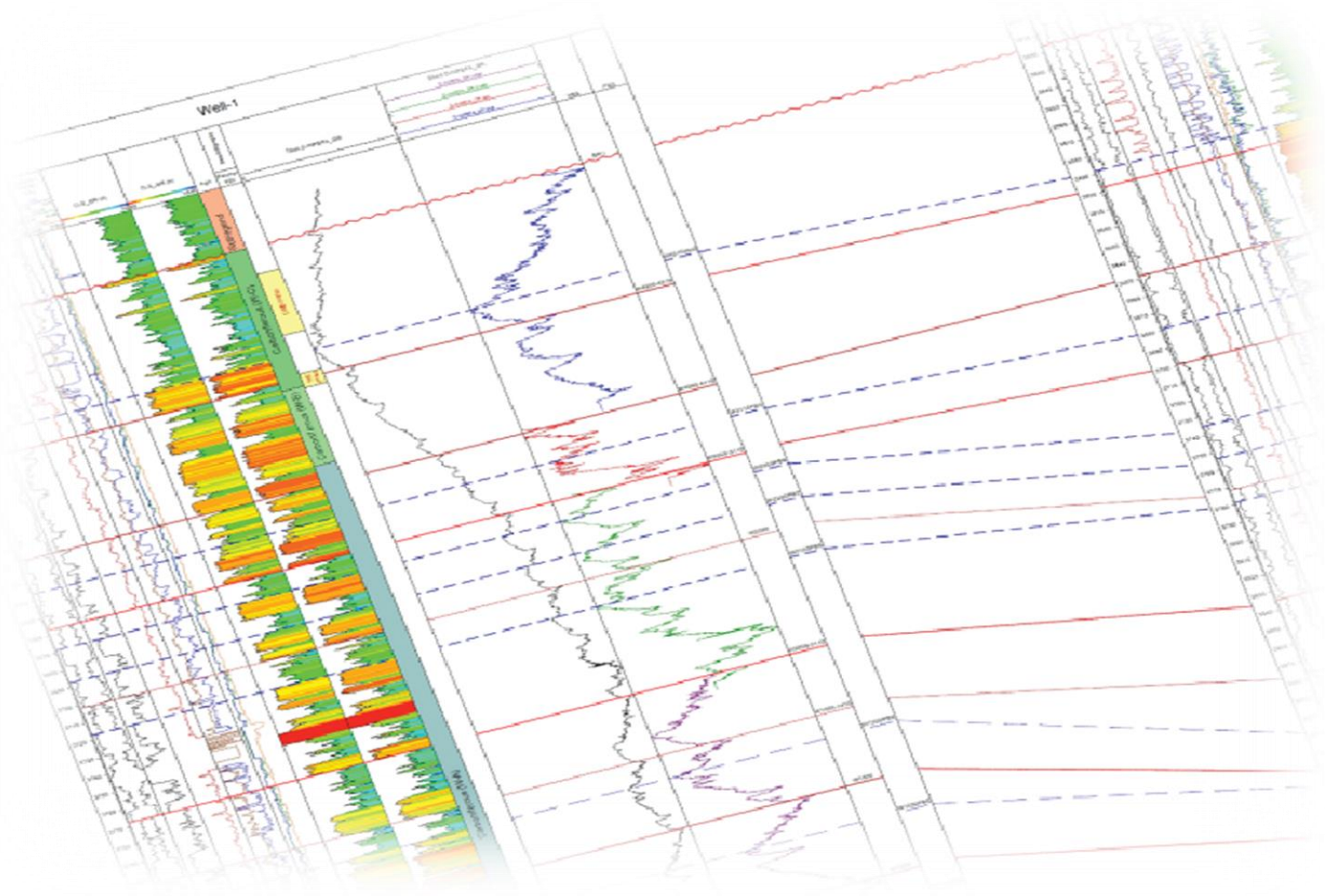
ENRES INTERNATIONAL CycloLog

# Tutorial – Base Module



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# *Welcome to CycloLog!*

**CycloLog® 2016** is a software toolbox with multiple applications in petroleum geology. The purpose of this tutorial is to guide the user, step-by-step, through the common functions and features of CycloLog. Using this tutorial, the new user of CycloLog should be able to:

- understand the CycloLog desktop
- input and display log data
- perform the most important CycloLog functions
- create well composite charts and correlation panels
- export data from CycloLog

The tutorial is also useful, as an *aide memoire*, to the occasional user of the software.

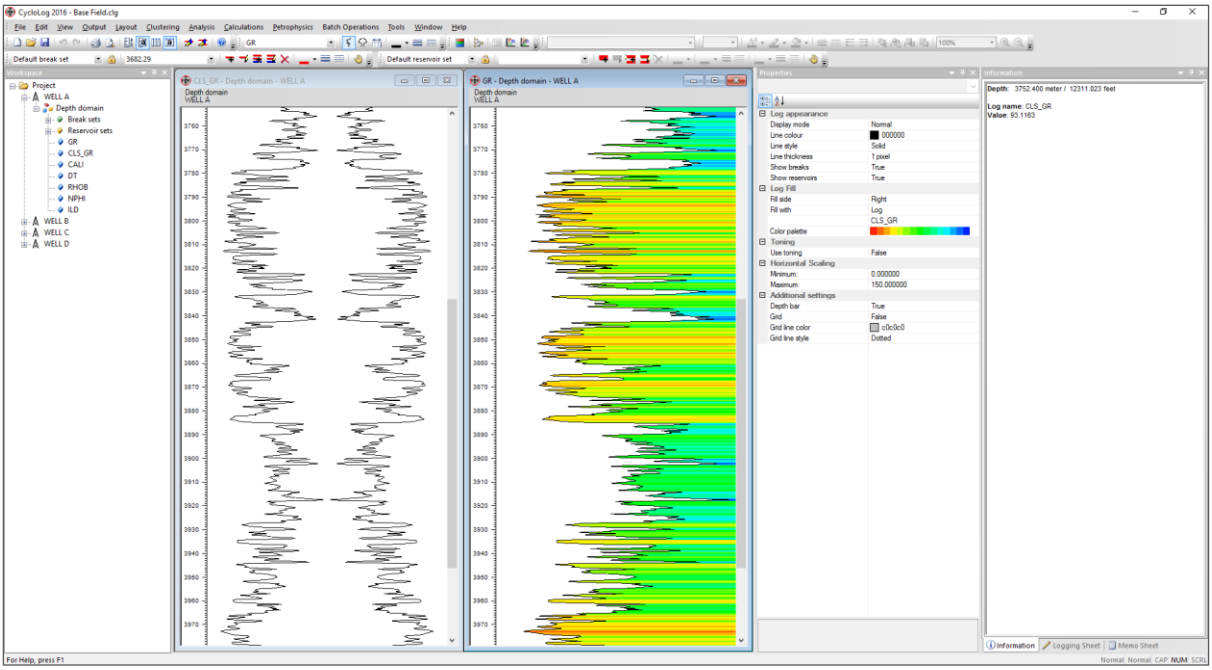
Note that the tutorial is not a comprehensive guide to every function in CycloLog. That information can be found in the Help Manual within CycloLog itself.

Note also that the tutorial is not a guide to the interpretation of CycloLog output such as INPEFA curves.

# Part 1 - Introduction to the CycloLog desktop

## 1.1 Introduction to the CycloLog desktop

The CycloLog desktop uses standard Windows functionality, and looks like this:



The main components of the CycloLog desktop are:

- a number of **Menus** (File, Edit, View …) in the main bar, at the top
- a variable number of **Toolbars,** at the top
- a number of Toolbar panes (**Workspace, Information, Logging Sheet,** and **Memo sheet** panes), usually on the left and in the bottom left corner
- a variable number of **Log Data** panes
- a **Status Bar**; usually at the bottom of the Desktop

Under standard Windows functionality:

- ➢ the Menu Bar, Toolbars, the Toolbar panes can be rearranged (click and drag to the required position).
- ➢ the toolbars can be toggled ON or OFF (right-click over the menus/toolbars area).

Note that:

- The **Workspace** pane contains information about the contents (i.e., the wells and logs) of an opened CycloLog project file (*.clg).
- Toolbar panes can be overlaid and accessed through tabs, e.g.:
    - **Information** pane, displays information about the active, i.e. opened, Log data pane.
    - **Logging Sheet** pane, shows a record of all the actions performed in this project file.
    - **Memo Sheet** pane, allows the user to add notes to the project file.
- The **Properties** toolbar pane contains (interactive) information about the active log (or chart) display pane: its use is not discussed here.
- When a Log Data pane is active, the **Status Bar** shows the same information as in the Information pane (i.e., the depth and the value of the log(s) at the position of the cursor).

***Suggestion**: to maximise the window space for displaying Log Data panes, the user is advised to **minimise the number of opened Toolbars.** The latter can be achieved by closing toolbars via the menu bar: View → Toolbars.*

## 1.2 Using Log Data panes

The **Log Data** panes display any or all of the original and modified logs in the in an opened CycloLog project.

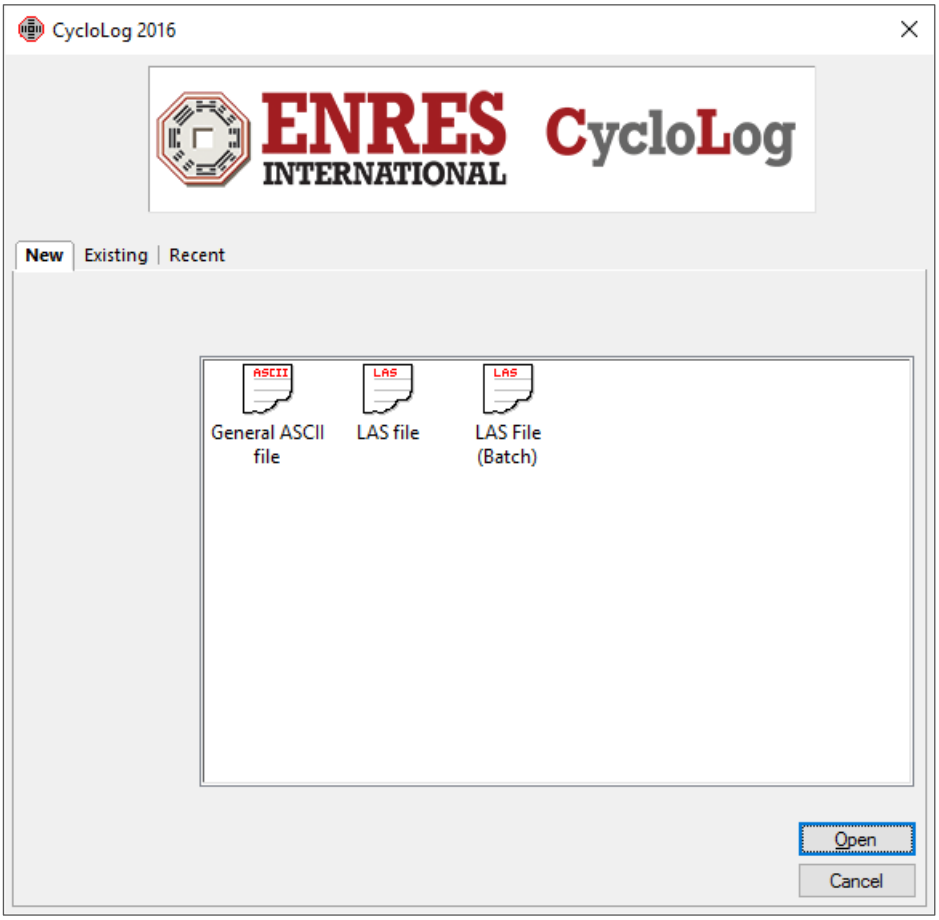
- To open a Log Data pane, double-click on a log listed in the Workspace.
- To close a Log Data pane, click on the Close icon, in the top right corner.
- Each Log Data pane can be minimised/maximised using the other buttons in the top right corner.
- Use either the Log Data pane's scroll bar or activate the pane and use the mouse wheel to scroll up and down a log. When more than one Log Data pane of the same well are opened, all logs will scroll.
- The width of each Log Data pane can be adjusted separately; click and drag a side of the pane window to adjust the width.
- The width of all Log Data panes can be equalised using the **Reposition** function (or F5), which is available (1) in the Window menu, (2) on the Standard Toolbar, or (3) using keyboard shortcut F5.
- The log name and data values in the Log Data pane can be displayed on the cursor by holding down the left-mouse button and then pressing the letter L on the key-board. Pressing on L again will toggle the log name off leaving only the log values displayed.
- Hold down left-mouse button and press the letter D on the key-board to activate the depth value. By pressing the U-key, the opposite unit (e.g., feet) of the log depth (meters) appears on the cursor indicator. The depth value and unit can be toggled on/off using these two key-board functions.
- A grid in the log pane can toggled on/off. Activate the pane and then press the key-board letter G. This grid functionality can also be accessed by a right-mouse click on the Log Data pane thereby opening the context menu; select Display → Show Grid.

***Further information about displaying logs can be found in the following section (Part 2) of this tutorial.***

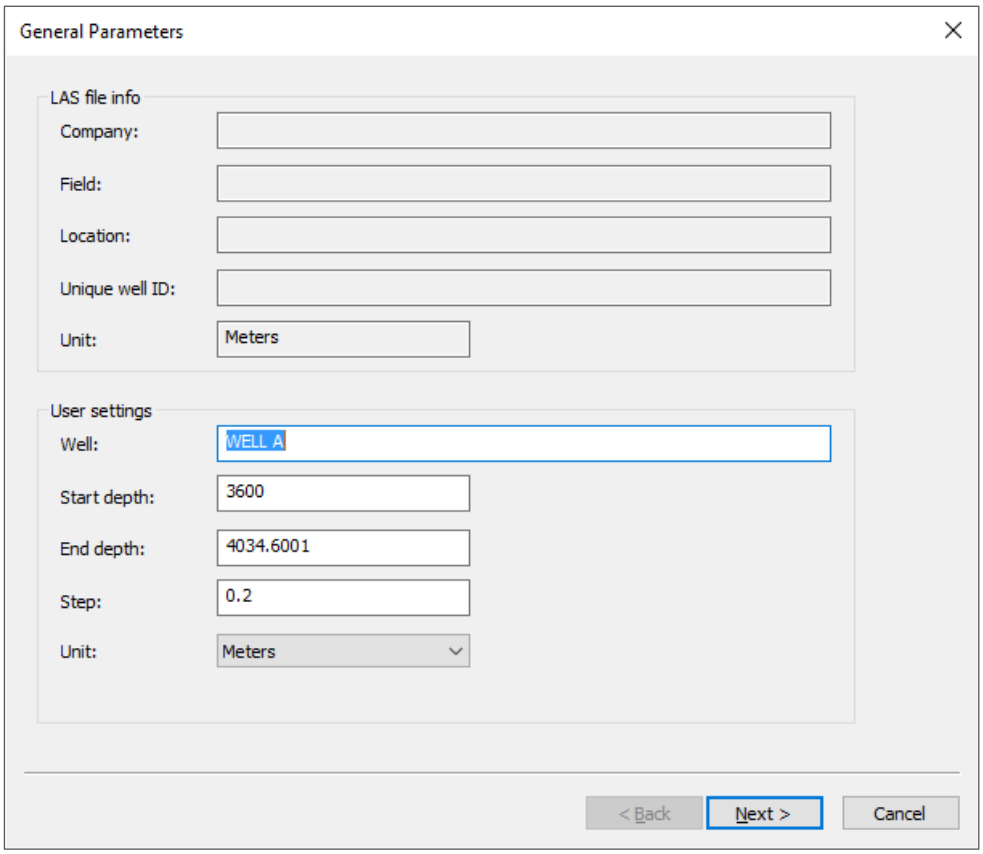
# Part 2 - Importing and displaying well log data

## 2.1 LAS Import

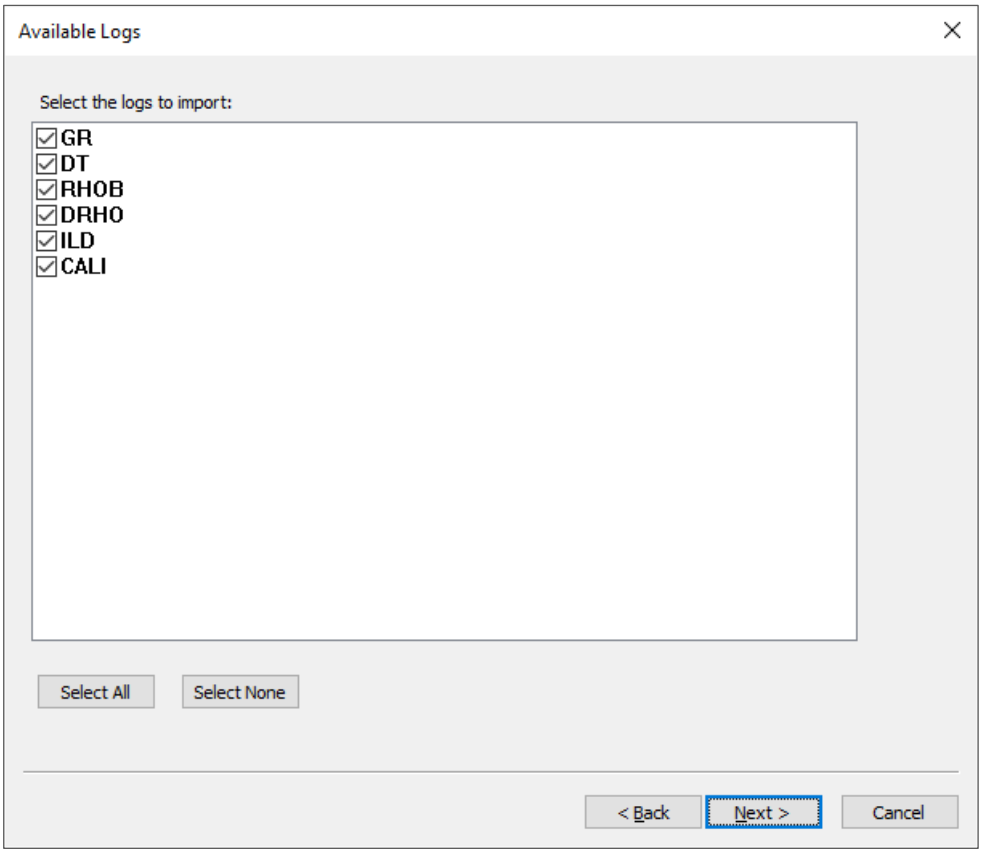
- Select from the main menu: **File → New**, then click on the **New** tab.
- Select **LAS file** and click **Open.**
- Navigate to the file to be used and click **Open.**
- The file will be uploaded into CycloLog.



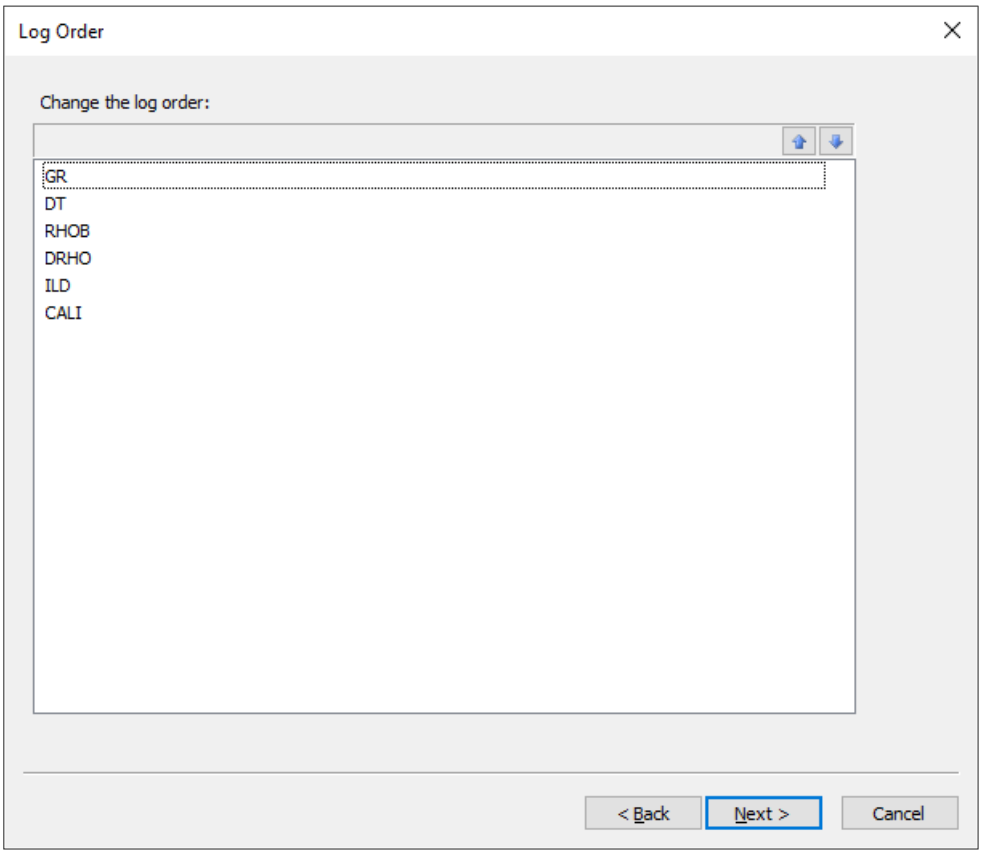
- In the **General Parameters** dialog box (**User Settings** area), the required depth interval can be entered (**Start depth** and **End depth**; default values are the top and bottom of the well), and the **Unit** (in *Feet* or *Meters*).
- Keep the default **Step** value at 0.5 (unless you wish to change it).
- Click on **Next**.



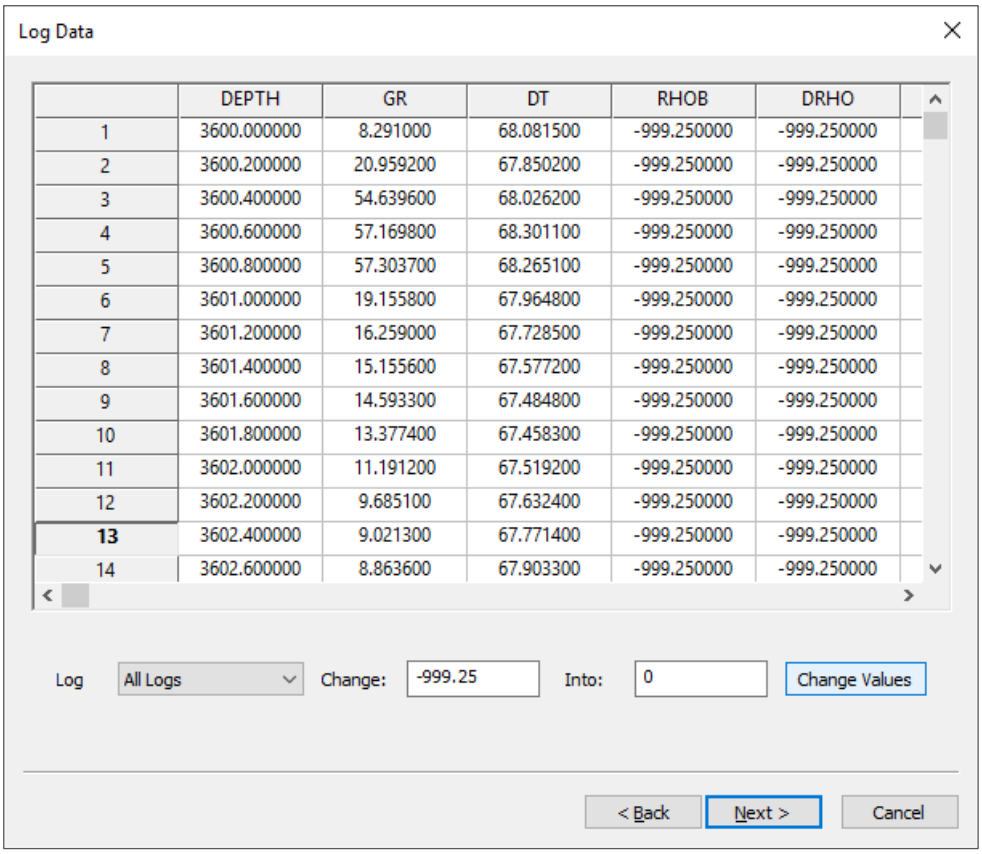
- In the **Available Logs** dialog box, select the required logs or click **Select All** for all logs.
- Click **Next**.



- In the **Log Order** dialog box, use the Up and Down arrows to change the order of the logs, if required. *(Suggestion: place the GR log at the top of the list).*
- Click on **Next**.

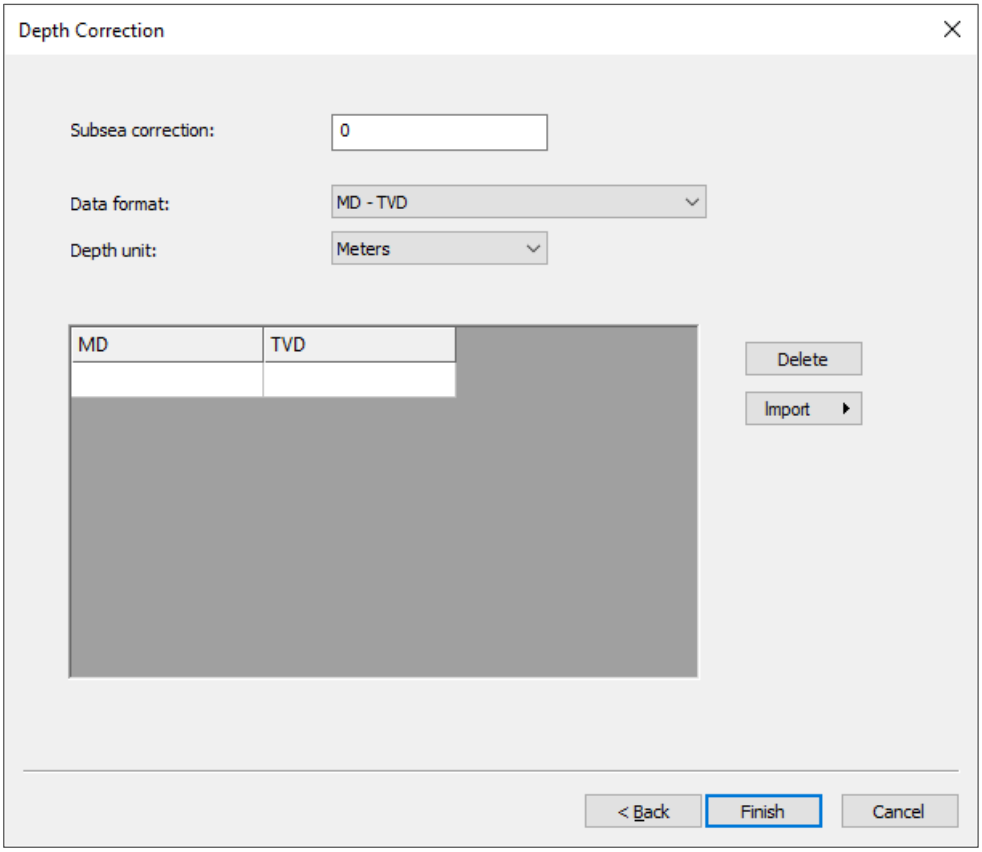


- In the **Log Data** dialog box, the data can be viewed.
- Use this box to change null values (-999.25) into zeroes *(recommended)*, click the **Change Values** button.
- Click **Next**.




| | DEPTH | GR | DT | RHOB | DRHO |
|---|---|---|---|---|---|
| 1 | 3600.000000 | 8.291000 | 68.081500 | -999.250000 | -999.250000 |
| 2 | 3600.200000 | 20.959200 | 67.850200 | -999.250000 | -999.250000 |
| 3 | 3600.400000 | 54.639600 | 68.026200 | -999.250000 | -999.250000 |
| 4 | 3600.600000 | 57.169800 | 68.301100 | -999.250000 | -999.250000 |
| 5 | 3600.800000 | 57.303700 | 68.265100 | -999.250000 | -999.250000 |
| 6 | 3601.000000 | 19.155800 | 67.964800 | -999.250000 | -999.250000 |
| 7 | 3601.200000 | 16.259000 | 67.728500 | -999.250000 | -999.250000 |
| 8 | 3601.400000 | 15.155600 | 67.577200 | -999.250000 | -999.250000 |
| 9 | 3601.600000 | 14.593300 | 67.484800 | -999.250000 | -999.250000 |
| 10 | 3601.800000 | 13.377400 | 67.458300 | -999.250000 | -999.250000 |
| 11 | 3602.000000 | 11.191200 | 67.519200 | -999.250000 | -999.250000 |
| 12 | 3602.200000 | 9.685100 | 67.632400 | -999.250000 | -999.250000 |
| **13** | 3602.400000 | 9.021300 | 67.771400 | -999.250000 | -999.250000 |
| 14 | 3602.600000 | 8.863600 | 67.903300 | -999.250000 | -999.250000 |

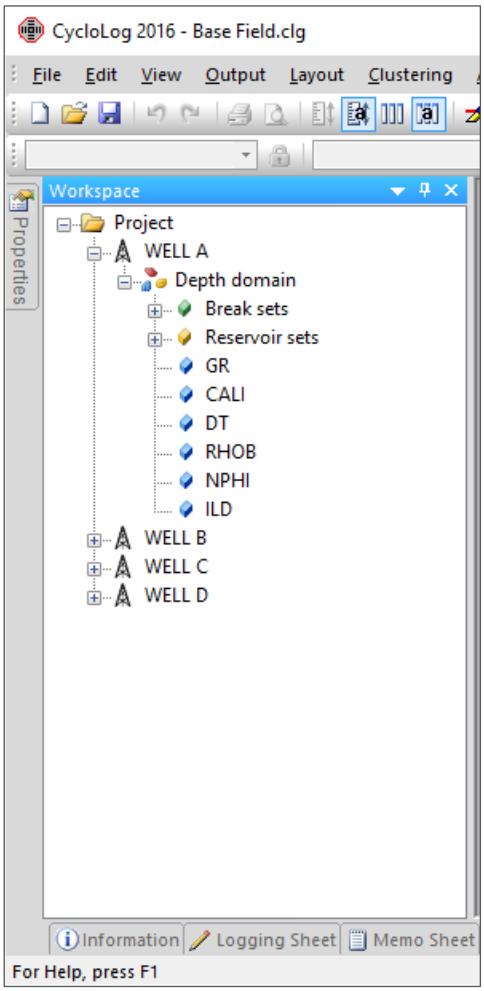
- A depth correction can be applied in the **Depth Correction** dialog box.
- If the well is vertical and/or no correction is required, click **Finish**.
- If necessary, apply a **Subsea correction**.
- If the well is deviated, different types of deviation data can be entered manually or via a deviation survey file (click **Import → Plain File** or **LAS File** and navigate to the file).
- Alternatively, copy the deviation data from another file (e.g., spreadsheet) to the clipboard, and use the **Import → Clipboard** option.




- Click **Finish**.
- Click the **Save** icon (or **CTRL+S**) to save and name the file (****.clg).
- Note that CycloLog can only import LAS File deviation data that were exported out of Petrel (i.e., the LAS file is a Petrel-based format).

## 2.2 Managing log curves

- When a well has been imported, the well and its logs will appear in the **Workspace**.
- Re-order logs in the Workspace by clicking and dragging them up or down the list.



## 2.3 Displaying log curves

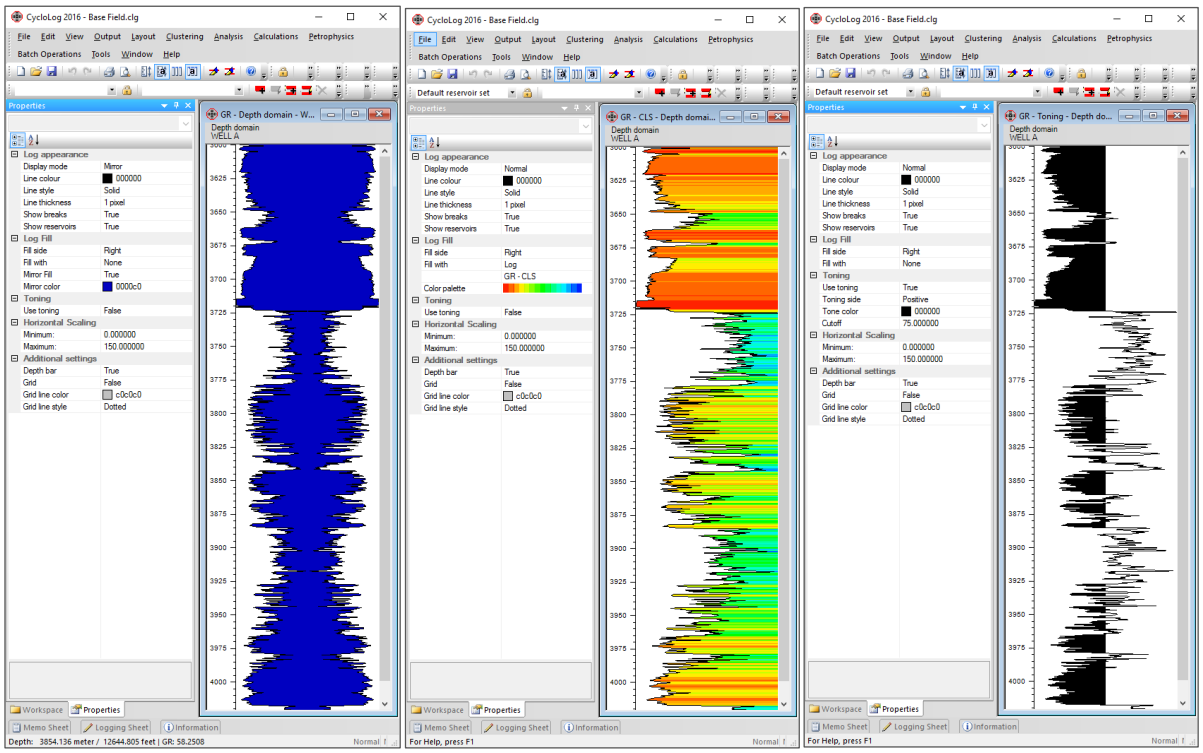
- Double-click on a log in the workspace to display it; right-click over a log for other options.
- Open the Standard Toolbar if it is not open yet (click **View → Toolbars → Standard Toolbar**).

- Use the **Vertical Scaling** option (red rectangle above) on the Standard Toolbar to change the vertical scale; the new scale will apply to all displayed logs from the same well.
- To change the vertical scale manually, place the cursor on the depth bar of the Log Data pane. Hold down the left-mouse button on the pane and then move up or down to increase/decrease the vertical scale.
- Use the icons on the **Log Toolbar** (click **View → Toolbars → Log bar** if this toolbar is not opened yet) to change the appearance of a log: normal/mirror display, horizontal scaling, wiggle colour, wiggle thickness and style.

- These and other options can also be accessed by right-clicking over the log pane.

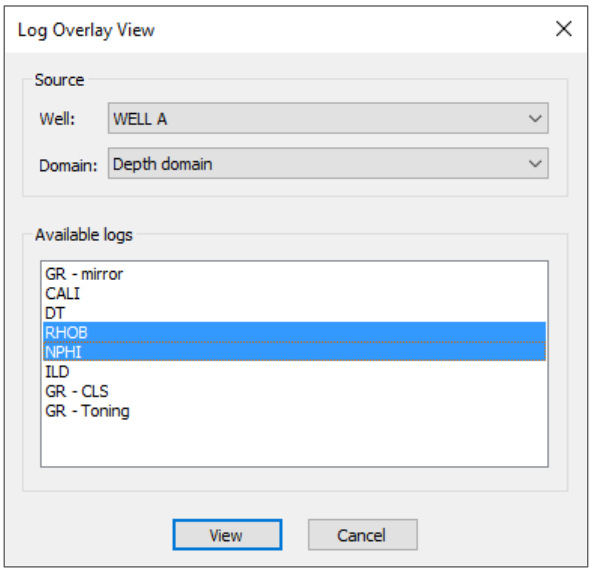
*The following shows the GR curve in three different display formats: mirror-plot, cut-off toning, and colour-classified.*

- *All three display types can be accessed from the right-click menu or, more efficient, use the Properties toolbar.*
- *The classified plot (rightmost image), useful for suggesting lithology, divides the range of values into equal intervals. As can be seen in the Properties toolbar, the Colour palette style is by default discrete, with the number of colours (intervals) set at 15, and the colours range from red (low values) to blue (high values). These values can be changed in this toolbar.*

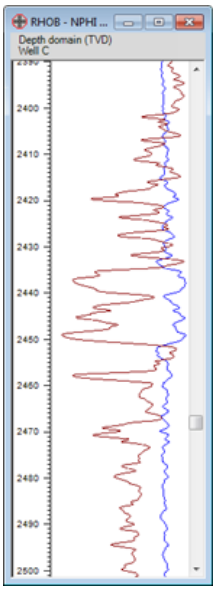


## 2.4 Overlaying log curves

- To overlay logs (e.g., neutron and density), go to the main menu and select **View → Log Overlay**.
- From the list, select the logs to be overlaid and click **View**.
- In a pane that displays overlaid logs, change the properties of individual logs by activating the pane, then select the log from the drop-down list on the Log Toolbar, or right-click on the pane and select **Wiggle Properties.** Alternatively, the properties can be changed by using the editing options in the properties pane.
- Note that the overlaid logs cannot be saved in the workspace, however, they can be preserved in a composite well chart (see part 4 for displaying log overlays in composite well charts).




*The example below shows the RHOB and NPHI logs separately, and overlaid.*



## 2.5 Importing additional wells and/or logs

A **CycloLog (*.clg) file** is a *project file* which can hold more than one well.

- Multiple wells can be added using the batch load LAS functionality.
- Wells can be added to the project either from another LAS file, ASCII file or from an existing .clg file.
- To add a well, select **File → Import** and select **LAS File**, **General ASCII** or **CycloLog File**.
- New wells and their logs will be added to the workspace.

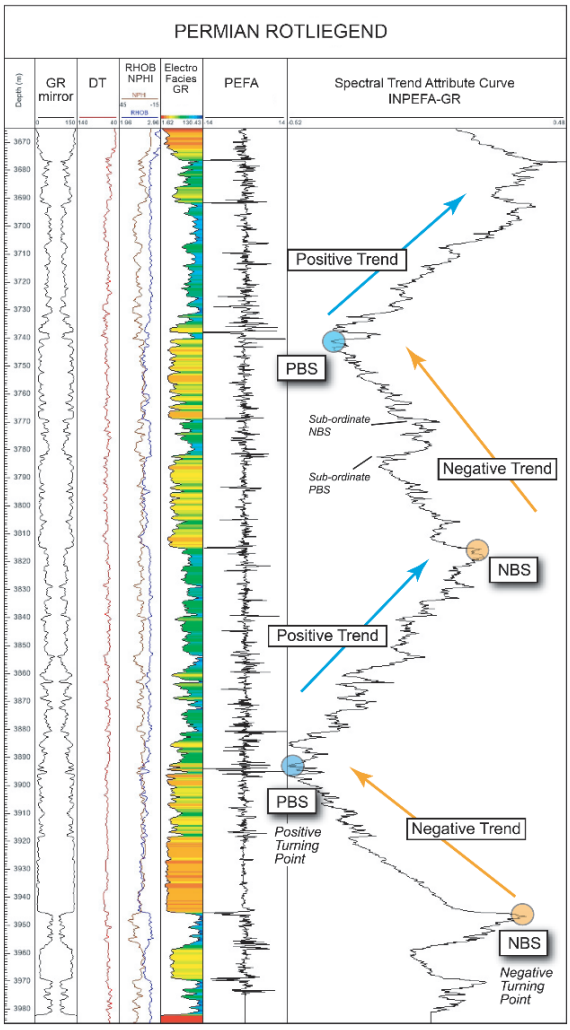
Logs can be added to an existing well:

- Go to **File → Import.**
- Select **Log from LAS File**.

# Part 3 - Generating and displaying INPEFA curves

## 3.1 Introduction to the INPEFA curve

ENRES has developed a unique approach in well analysis and correlations, enabling more accurate and faster well correlations: the INPEFA Log Transform (Integrated Prediction Error Filter Analysis). The INPEFA consists of a set of algorithms that analyses the log data using linear prediction. The result of these analyses is a curve that shows the discontinuities in the well log data. The trends and turning points of this curve can be used for well zonation and correlation. By picking the correlation surfaces on the INPEFA curve, this correlation approach can be considered as data-driven.




A negative trend in the INPEFA® curve is a trend to the left when going upwards along the curve (see above). A positive trend in the INPEFA® curve is a trend to the right when going upwards along the curve. Turning points mark the transition from a positive to a negative trend in an INPEFA® curve ('negative turning point') or the other way around ('positive turning point'). Applying a hierarchical approach to the identification and correlation of the trends and turning points in INPEFA® curves results in a structured, objective method for high-quality correlation of well logs.

## 3.2 Generating INPEFA curves

There are different workflows in CycloLog for calculating INPEFA curves. These workflows can be entered through:

- Menu bar: **Calculations.**
- Menu bar: **Batch Operations.**
- Workspace worksheet: right-mouse click on a log and select **Create Dynamic INPEFA log.**
- The key-board shortcut: **Ctrl + D.**

All workflows have the same mathematical formula.

As it is very advantageous to analyse shorter sections of a well to obtain a higher resolution, INPEFA curves are dynamic. Dynamic means that it is easy to modify the interval over which INPEFA is calculated. Within the CycloLog software, dynamic INPEFA curves are listed as D-INPEFA.

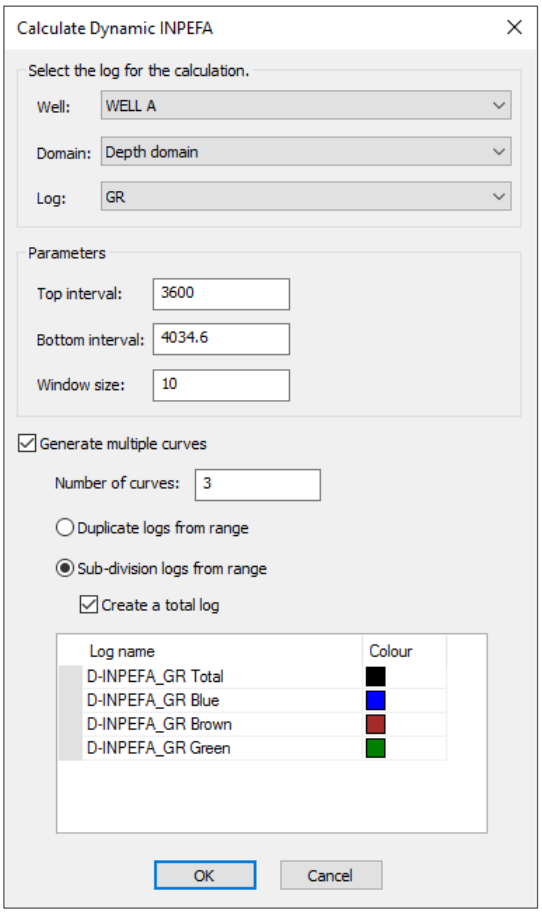
*NOTE: INPEFA can be applied on any log but is often applied on the GR log as this log is considered to be facies sensitive.*

## 3.3 Using Dynamic-INPEFA (D-INPEFA)

- Interpretation of INPEFA curves requires some experimenting with the depth interval over which INPEFA is calculated.
- This is most easily done with the Dynamic-INPEFA function.

To apply a Dynamic-INPEFA calculation on a log:

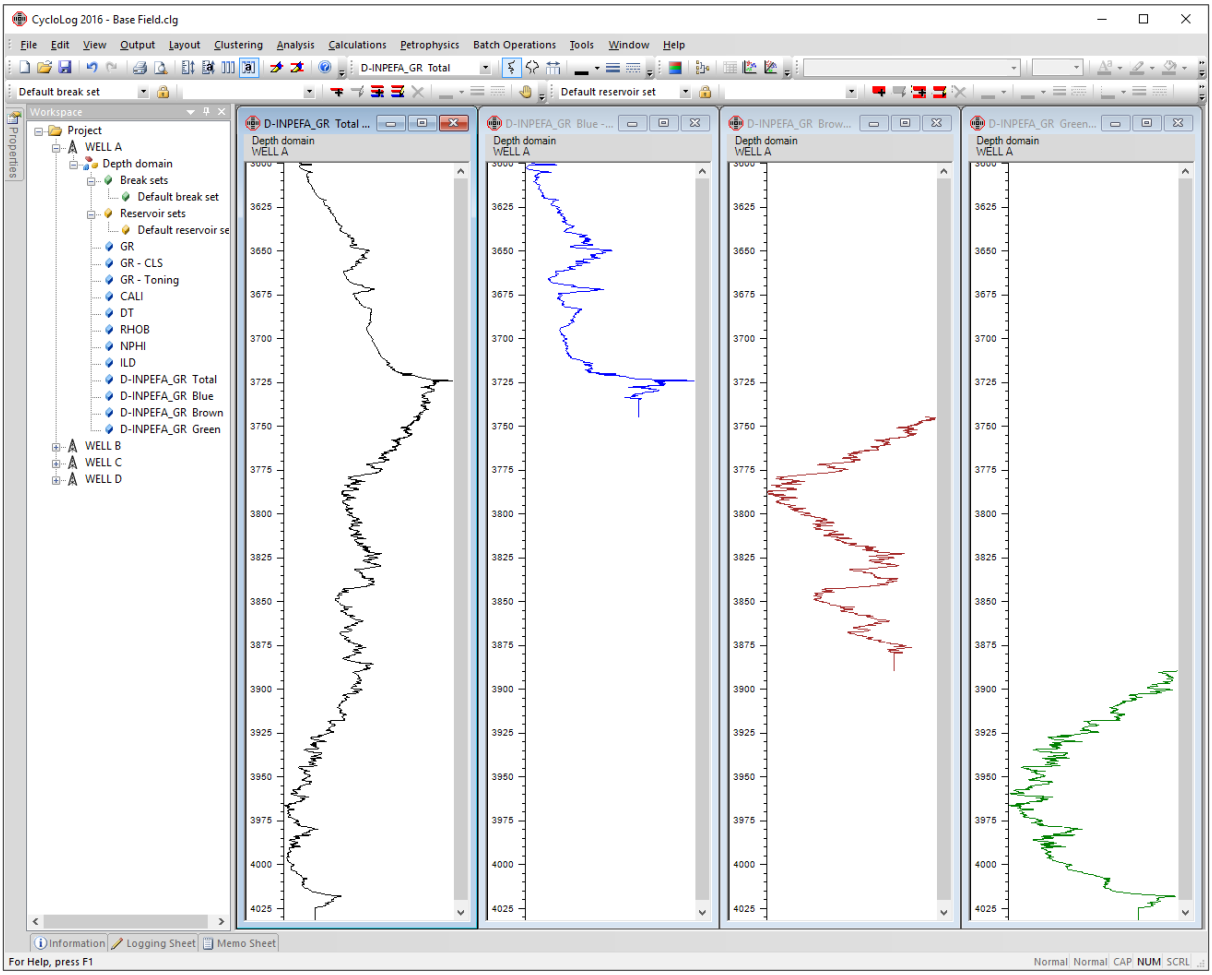
- Select from the menu bar **Calculations → Dynamic INPEFA.**
- Or use the keyboard shortcut **CTRL + D.**
- Or right-click on the log in the workspace and select **Create Dynamic INPEFA Log.**




In the **Calculate Dynamic INPEFA** dialog box:

- Select the well.
- Select the GR log (this will be the default if it is the first log in the Workspace list).
- Specify the interval (note that this can easily be changed later).
- If more than one D-INPEFA curve is required, check the box and specify the number of curves.
- EITHER you create an X number of INPEFA duplicates on the full interval range.
- OR you subdivide the INPEFA curve into a specified number of curves. The curves will be equally subdivided within the given interval range.
- Check the box **Create a total log** for the given range, if you wish.
- The colour and name of the INPEFA curves are automatically assigned but they can be edited in the dialog box. CycloLog uses a default colour set and name for the different INPEFA curves.
- To change the default colour set, go to the menu bar: **Tools → Colour Set**.
- Click **OK**.
- The INPEFA curves are saved to the workspace.

*The following picture shows INPEFA curves calculated for the entire data set, and for short sub-intervals of the data set.*



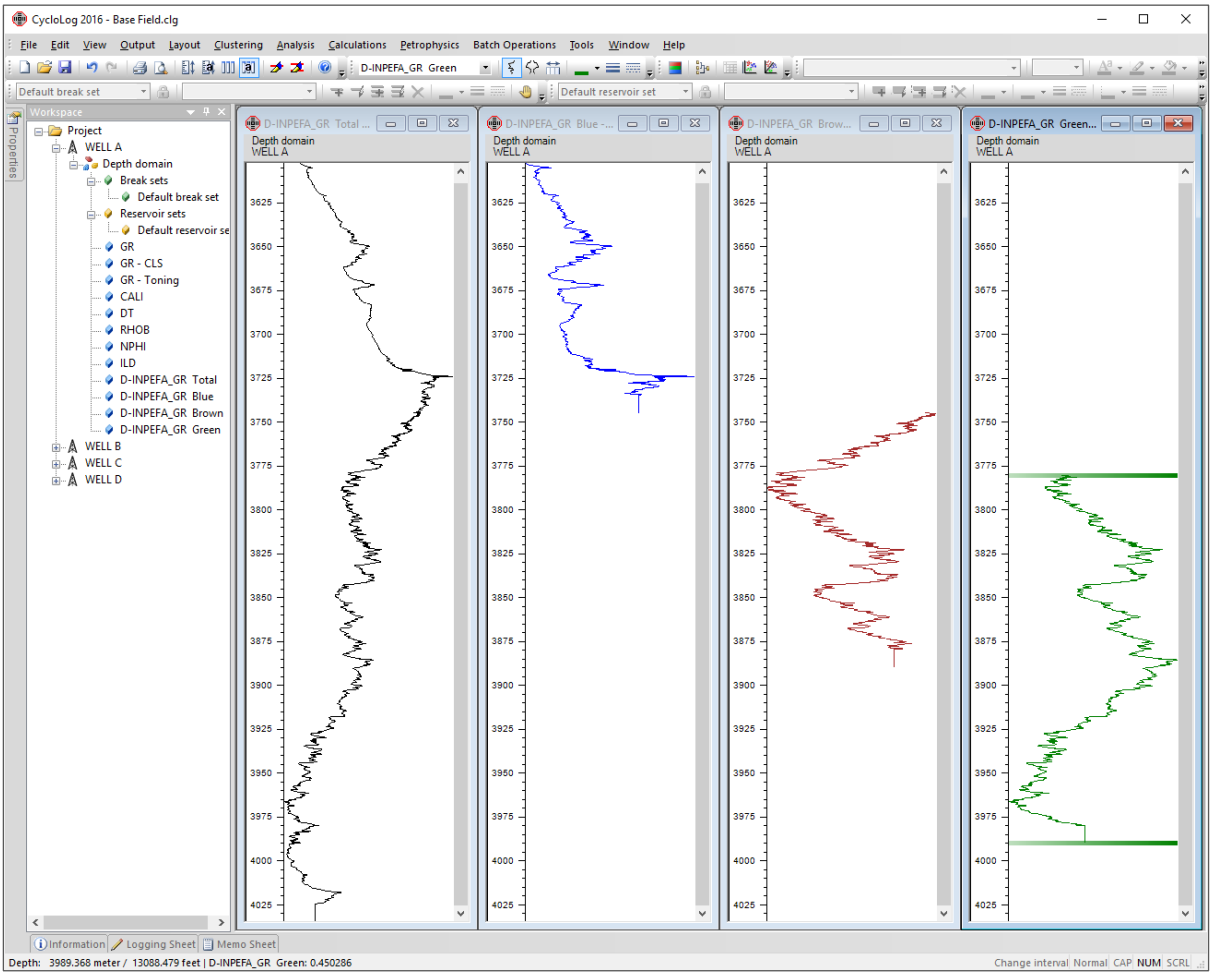
To change the interval over which a D-INPEFA curve is calculated:

- Right-click over the curve.
- Select **Move D-INPEFA**.

*Horizontal bands appear at the top and base of the selected curve; when the cursor is placed on the band it will change to a hand.*

- Click one of the horizontal bands and drag it up or down.
- The D-INPEFA is re-calculated while dragging the bands.

*The picture below shows the green D-INPEFA curve in the process of being modified:*



## 3.4 Overlaying multiple D-INPEFA curves in one column

When creating several D-INPEFA curves for non-overlapping or partially overlapping intervals of the same well, it is very useful to display them in a composite well chart in a single column, thereby also saving window space.

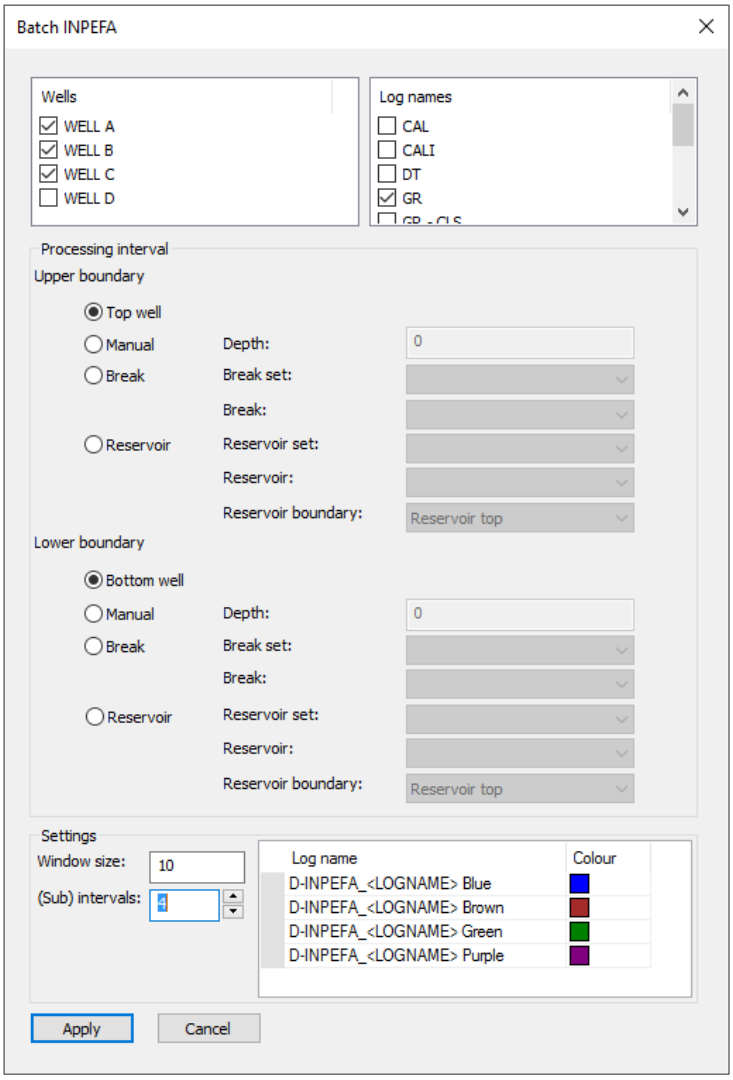
When the D-INPEFA curve is displayed in a composite well chart (see Part 4 for how to make composite charts), right-mouse click over the chart and select: **Log Manager → Add log**, then select the D-INPEFA curve(s) to add to the D-INPEFA column in the chart (see part 4.10 for how to add logs to a column in a composite well chart).

## 3.5 Batch generation of Dynamic INPEFA curves

In CycloLog, D-INPEFA curves for more than one well can be generated. This operation is especially useful and time-saving when many wells are in a CycloLog project file which all require INPEFA curves.

To generate a batch of Dynamic INPEFA curves:

- On the main menu bar, go to **Batch Operations**.
- Select **INPEFA…**, the *Batch INPEFA* dialog box opens:

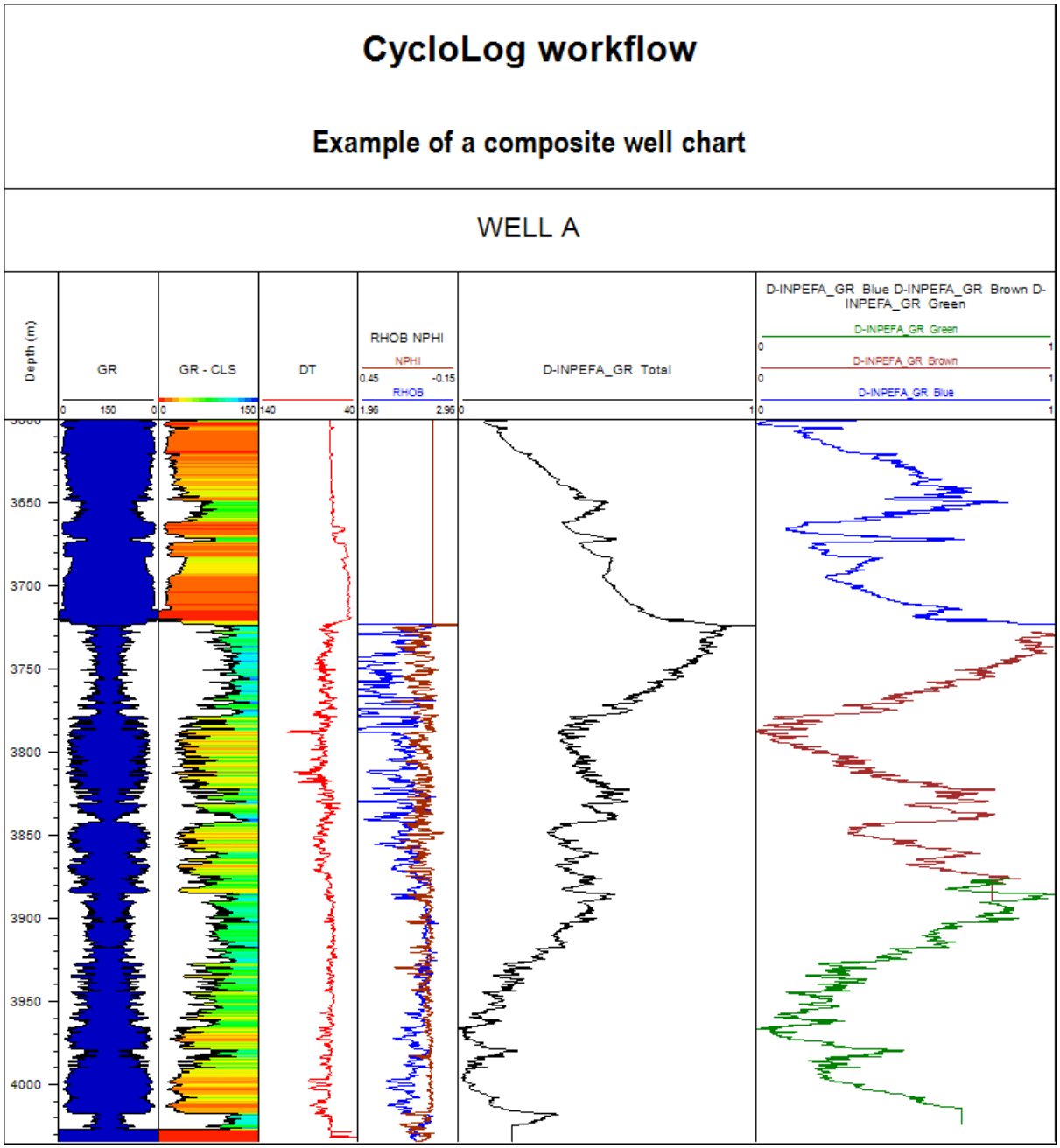



- Select the wells and then the logs for which INPEFA calculations are to be applied. All logs that are contained within the well selection will appear next to the *Wells* list in the *Log names* list.
- Define the processing interval. This interval can be specified by using the top and bottom of a well, depth values, breaks or reservoirs (see parts 5 and 6 for breaks and reservoirs).
- Define the window size. The default size is 10m / 30ft. Values below 3m or 10ft are not recommended for INPEFA calculation.
- Define the number of (Sub)interval. This is a user defined number of parts (sub-intervals) over which INPEFA's will be calculated.
- Click **Apply**. The INPEFA curves will be generated and automatically added to the workspace worksheet. **Cancel** closes the Batch INPEFA dialog box.

# Part 4 - Composite well charts

## 4.1 The composite well chart functionality in CycloLog

This section of the CycloLog tutorial describes the composite well chart as a working chart and as a graphic composition for reporting.

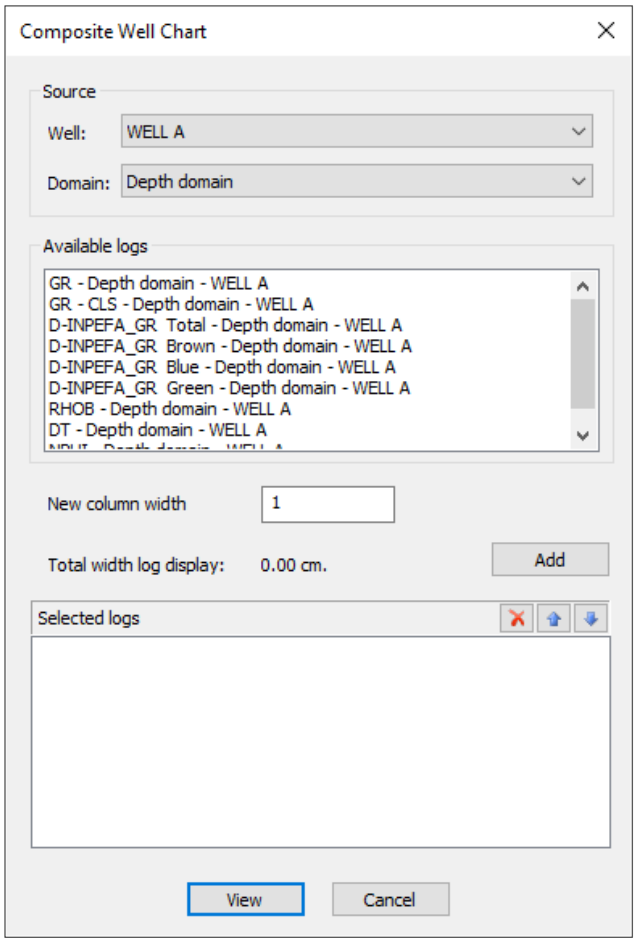


## 4.2 Preparing logs for a composite well chart

- Before including a log curve in a composite well chart, check that the properties of each curve are as you like them to appear in the chart (e.g., wiggle colour and style, horizontal scale, colour fill). Therefore, use the Properties toolbar. Note that the log properties can also be changed when the log is included in the composite well chart.
- Make overlays of logs that are to appear as overlays in the chart (e.g. NPHI/RHOB).
- Make as many as required INPEFA curves that are to be included.
- Note that in contrary to previous versions of CycloLog, it is not necessary to open the log panes prior to its insertion in a composite well chart.

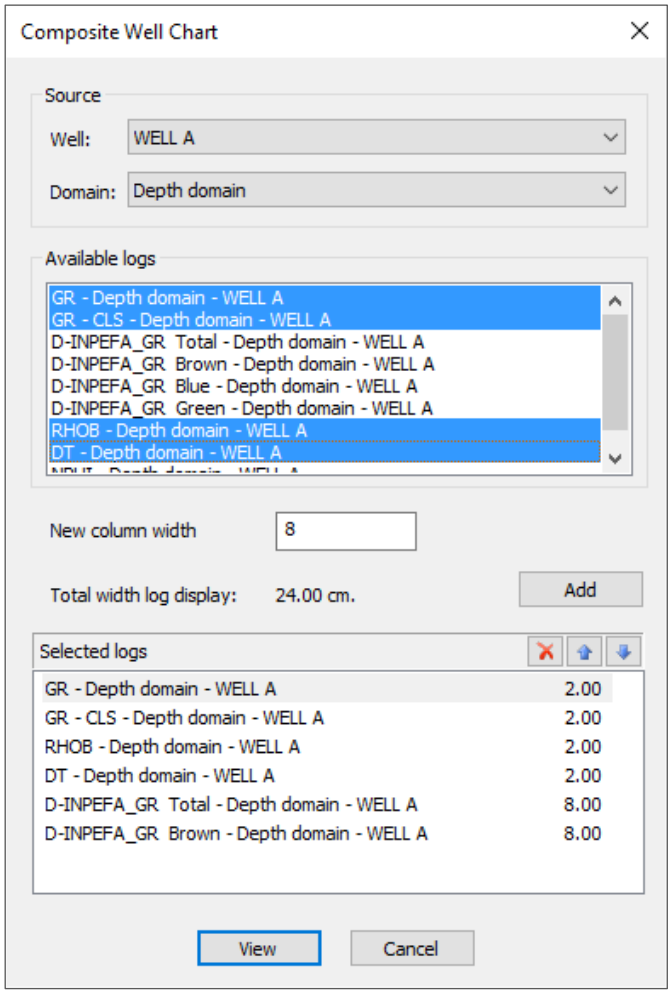
## 4.3 Creating the chart

- Now go to the main menu and select **Output → Composite Well Chart**.
- In the dialog box, check that the correct well is shown (if there is more than one in the project file).



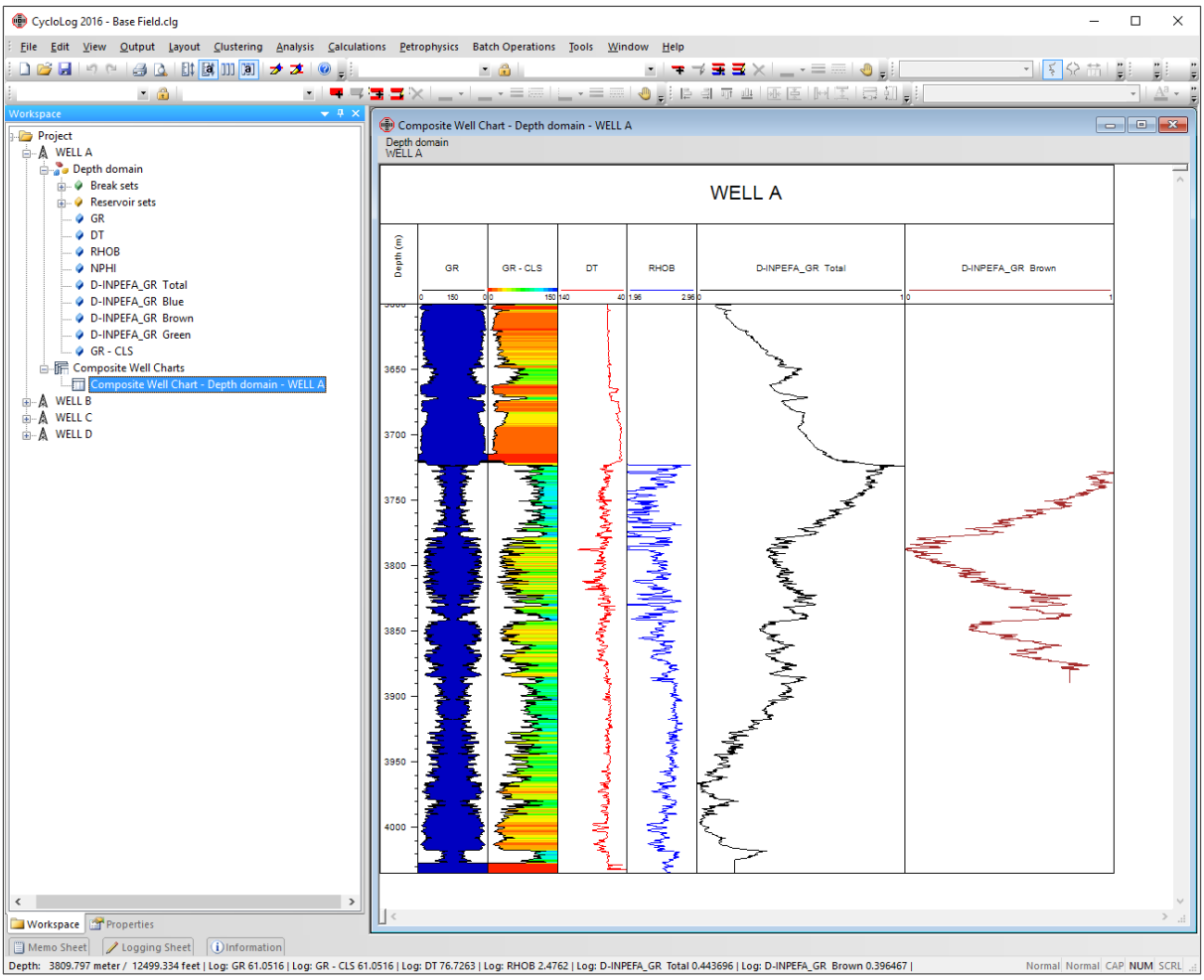
All logs can be selected from the list. Enter the column width. Note that this width will be applied to all selected logs.

- *It is advisable to give INPEFA curves a wider column (in the example below it is set at 8).*
- Click **Add**. The dialog box now shows the curves to be included in the composite well chart, with the width of the column assigned to each one.
- *If a wider column for the INPEFA curves is preferred, repeat the former action and enter a column width of 10. Click **Add**.*
- The blue arrows allow you to move the order of the log columns as to be displayed in the composite well chart. Note that the order can be changed in the chart later (see part 4.9).



## 4.4 Viewing the composite well chart

- Now click **View** and the composite well chart will be displayed.
- Note that the composite well chart has been added to the list in the workspace.
- To add NPHI for an overlay with the RHOB log, see part 4.10.
- To add more short D-INPEFA curves to the D-INPEFA_GR Brown log column, see also part 4.10.



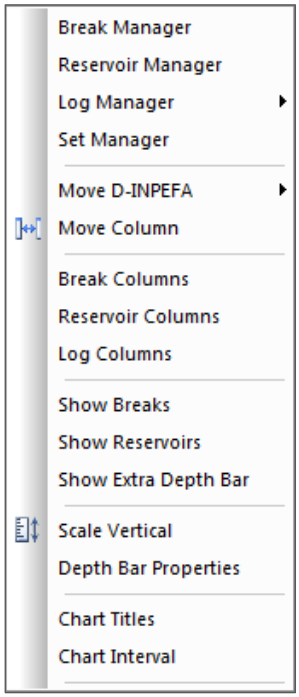
## 4.5 Modifying the composite well chart

Many aspects of the composite well chart can be modified. Some of the most commonly used aspects are described below:

- *Adding chart titles.*
- *Changing the scale and modifying the scale bar.*
- *Changing the chart interval.*
- *Changing the order of the columns.*
- *Adding and removing columns and logs.*
- *Using Dynamic INPEFA curves in the composite well chart.*
- *Changing column widths and column headers.*

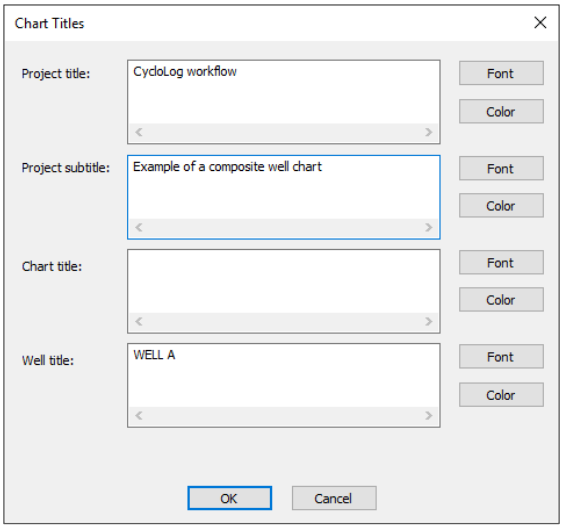
➢ Several of these functions are accessed through a special context menu.

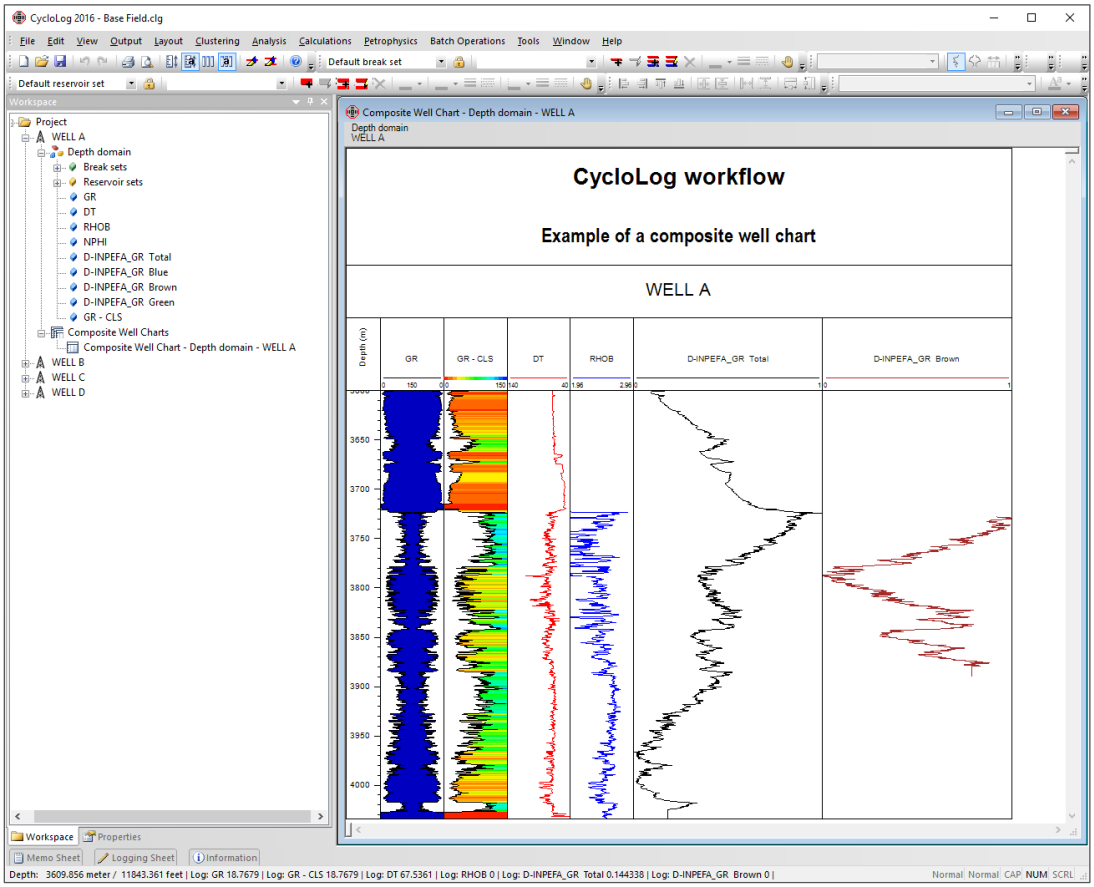
➢ Right-click over the composite well chart to access this menu:



## 4.6 Adding chart titles

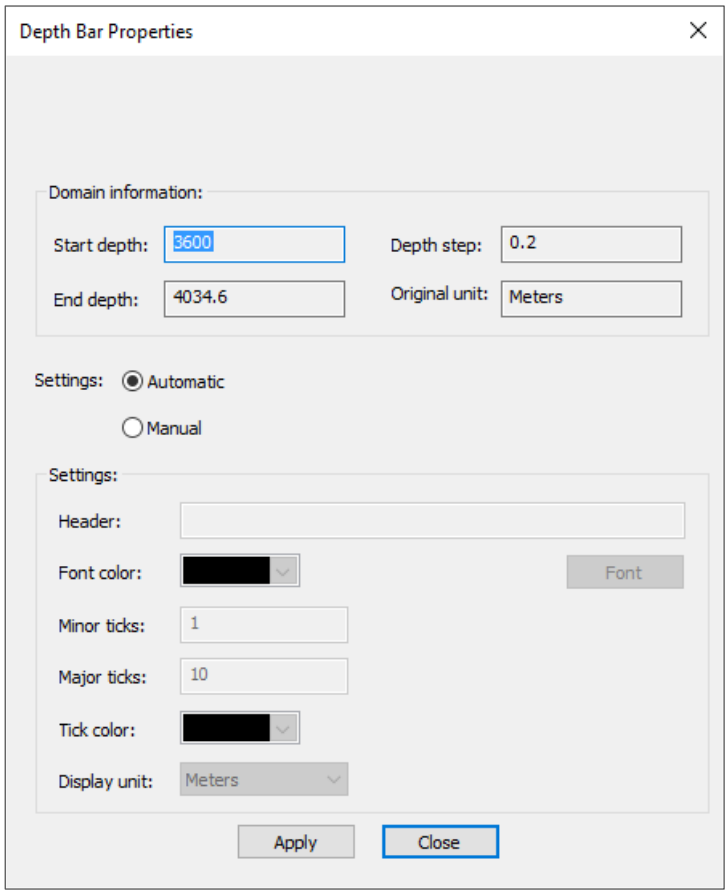
- By default, the composite well chart title is the name of the well.
- To change or add to the title, right-click over the chart for the menu.
- Select **Chart Titles**.
- Add titles, change the fonts and colours, as required.
- Click **OK**.



## 4.7 Changing the scale and modifying the scale bar

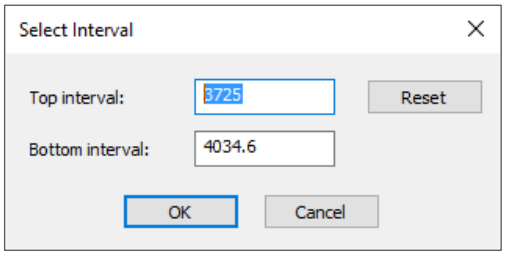
- By default, the **scale** of the composite well chart is the same as the logs that are in the workspace when you started making the chart.
- The **scale** of the composite well chart can be changed:
  - EITHER from the right-click menu (right-click over the chart and select **Scale Vertical**),
  - OR the vertical scale icon on the Standard Toolbar (see part 2.3),
  - OR by dragging the cursor up or down over the depth bar (hold down the left mouse button on the depth bar).
- To change the appearance of the **scale bar**, select **Depth Bar Properties** from the right-click menu or go to **Layout → Depth Bar Properties**.
- In the **Depth Bar Properties** dialog box, you can change the spacing of the major and minor ticks, and the font and colour of the scale and tick marks.
- Change "*Settings*" from **Automatic** to **Manual** to be able to make the desired changes.



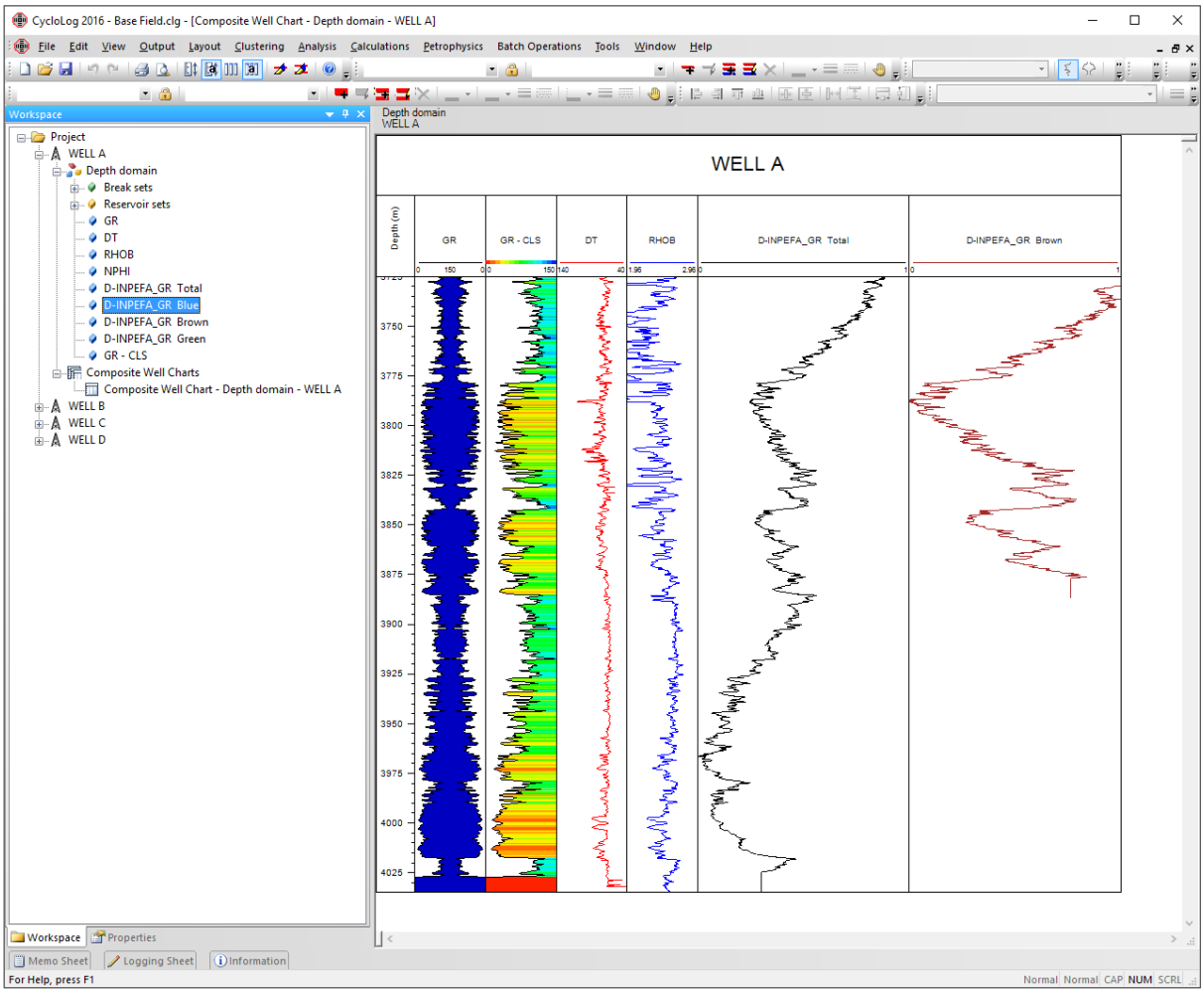
## 4.8 Changing the chart interval

If you do not wish to display the entire depth interval for the well:

- Select **Chart Interval** from the right-click menu or go to the main menu bar and select **Layout → Chart Interval.**
- In the *Select Interval* dialog box, enter the desired depths in **Top interval** and **Bottom interval** for the interval that you wish to display in the composite well chart.



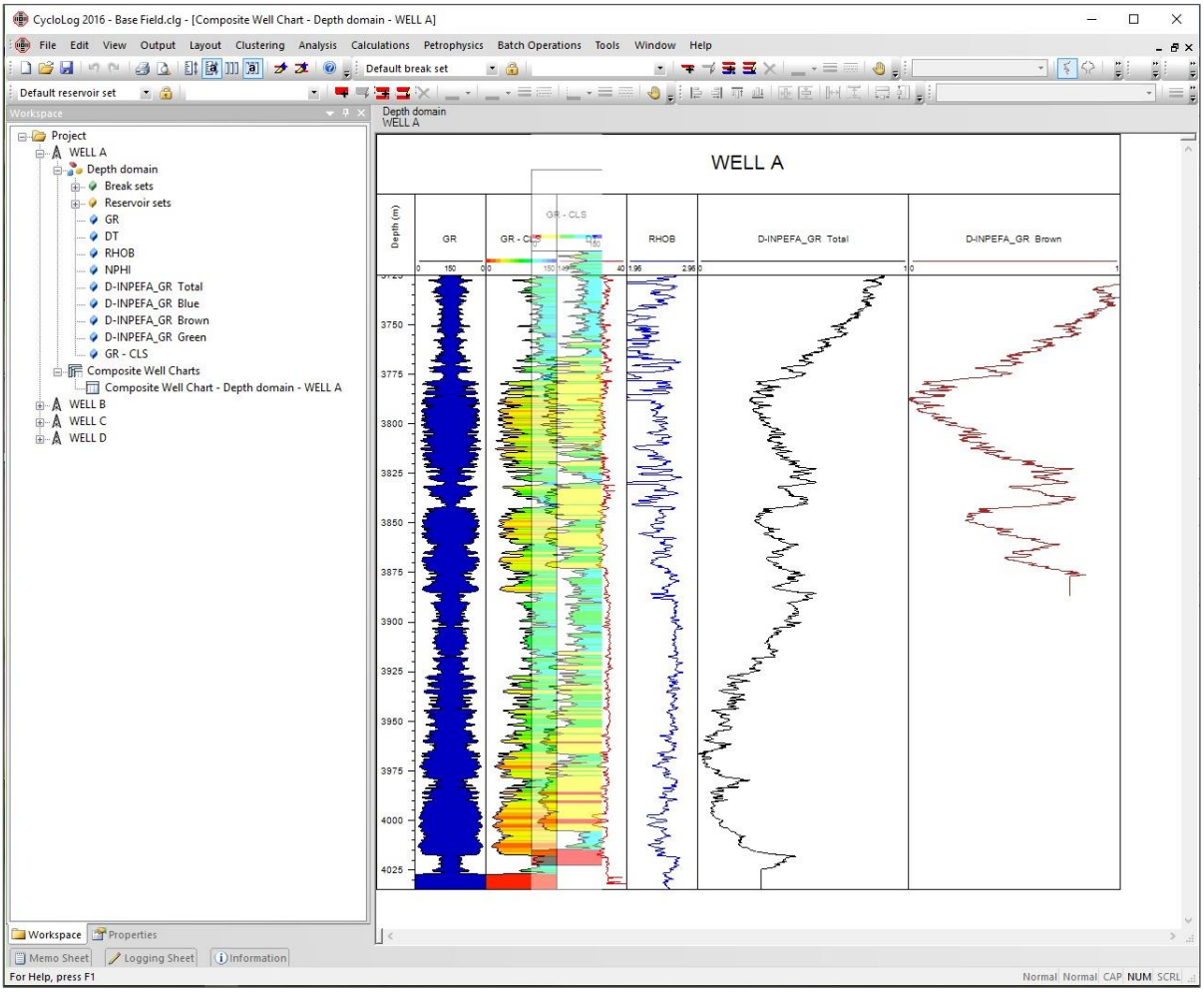

*In the following picture, the displayed interval has been restricted to exclude the interval of low quality data above 3725m (compare the previous pictures):*



## 4.9 Changing the order of the columns

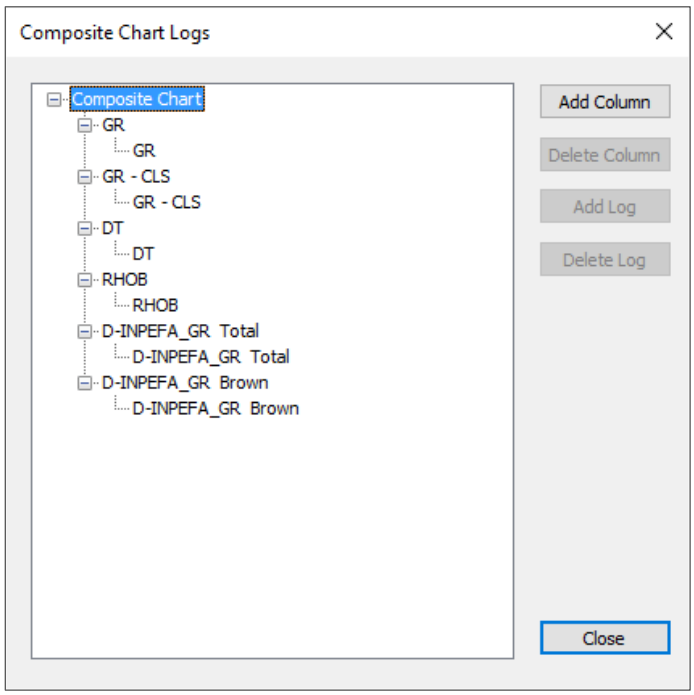
To change the order of the columns in a composite well chart:

- Right-click over the chart for the composite well chart menu.
- Select **Move Column**.
- Over the column to be moved, hold down the left mouse button, and drag the column to its new location.



## 4.10 Adding and removing columns and logs

- Right-click over the composite well chart to show the composite chart right-click menu.
- Select **Log Manager → Manage Composite Logs.**
- In the **Composite Chart Logs** dialog box, the *tree structure* shows the existing columns in the chart, and the logs present in each column.




To add a column:

- Click **Add Column**.
- In the **Add Column** dialog box, the names of the log panes for the specific well will appear.
- Select the required log, and specify the *Column width*.
- Click **OK**.

To delete a column:

- Click on the name of the column (e.g. **DT**).
- Click **Delete Column**.

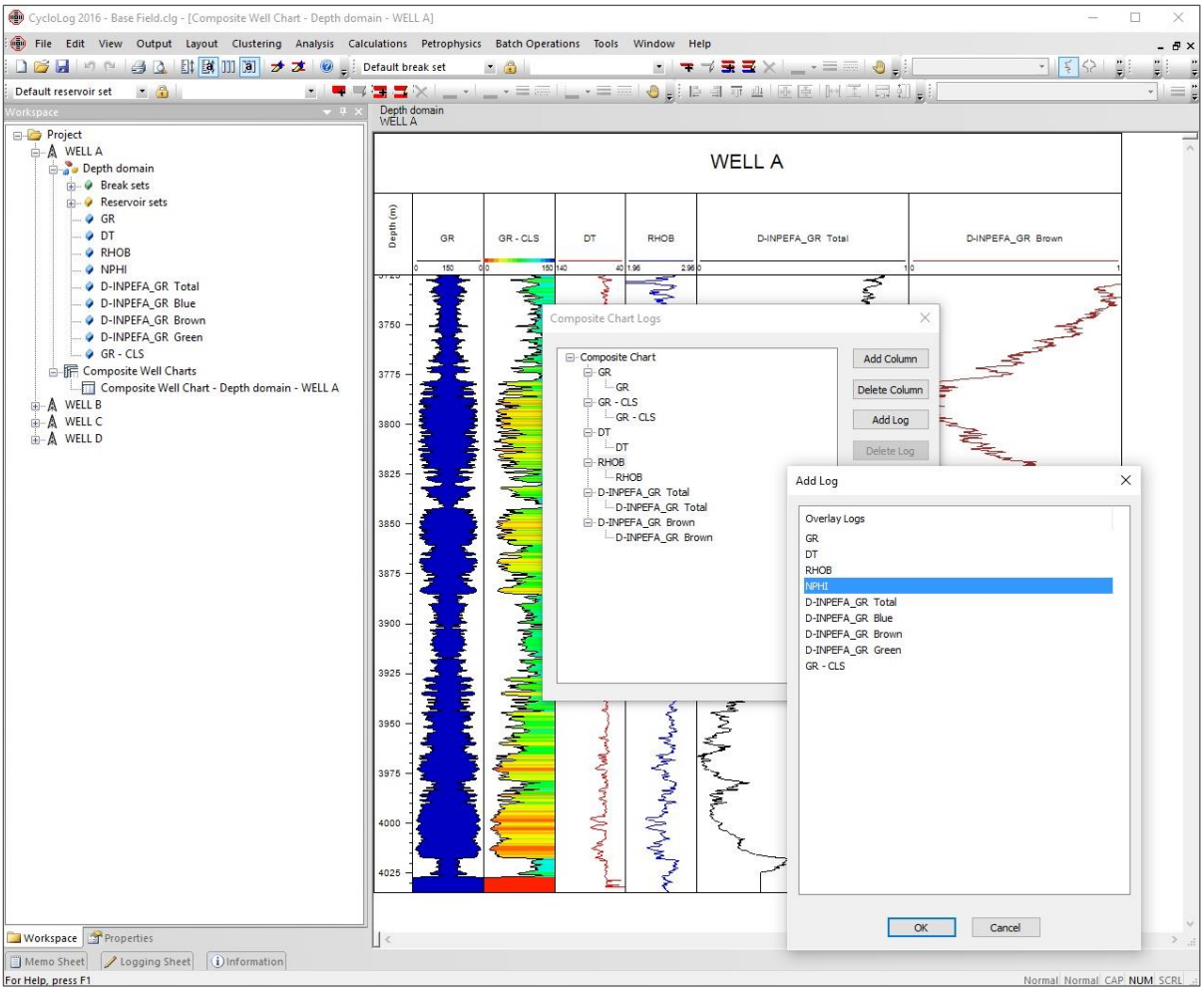
To delete a log from a column:

- Click on the name of the log to select it.
- Click **Delete Log**.

To add a log to a column:

- Click on the name of the column to select it.
- Click **Add Log.**
- A list of logs is displayed from which the desired log can be selected. Note that you can select more than one log.

*In the following picture, a log is added to an existing column in the composite well chart by selecting the log from the **Add Log** dialog box. In this case, the NPHI log.*




**NOTE**: Columns and logs can be directly added or deleted from the composite well chart.

To add a column and log directly to the composite well chart:

- On the composite well chart, right-click and select **Log Manager → Add Column.** An empty column is added to the chart.
- Right-click on the empty column and select **Log Manager → Add Log**; a list with all available logs in the well is displayed. Select the log(s). Note that you can select more than one log.

To delete a column or a log from a column:

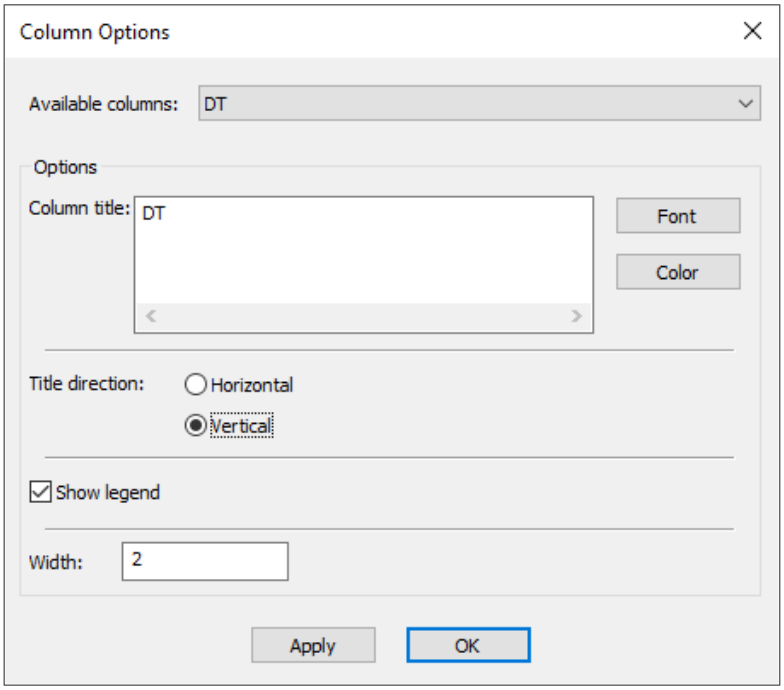
- On the composite well chart, right-click on the column you wish to delete, select **Log Manager → Delete Column** or **Delete Log**. In the latter case, a list with the displayed logs in the column appears. Select the log you wish to delete.

## 4.11 Changing column widths and headers

Column widths and headers can be edited in the **Log Columns** dialog box.

- Right-click over the composite well chart to open the composite chart menu.
- Select **Log Columns**; The *Column Options* dialog box opens.
- Select the column to be changed from the **Available columns** drop-down list.
- Use the **Column title** box to type in a new title for the column.
- The font and colour of the title can be changed; click on the **Font** and **Color** buttons.
- The orientation of the column title can be changed to vertical: click the **Vertical** button.
- The **legend**, below the column title (showing wiggle colour and minimum and maximum values) can be toggled off if required.
- The width of the column can be changed in the **Width** box.
- Click **Apply** after making changes to each log.

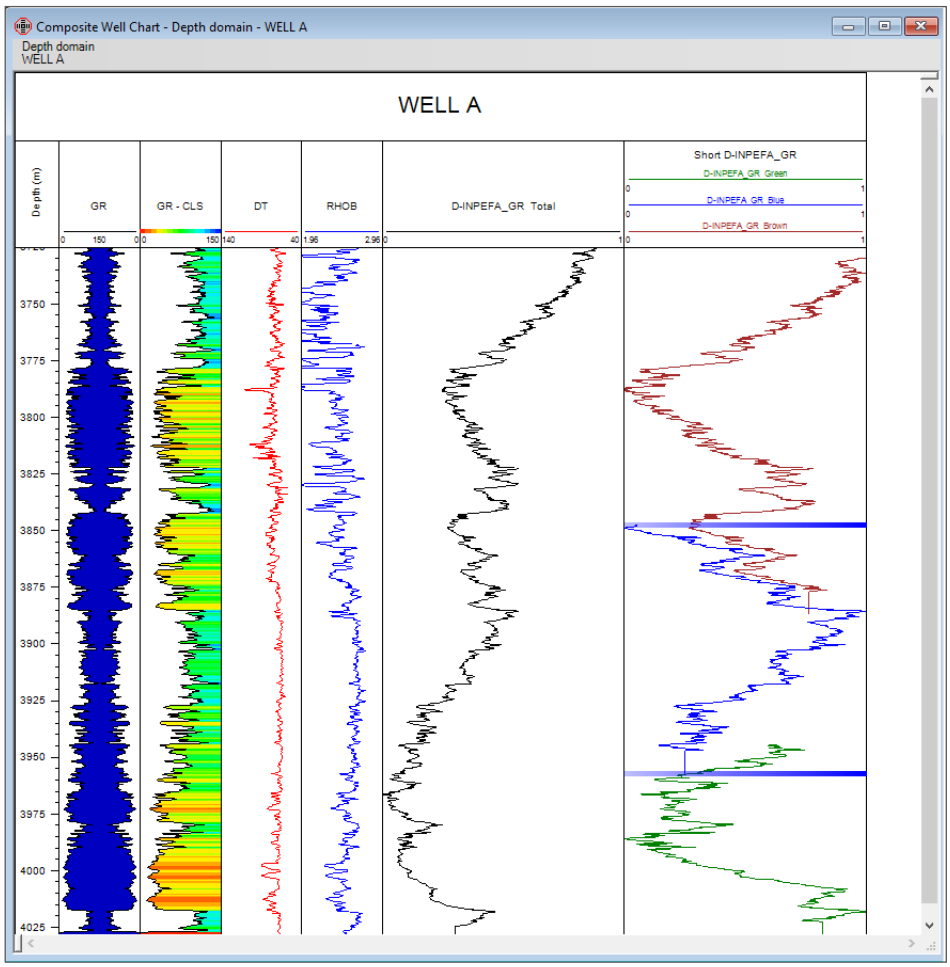
**NOTE:** The width of the individual columns can be adjusted manually in a composite well chart. Therefore, move the cursor over a column border; a double-sided arrow will appear. Hold the right mouse button when the arrow appears and pull the column border to change its width.



## 4.12 Using Dynamic INPEFA curves in the composite well chart

*Dynamic INPEFA curves can be added to a composite well chart, with the advantage that they remain interactive.*

*In the picture below, more D-INPEFA_GR curves have been added to the column D-INPEFA_GR Brown in the composite well chart (see previous pages). Therefore, the right-click menu* **Log Manager → Add Log** *has been used to add the D-INPEFA logs to the column in the composite well chart. The new column has been re-named* **Short D-INPEFA_GR**.




The depth interval over which each individual INPEFA is calculated can be changed:

- Right-click over the column in which the short D-INPEFAs are shown.
- Click on **Move D-INPEFA**.
- From the list of D-INPEFAs in the column, select the one to be moved.
- Coloured bands appear at the top and bottom of the selected D-INPEFA curve.
- Click and drag these bands to the new positions.
- From the right-click menu, go to **Move D-INPEFA** again, and deselect the log (or select another to be changed).

## 4.13 Template composite well chart

The template functionality in CycloLog enables the user to quickly and efficiently generate one or more composite well charts using an existing composite chart as a template. The logs in a template chart are matched to logs in the target well(s) and as soon as a match is found all layout properties of the template chart are cloned (i.e., replicated) to the other target wells, creating new composite well charts for these wells.

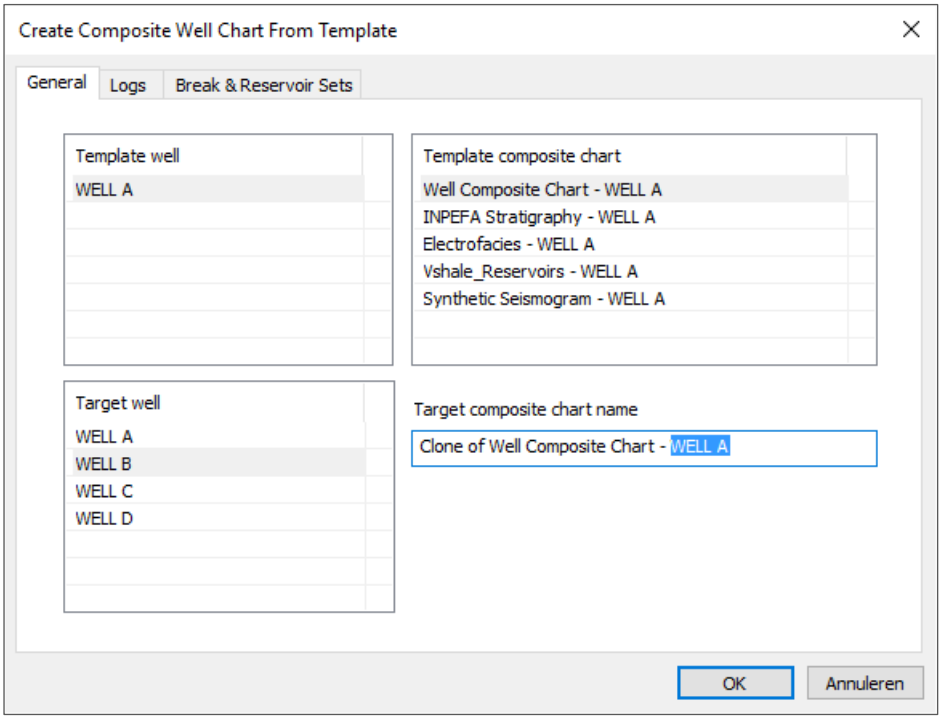
Generating composite well charts from a template can be done two ways:

1- Single composite well chart from Template
2- Batch composite well charts from Template

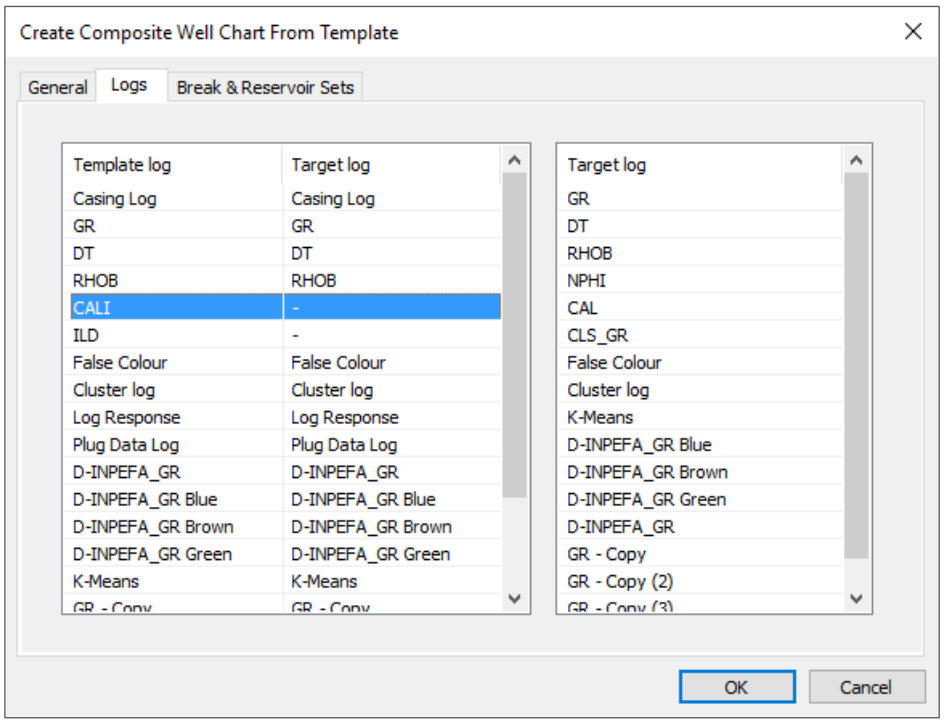
### *4.13.1 Single composite well chart from Template*

This functionality is especially useful when the user only has a few wells with many different logs, or when the user prefers to use different template layouts for different wells.

- Make sure that you have made a composite well chart (see parts above), which you would like to use as a template for another well.
- Select from the main menu bar: **Output → Composite Well Chart From Template**.
- The following dialog window opens:

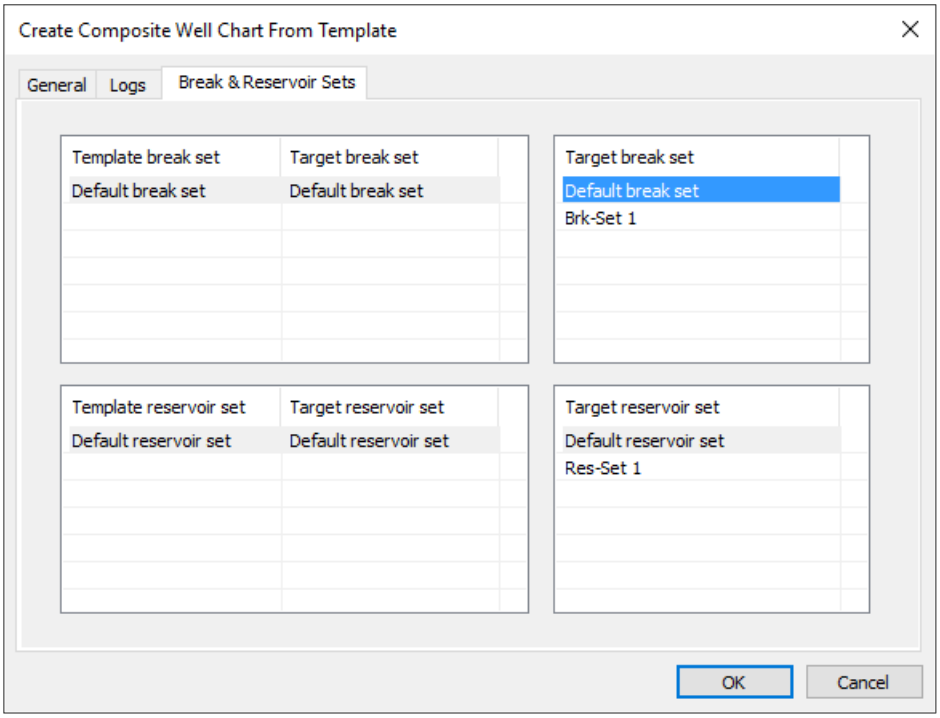


- In the **General** tab, you can define the template and target wells.
  - In the **Template well** field, the wells are listed that contain composite well charts. In the example above, only WELL A has composite charts. These charts are listed in the **Template composite chart** field.
  - Select from the **Template composite chart** field the chart that you wish to use as template. In the example above, *Well Composite Chart* has been selected.
  - Choose the **Target well** which you wish to clone from the selected template. In the Example above WELL B has been selected.
  - In the **Target composite chart name** field, you can change the name of the composite chart for WELL B. By default, when you select a chart from the **Template composite chart** field, the name of the selected chart with the prefix *Cone of* will be added in the name field.
- Open the **Logs** tab:




  - Here you can see which target logs CycloLog could match, by name, to the available logs in the template well (the log name must be exact otherwise no match is made). The missing, i.e. non-matched, logs in the target well are kept empty. You can select an appropriate log from the **Target log** list on the right box that best matches the template log. In the example above, you can select CAL from the **Target log** box to match with CALI in the **Template log**.

- Open the Breaks & Reservoir Sets tab:




  - If you have defined break and/or reservoir sets in the template **and** the target well, CycloLog will automatically match the set name.
  - If there is no name match, you can select the appropriate set for the target chart from the **Target break set / Target reservoir set** list on the right side.

- Click **OK**.
- A new composite well chart for WELL B will open, which is also automatically saved to the **workspace**.

### *4.13.2 Batch composite well chart from Template*

The batch generation of composite well charts is very useful if you wish to generate composite well charts for as many wells as possible. An existing composite well chart is used as a template to create composite well charts for (all) other wells in the CycloLog project file. Creating multiple charts from a template is based on cloning this template whereby the logs in the template chart are matched to logs available in the target well. If a match is found, then all layout properties of the template are applied to the target log. See for more details Help manual in CycloLog (section 22.4).

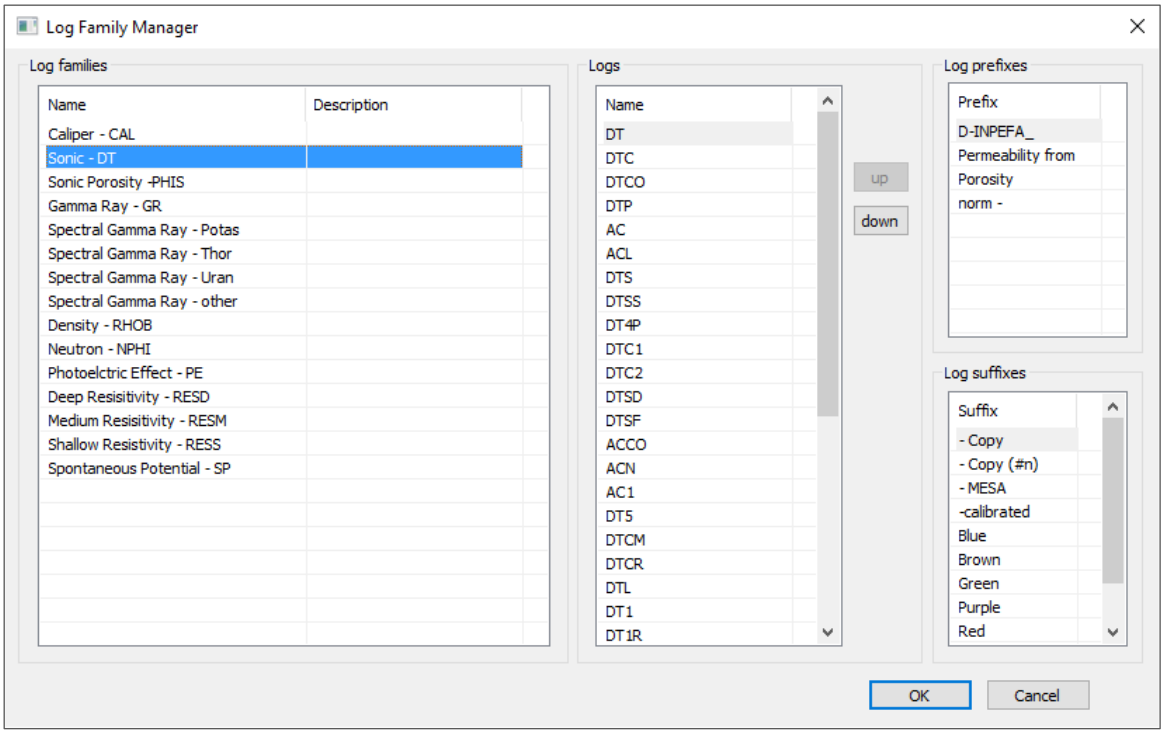
To create a batch of composite charts for multiple wells, the following two steps are essential:

**Step 1**: Log Family Manager: consists of a default list of log families, logs and/or affixes

**Step 2**: The Batch Composite Well Chart Template functionality

To start with **Step 1**:

- Select from the main menu bar: **Tools → Log Family Manager**.
- The **Log Family Manager** dialog window opens:




- In the **Log families** and the **Logs** field show default lists of log families and their related logs defined internally by ENRES and can be changed any time according to your preferences. In the **Log prefixes** and **Log suffixes** fields, a default list of these are shown and are based on CycloLog calculation functions that generate and automatically save newly calculated logs to

the workspace. if you have changed or added differently named prefixes or suffixes to the logs in the CycloLog workspace, that you can include them (to a certain degree) in the Log prefixes and suffixes list.

To edit the name of a log family:

- In the **Log families** field, double click on a log family in the **Name** column.
- A cursor will appear and you can modify the name of the log family.
- If you wish to add a description to your log family, double click in the box next to the log family of interest, in the **Description** column.
- A cursor will appear and you can add or modify a description.
- Click **OK** to save.

To add a new log family:

- In the **Log families** field, double click on the first empty row in the **Name** column.
- A cursor will appear in the empty row and you can add the name of your new log family.
- You can add a description to this new log family by double clicking in the adjacent box, in the **Description** column.
- A cursor will appear and you can add a description of the new log family.
- Click **OK** to save.

To delete a log family:

- Click once on a name in the **Log families** list; the row will be selected.
- Press '*Delete'* on your PC keyboard.
- A message will appear asking whether you want to delete this Log family.
- Click **Yes** to Delete. Note that all the logs related to the deleted Log family are deleted too.
- Click on **No** to cancel the deletion.

To edit the name of a log:

- In the **Logs** field, double click on a log in the **Name** column.
- A cursor will appear and you can modify the name of the log.
- Click **OK** to save.

- Note that you also can change the order of the logs by clicking on the '**up'** and '**down'** buttons, situated next to the logs list. The order is important as the batch template algorithm will consider the highest ranked log as the most appropriate to replace a log with a different name in the target well. For example, if you have GR in your template composite well and SGR and GRS logs in your target well, then CycloLog will choose SGR to replace GR, because it is higher ranked than GRS in the default log list.
- Finally, you also can add a wildcard to a log. For example, you can add GR (#n) to the logs list. In this case if you have GR in your template well, and GR (5) and GR (7) in your target then CycloLog will match it with GR (5).

To add a new log:

- Make sure to select the log family to which you want to add a new log. If you wish to add a new log to a new log family, then first create a new log family (see above).
- Go to the **Logs** field, and double click on the first empty row under the **Name** column.
- A cursor will appear in the empty row and you can add the name of your new log. Note that you can add as many logs as you wish.
- Click **OK** to save

To delete a log:

- In the **Logs** field, click once on a log in the **Name** column.
- Press '*Delete'* on your PC keyboard; the log will be deleted directly.
- If you wish to undo this deletion, click on **Cancel** in the **Log Family Manager**.
- Then click **Yes.**

To edit a log prefix or suffix:

- In the **Logs prefix** (or **Logs suffix**) field, double click on a prefix (or suffix) you wish to edit.
- A cursor will appear and you can modify the name of the prefix (or suffix).
- Click **OK** to save.

To add a new log prefix or suffix:

- Make sure to activate the log family to which you want to add a new prefix (or suffix) by selecting it.
- Go to the **Logs prefixes** (or **Logs suffixes**) field and double click on the first empty row in the **Prefix** (or **Suffix**) list.

- A cursor will appear in the empty row and you can add the name of your new prefix (or suffix).
- Click **OK** to save.

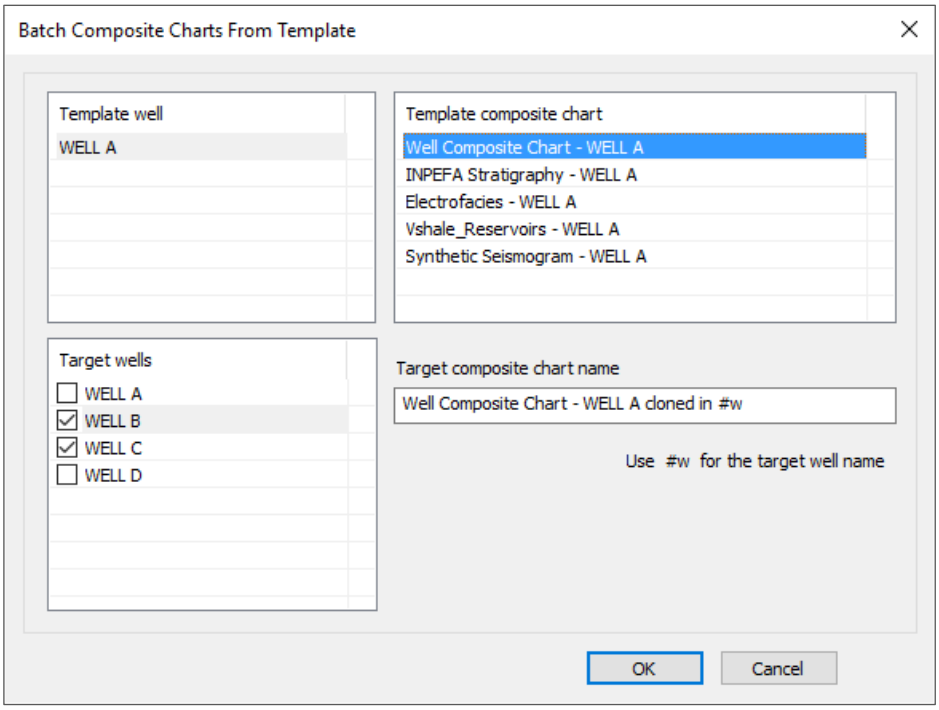
To delete a log prefix or suffix:

- In the **Logs prefixes** (or **Logs suffixes**) field, click once on a prefix (or suffix) you wish to delete.
- Press '*Delete*' on your PC keyboard.
- The prefix (or suffix) will be deleted directly.
- If you wish to undo this deletion, click on **Cancel** in the **Log Family Manager**.
- Then click **Yes**.

***The settings in the Log Family Manager are essential for a successful matching of logs and the generation of composite well charts. Therefore, if you substantially different logs than the default defined by ENRES, you should carefully consult the Help Manual in CycloLog.***

Continue now with **Step 2**:

- Select from the main menu bar: **Output → Batch Composite Well Charts From Template**.
- The **Batch Composite Charts From Template** dialog window opens:



- Select from the **Template well** list the well and subsequently select from the **Template composite chart** list the composite chart you wish to use as a template to generate composite charts for the other, target, wells. Note that no composite well charts will be listed in the Template well if you haven't generated any beforehand.
- Select the **Target wells** for which you want to have a composite well chart.
- In the **Target composite chart name** you can change the name of the target well charts. We advise you to keep the wildcard **#w** at the end of (or within) the text string so that the name of the target well is added to the chart name. This is especially convenient when distinguishing composite charts of the different wells in the workspace, or when charts are open in the main Data window.
- Click on **OK**.
- The logs and the layout of the template composite well chart will be cloned to the selected target wells and saved to the CycloLog **workspace**. Always check if the logs in the charts have been cloned properly especially if you have logs, prefixes or suffixes that are different than those in the standard (default) Log Family Manager lists.
- If you have added a break (and/or reservoir) column to your template composite well chart then this column and its related break (and/or reservoir) set, only will be cloned if the name of the break (and/or reservoir) set in the target well is exactly same as in the template well.

## 4.14 Exporting and printing composite well charts

A composite well chart can be printed directly from CycloLog, or exported as a graphics or PDF file.

To print:

- Use **File → Print Setup** and **File → Page Setup** to set the appropriate page and print parameters, then select **File → Print**.

To export the composite well chart as a graphic file:

- Go to **Output** in the menu bar, and select from the available formats: **Bitmap**, **GIF**, **JPG**, **PNG** or **TIFF**.

*To create a PDF file, see the Help manual in CycloLog.*

## 4.15 Deleting, duplicating and renaming composite well charts

To Delete, Duplicate or Rename a composite well chart:

- Right-click over the name of the composite well chart in the workspace.
- Select Delete, Duplicate, or Rename.

*NOTE: A composite well chart cannot be deleted from the workspace while it is open. Therefore, close the chart. A log that is included in one or more composite well charts can be deleted from the workspace; the log as well as the column will then be removed from the composite well chart.*

# Part 5 - Defining and managing breaks

## 5.1 Stratigraphic breaks in CycloLog

One of CycloLog's principal functionality is its stratigraphic application tool. Therefore, it has powerful features for defining and naming stratigraphically important surfaces in a well. In CycloLog, these surfaces are referred to as ***breaks***.

- Break depths can be defined and edited.
- The display characteristics of breaks can be edited.
- Breaks can be organised into break-sets.
- Sets of breaks can be imported and exported.

These functions are described in the paragraphs below.

## 5.2 Defining breaks

To define a break in CycloLog:

- Display a log, composite well chart or a well correlation panel (double-click its name in the workspace).
- Place the cursor at the depth where a break is to be defined.
- Hold down the CTRL key and left-click with the mouse.
- The break will appear as a horizontal red line.

## 5.3 Moving a break

Once defined as above, a break can be moved. To do this:

- Open the **Break Bar** (right-click over the toolbar area and select **Break Bar**), if it is not already open.
- Select the **Move Break** (hand) tool.
- Position the cursor over the break to be moved (cursor changes to a hand).
- Click and drag the break to the new position, and release the mouse button.
- If no more breaks are to be moved, de-select the **Move Break** tool on the Break Bar.

## 5.4 Deleting a break

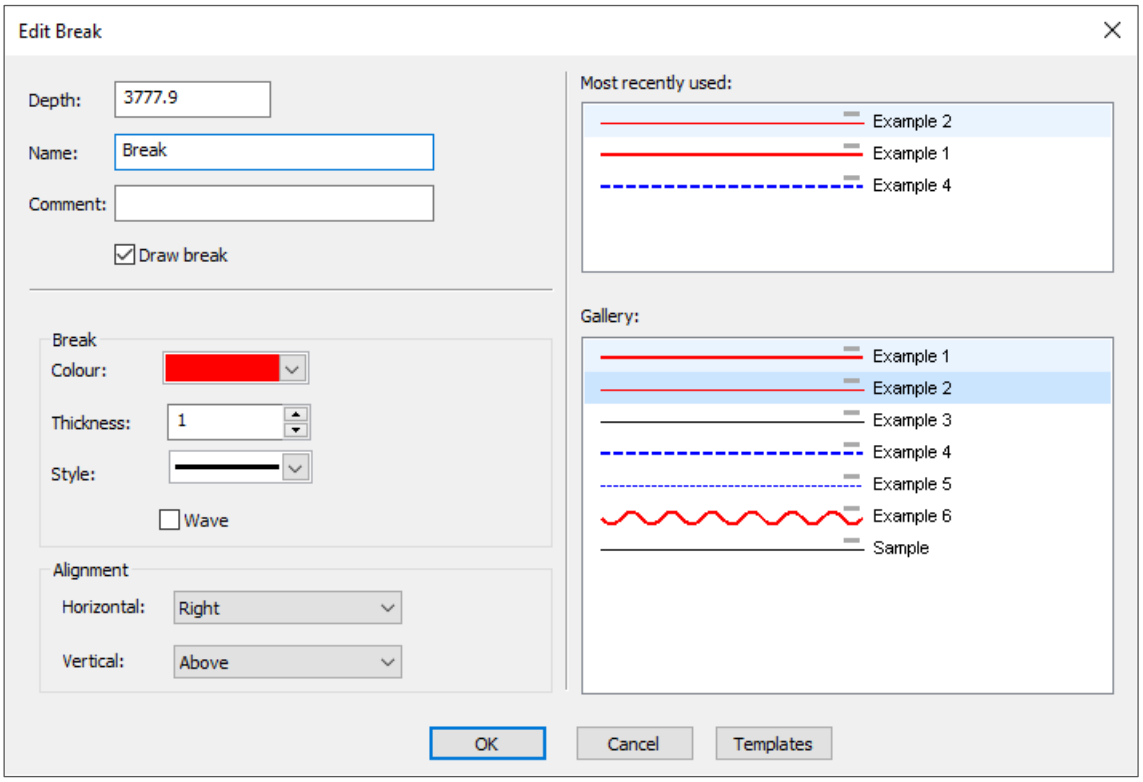
To delete a break:

- Position the cursor over the break to be deleted (cursor changes into a flash);
- Either, press the **Delete** key (on the key-board).
- Or, single click with the left mouse button on the break and then on the **Delete Break** icon (**X**) on the **Break Bar**.

## 5.5 Naming and editing breaks

To name a break, and to edit its properties:

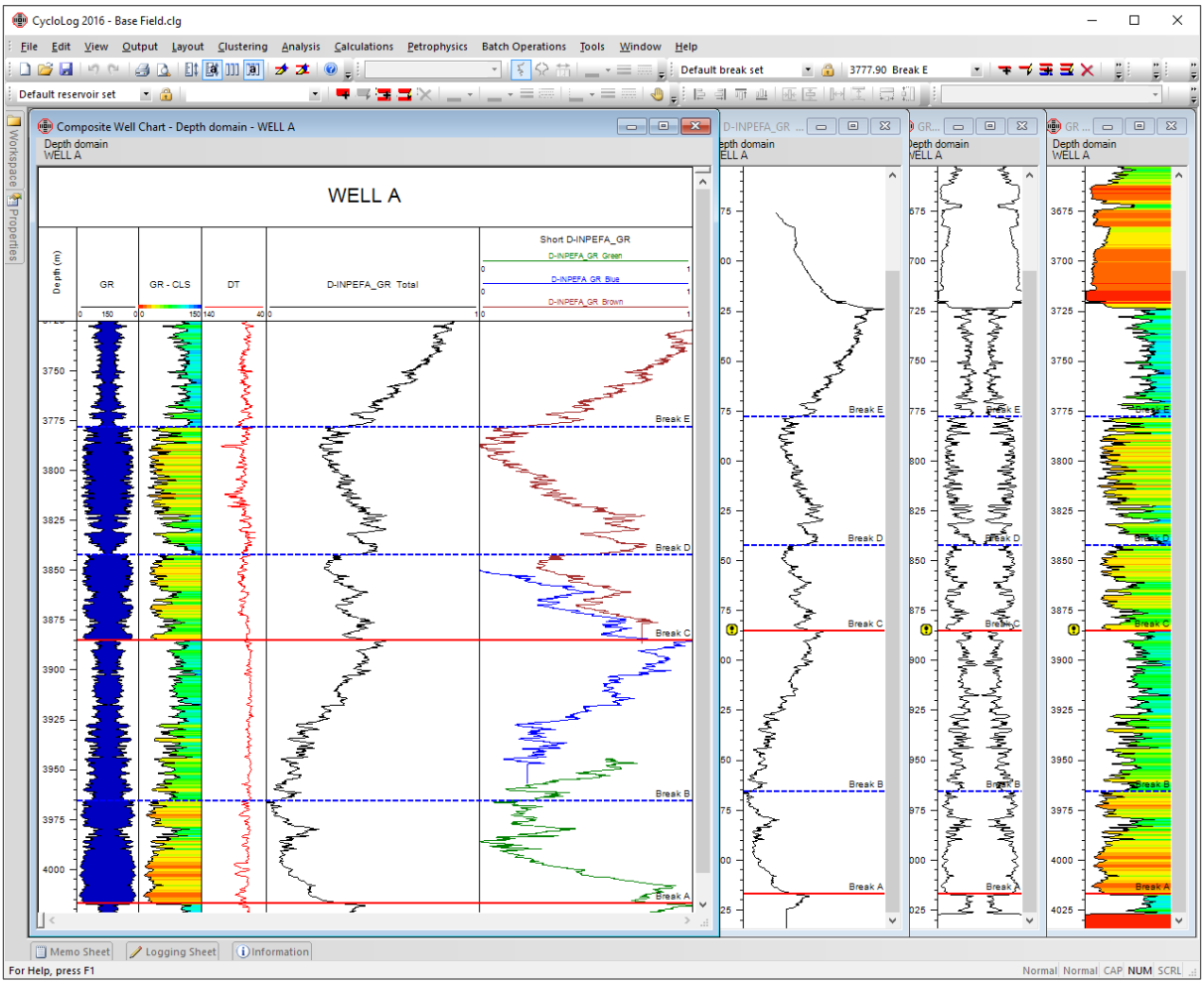
- Position the cursor over the break to be edited (cursor changes to a flash).
- Double-click with the left mouse button.
- The following dialog box opens:




- The **Depth** of the break is shown: it can be changed here if required.
- The break can be given a name: type it into the **Name** box.
  You can add a **Comment**. The existence of a Comment for *Break* is shown by the exclamation mark in the depth bar of the log pane or chart (see figure below).

- If the break is to be defined but not displayed, uncheck the **Draw break** box.
- The colour, thickness and line style of the break can be defined in the **Break colour, Thickness** and **Line Style** boxes, or you can pick a standard style from the **Gallery**, or use one from the **Most recently used** area.
- The **Alignment** of the break name (right, left or centred; above, over or under the break line) can also be defined.
- Click **OK** to save your changes.

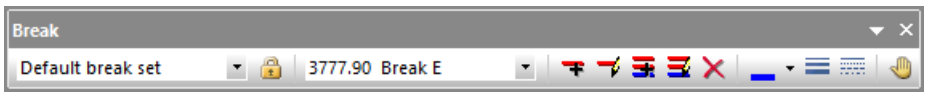
The result of naming and editing the properties of several breaks is shown below.



## 5.6 Editing break properties

The colour and line style of a break can also be edited using the **Break Toolbar**:

- Position the cursor over the break to be modified (cursor changes to a flash), and left click once, to select it.
- Note that the **Break Bar** now displays the identity (break set, depth, and name) of the selected break:




- On the Break Bar, use the **Break color**, **Break style**, and **Break thickness** drop-down lists to make your changes.

***NOTE: If more than one set of breaks has been defined (see* Break Manager*, below), interactive editing of breaks is much easier with* Lock Break Set *enabled, as follows:***

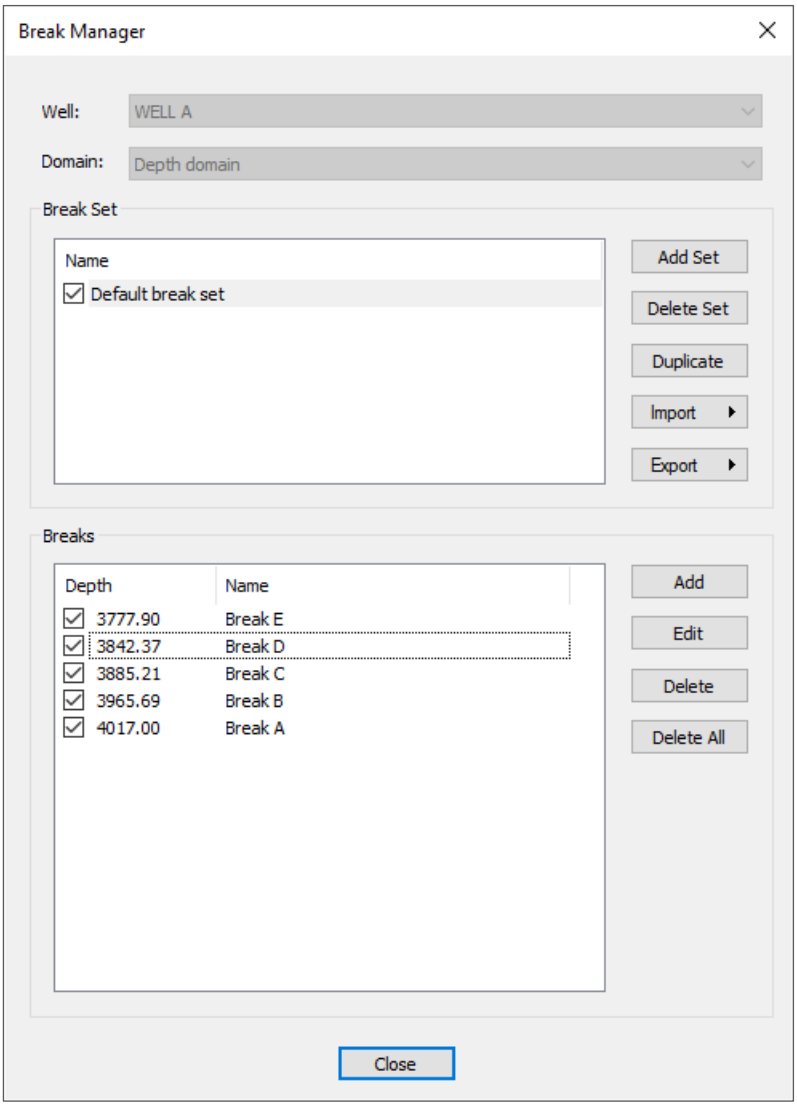
- On the **Break Bar**, use the drop-down list to select the relevant Break Set (the "Default break set" here is selected in the above figure), and click on the padlock icon.
- *Only breaks from that break set can now be selected.*
- Click **Lock Break Set** again when finished, or to select a different break set.

***NOTE: The Break Bar also has icons for adding and deleting breaks, and for adding and editing break sets.***

## 5.7 Using the Break Manager

Defining additional sets of breaks, importing and exporting breaks, and deleting breaks and sets of breaks are done through the **Break Manager**. To open the Break Manager:

- Click on the **Edit Breaks** icon on the Standard toolbar, or
- Select from the main menu **Edit → Edit Breaks**, or
- Right-click with the cursor over one of the log panes or charts and select **Break Manager**.




- (In case no log pane or composite well chart is open and the Break Manager is opened from the Standard toolbar or the main menu bar, first select the required well from the drop-down list at the top of the Break Manager dialog box).

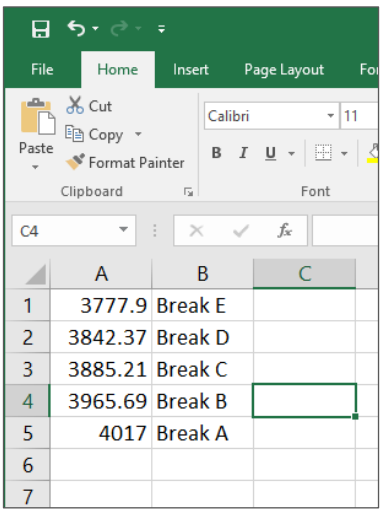
- The **Break Manager** will initially show one set of breaks – the **Default break set**. Any breaks defined so far will belong to this Default set.
- To rename the Default break set (or any other Break Set), slowly left-click twice over the set name in the Break Set list and type the new name (if you double-click too fast, there will be no response). Press the enter key or click outside of the selected area.
- To add another set of breaks, click **Add Set** and give the new set a name in the **Add break set** dialog box that appears. (You can also use **Duplicate** to make a copy of a complete set of breaks; this useful if you wish to subdivide a large break set.)
- To delete a set of breaks, select it and click **Delete Set**.
- You can also add, delete and edit breaks from the Break Manager.

## 5.8 Exporting breaks

A set of breaks can be exported in two ways; as an independent (*.brk) file, or via the Clipboard for import into another application.

To export a break set to (for example) a spreadsheet:

- Open the **Break Manager**.
- Select the Break Set to be exported.
- Click **Export**, then **Clipboard**.
- Open a spreadsheet application and paste the data into it: the figure below shows the break data from the previous figure pasted into an Excel spreadsheet.



A break set may also be exported as a formatted file. Two formats are available in CycloLog:

- **Break File** (*.brk), in which all of the break properties are preserved. This file can only be used as input for CycloLog.
- **Tabular File** (*.asc), in which only the break depth and break name are preserved, in the same (**Depth, Name**) format as shown in the spreadsheet above.

To export a break set to a file:

- Open the **Break Manager**.
- Select the Break Set to be exported.
- Click **Export** and select **File**.
- In the **Save As** dialog box, name the file and select the format, **Break File (*.brk)** or **Tabular File (*.asc)**, from the **Save as type** drop-down list.

## 5.9 Importing breaks

Break sets can be imported either from a file, or from the Clipboard. (For batch import of breaks and break sets see part on Advance Data Management in section 8.4).

To **import from a file** (which can be in either the Break File or Tabular File format):

- Open the **Break Manager**.
- **Either**, click on the Break Set to which the breaks are to be imported,
- **Or**, create a new, empty, break set (**Add Set**, then give it a name).
- Click **Import** and select **File**.
- Navigate to the file and click **Open**.
- The imported breaks will be added to the currently active Break Set.

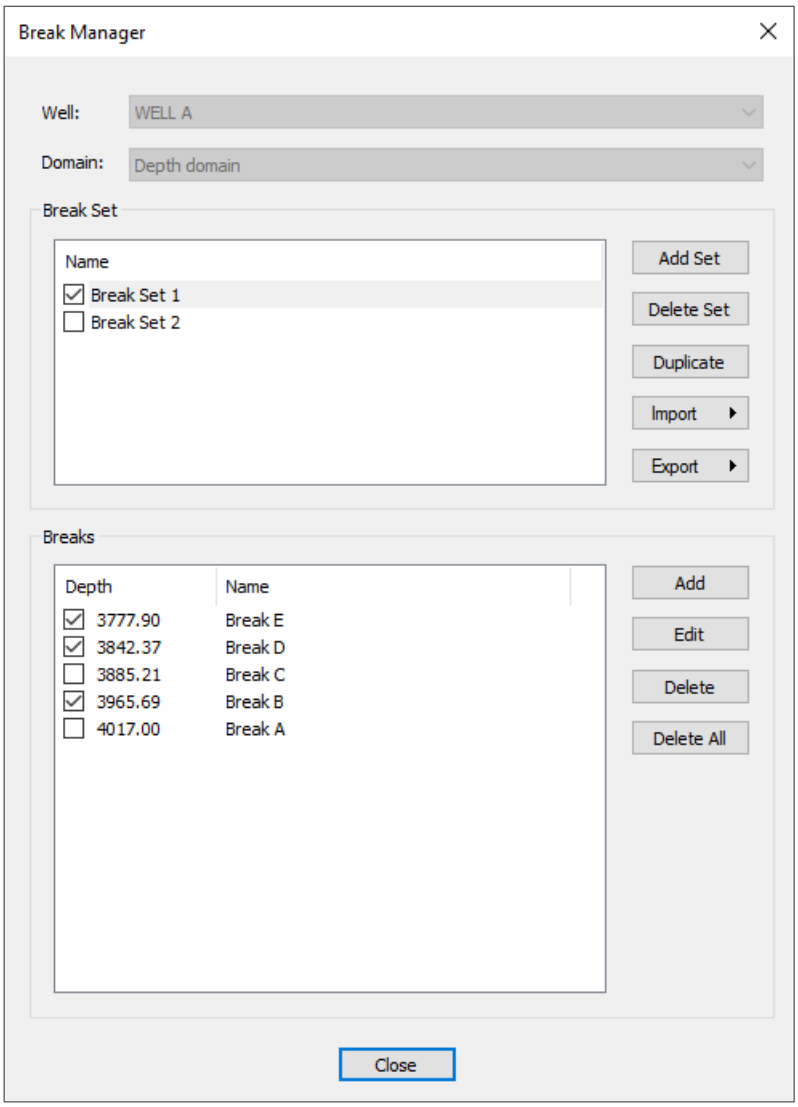
To **import from the Clipboard**:

- Make sure the break data are in the correct (**Depth, Name**) format, as in the spreadsheet example illustrated above.
- Select and copy the break data to be imported.
- Open the **Break Manager**.
- **Either**, click on the Break Set to which the breaks are to be imported,
- **Or**, create a new, empty, break set (**Add Set**, then give it a name).
- Click **Import** and select **Clipboard**.
- The imported breaks will be added to the currently active Break Set.

## 5.10 Displaying and hiding breaks

Break sets, and individual breaks, can be either displayed or hidden.

- Open the **Break Manager**.
- Use the check boxes to select which breaks and break sets are to be displayed. In the example below, only breaks B, D, and E from Break Set 1 will be displayed.

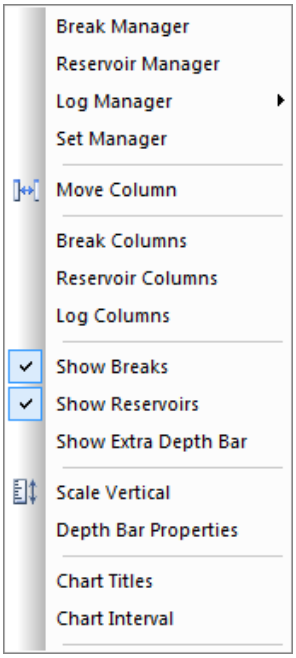



Alternatively, to hide an individual break, you can **edit** that break (double-click on it in the Log data pane or composite chart to open the **Edit Break** manager) and uncheck the **Draw Break** box.

## 5.11 Displaying breaks in composite well charts

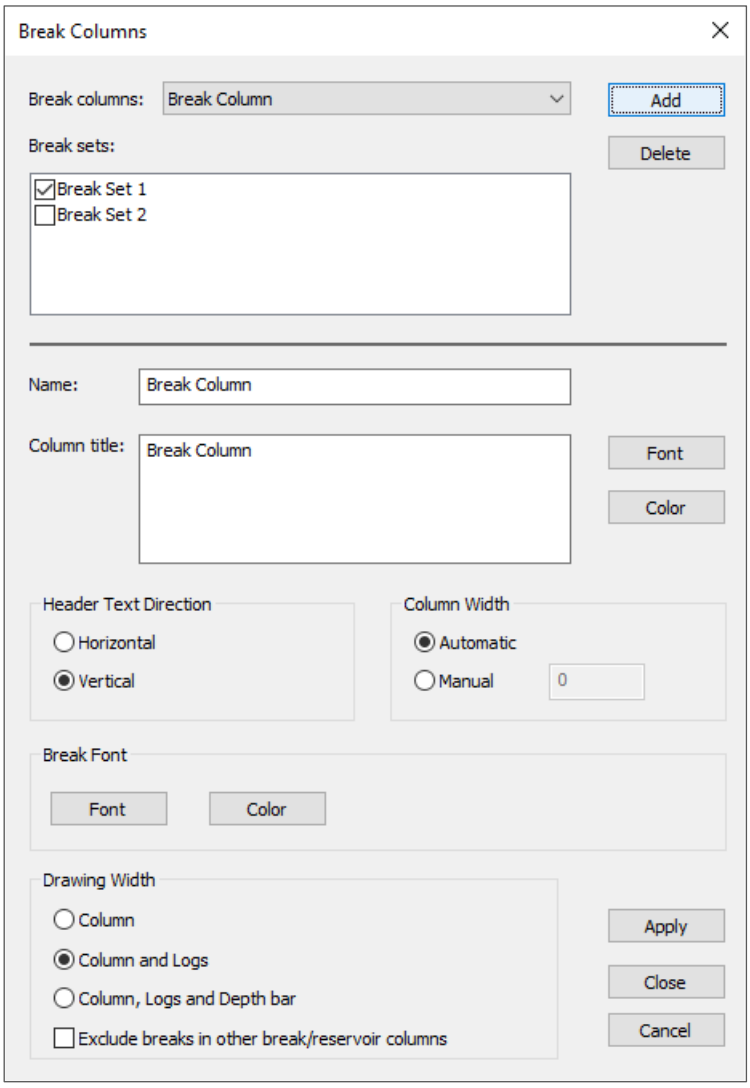
The basic construction of composite well charts was described in Part 4 of this tutorial. We now describe the steps needed to add break columns to a composite well chart, containing the stratigraphic breaks.

- Having made a composite well chart, make sure that **Show Breaks** is enabled in the right-click menu (right-click anywhere over the composite chart, either in a separate pane or in the composite well chart or correlation panel).



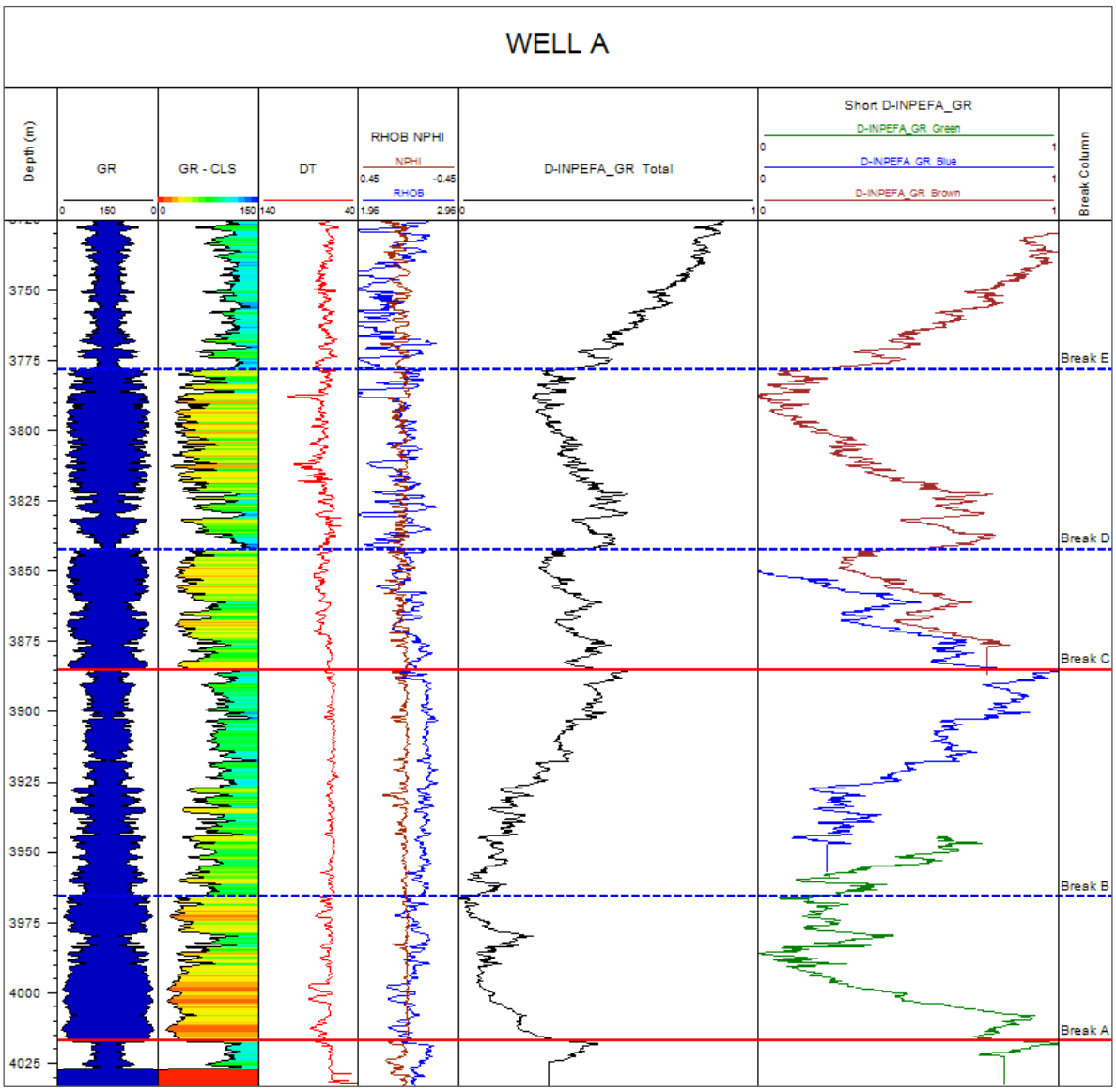
To create a break column in a composite well chart:

- Select **Break Columns** from the right-click menu (right-click anywhere over the composite chart) to open the **Break Column** dialog box.
- The input fields will be empty but after clicking on **Add** the dialog box looks like this:




  - On the **Break sets** list, check the break set(s) to appear in this column.
  - **Name** the break column. The **Column title** (the header for the column) is automatically named after the break column but it can be re-named.
  - The default values for the header font, colour, text direction and width can all be changed if required, as can the font and colour for the break labels.
  - Under **Drawing Width**, you can specify the horizontal extent of the break lines; also, whether or not these breaks are to appear in other break columns.
  - Click **Apply**, then go back to **Add** if you need to add another column.

The result of defining a break column for the Well A composite chart is shown below:



# Part 6 - Defining and managing reservoirs

## 6.1 Stratigraphic intervals in CycloLog

One of CycloLog's principal functionality is its stratigraphic application tool. Therefore, it has powerful features for defining and naming stratigraphically important surfaces in a well. In CycloLog, these surfaces are referred to as ***reservoirs***.

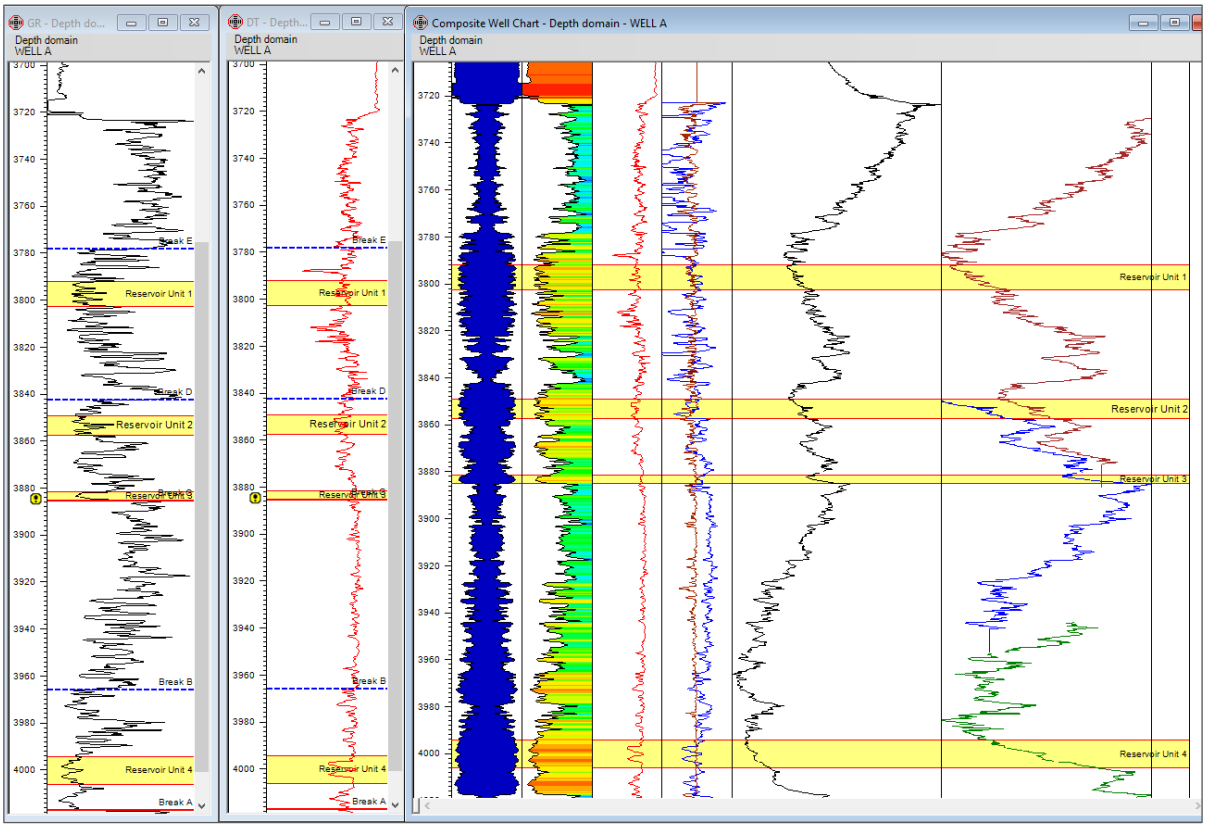
- Reservoir depth intervals can be defined and edited.
- The display characteristics of reservoirs can be edited.
- Reservoirs can be organized into reservoir-sets.
- Sets of reservoirs can be imported and exported.

These functions are described in the paragraphs below.

## 6.2 Defining reservoirs

To define a reservoir in CycloLog:

- Display a log, composite well chart or well correlation panel (double-click its name in the workspace).
- Place the cursor at the depth where a reservoir boundary is to be defined.
- Hold down the left-mouse button **and** the SHIFT key and drag to the other reservoir boundary with the mouse.
- The reservoir will appear as a yellow interval bounded by two horizontal red lines.




## 6.3 Moving a reservoir

Once defined as above, a reservoir may be moved. To do this:

- Open the **Reservoir Bar** (right-click over the toolbar area and select **Reservoir Bar**), if it is not already open:

- Select the **Move Reservoir** (hand) tool.
- Position the cursor over the reservoir boundary to be moved (the cursor changes to a hand).
- Click and drag the boundary to the new position, and release the mouse button.
- If no more reservoir boundaries are to be moved, deselect the **Move Reservoir** tool on the Reservoir Bar.

## 6.4 Deleting a reservoir

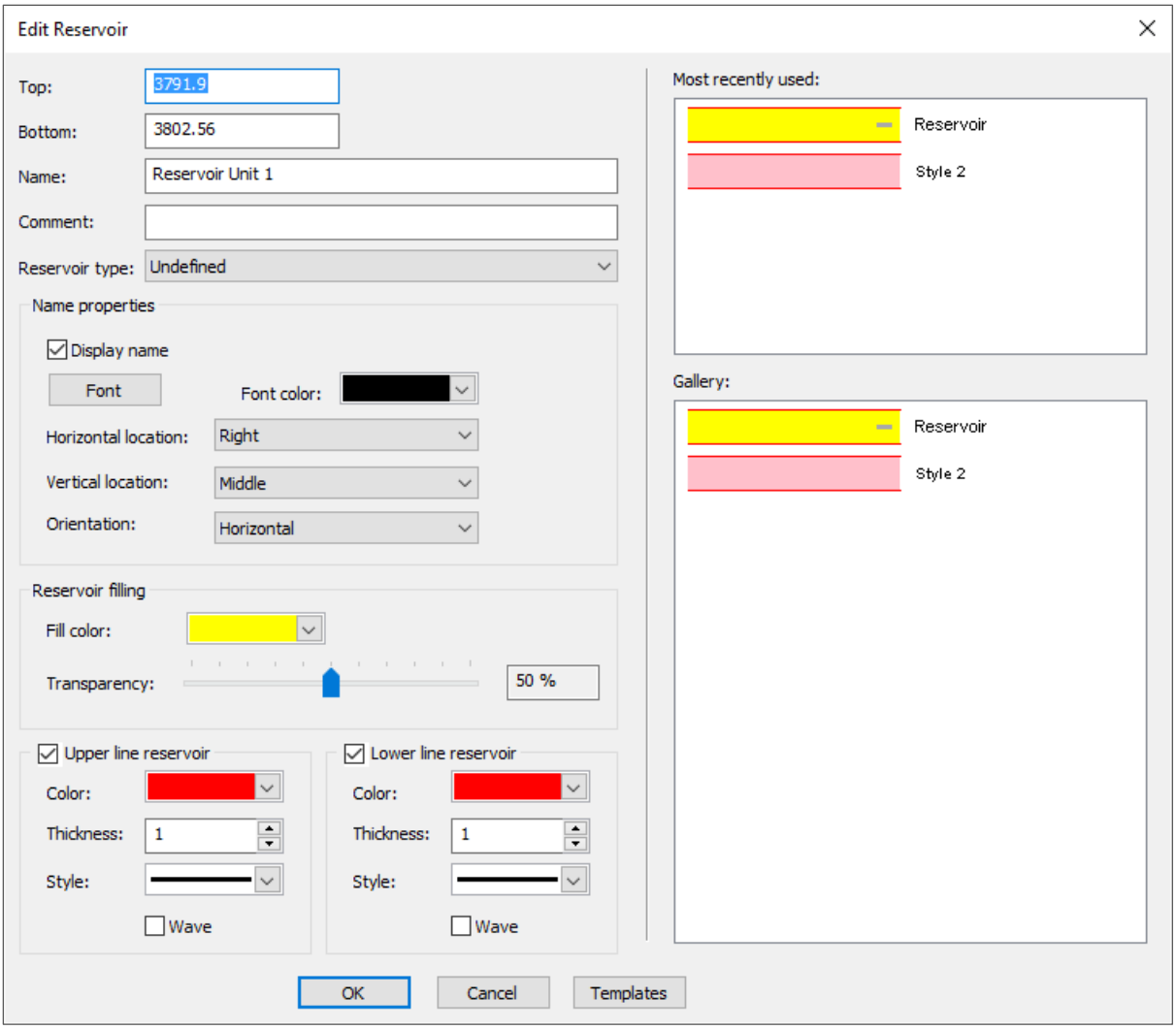
To delete a reservoir:

- Position the cursor over the reservoir to be deleted;
- Single click with the left mouse button on the reservoir and then on the **Delete Reservoir** icon (**X**) on the **Reservoir Bar**.

## 6.5 Naming and editing reservoirs

To name a reservoir, and to edit its properties:

- Position the cursor over the reservoir to be edited.
- Double-click with the left mouse button.
- The following **Edit Reservoir** dialog box opens



- The **Top** and **Bottom** depth of the reservoir interval is shown: it can be changed if required.
- The reservoir can be given a name: type it into the **Name** box.
- You also can add a **Comment**.
- The **Name properties** allows display and alignment of the reservoir name (left, centered, or right; top, middle or bottom of the reservoir interval).
- The colour, thickness and line style of the reservoir boundaries can be defined by checking the boxes for the upper or lower line, and change the C**olor, Thickness** and **Line Style**, or you can pick a standard style from the **Gallery**, or use one from the **Most recently used** area.
- Click **OK** to save your changes.

## 6.6 Editing reservoir properties

The color and line style of a reservoir boundary can also be edited using the **Reservoir Toolbar**:

- Position the cursor over the reservoir to be modified and left click once, to select it.
- Note that the **Reservoir Bar** now displays the identity (break set, depth, and name) of the selected reservoir:

- On the Reservoir Bar, use the **Reservoir top line color**, **Reservoir top line thickness**, and **Reservoir top line style** drop-down lists to make your changes to the top reservoir boundary. In the same way, a reservoir bottom boundary can be edited.

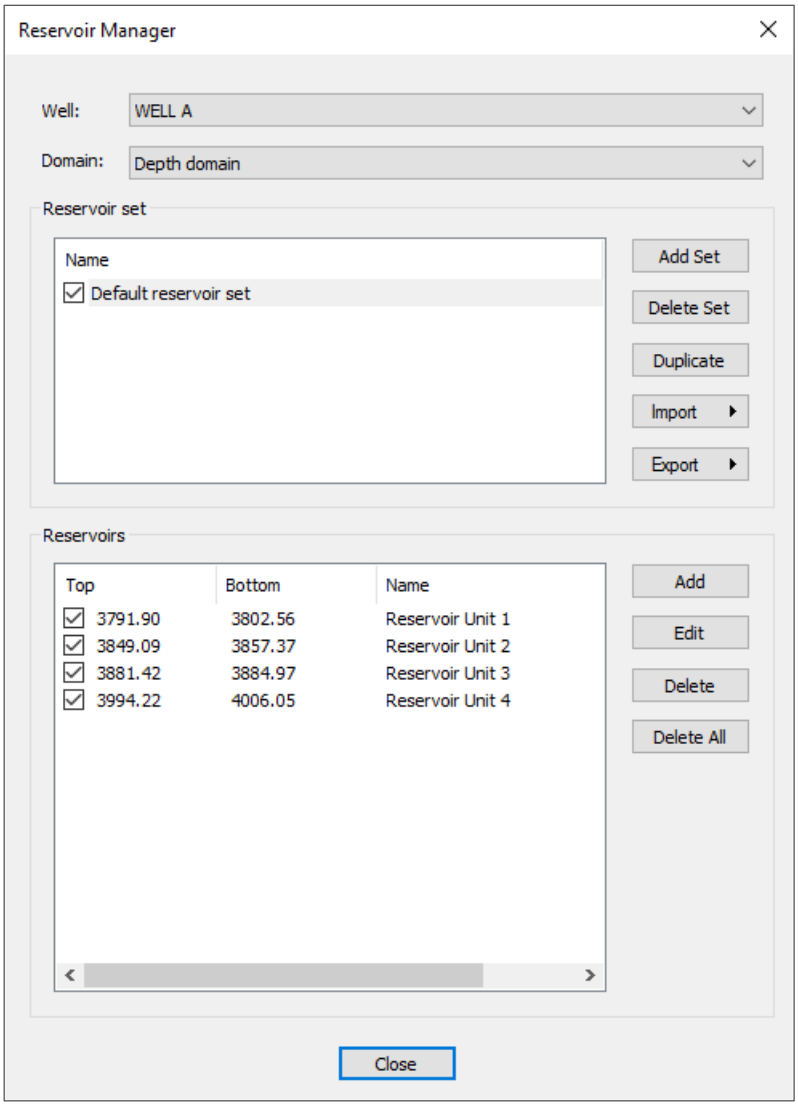
***NOTE: If more than one set of reservoirs has been defined (see* Reservoir Manager*, below), editing of reservoirs is much easier with* Lock Reservoir Set *enabled, as follows:***

- On the **Reservoir Bar**, use the drop-down list to select the relevant Reservoir Set (the "Default reservoir set" set is selected in the above figure), and click on the padlock icon.
- *Only reservoirs from that reservoir set can now be selected.*
- Click **Lock Reservoir Set** again when finished, or to select a different reservoir set.

***NOTE: The Reservoir Bar also has icons for adding and deleting reservoirs, and for adding and editing reservoir sets.***

## 6.7 Using the Reservoir Manager

Defining additional sets of reservoirs, importing and exporting reservoirs, and deleting reservoirs and sets of reservoirs are done through the **Reservoir Manager**. To open the Reservoir Manager, click on the **Edit Reservoirs** icon on the Standard Toolbar or main menu bar (**Edit → Edit Reservoirs**), or select **Reservoir Manager** by right-clicking with the cursor over one of the log panes or charts.




- (In case no Composite Chart is open and the Reservoir Manager is opened from the Standard toolbar or the main menu bar, first select the required well from the drop-down list at the top of the Reservoir Manager dialog box)
- The **Reservoir Manager** will initially show one set of reservoirs – the **Default reservoir set**. Any reservoirs defined so far will belong to this default set.

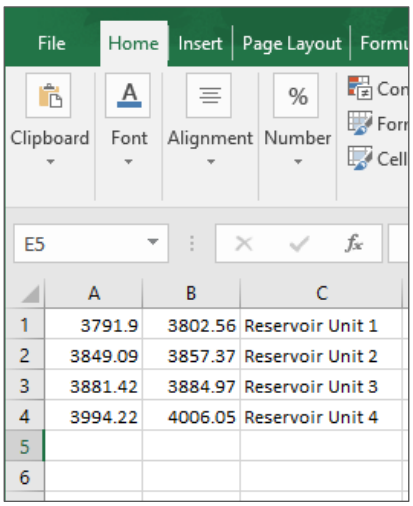
- To rename the Default reservoir set (or any other reservoir set), slowly left-click twice over it in the *Reservoir set* list and type the new name (if you double-click too fast, there will be no response). Press the enter key or click outside of the selected area.
- To add another set of reservoirs, click **Add Set** and give the new set a name in the **Add Reservoir Set** dialog box that appears. (You can also use **Duplicate** to make a copy of a complete set of reservoirs; useful if you wish to subdivide a large reservoir set.)
- To delete a set of reservoirs, select it and click **Delete Set**.
- You can also add, delete and edit reservoirs from the Reservoir Manager.

## 6.8 Exporting reservoirs

A set of reservoirs can be exported in two ways; as an ASCII file, or via the Clipboard for import into another application.

To export a reservoir set to (for example) a spreadsheet:

- Open the **Reservoir Manager.**
- Select the Reservoir set to be exported.
- Click **Export**, then **Clipboard**.
- Open the spreadsheet application and **Paste** the data into it: the figure below shows reservoir data pasted into an Excel spreadsheet.



## 6.9 Importing reservoirs

Reservoir sets can be imported either from a file, or via the Clipboard. (For batch import of reservoirs and reservoir sets see part on Advance Data Management in section 8.4).

To **import from a file**:

- Open the **Reservoir Manager**.
- **Either**, click on the Reservoir Set to which the reservoirs are to be imported;
- **Or**, create a new, empty, reservoir set (**Add Set**, then give it a name).
- Click **Import** and select **File**.
- Navigate to the file and click **Open**.
- The imported reservoirs will be added to the currently active Reservoir Set.

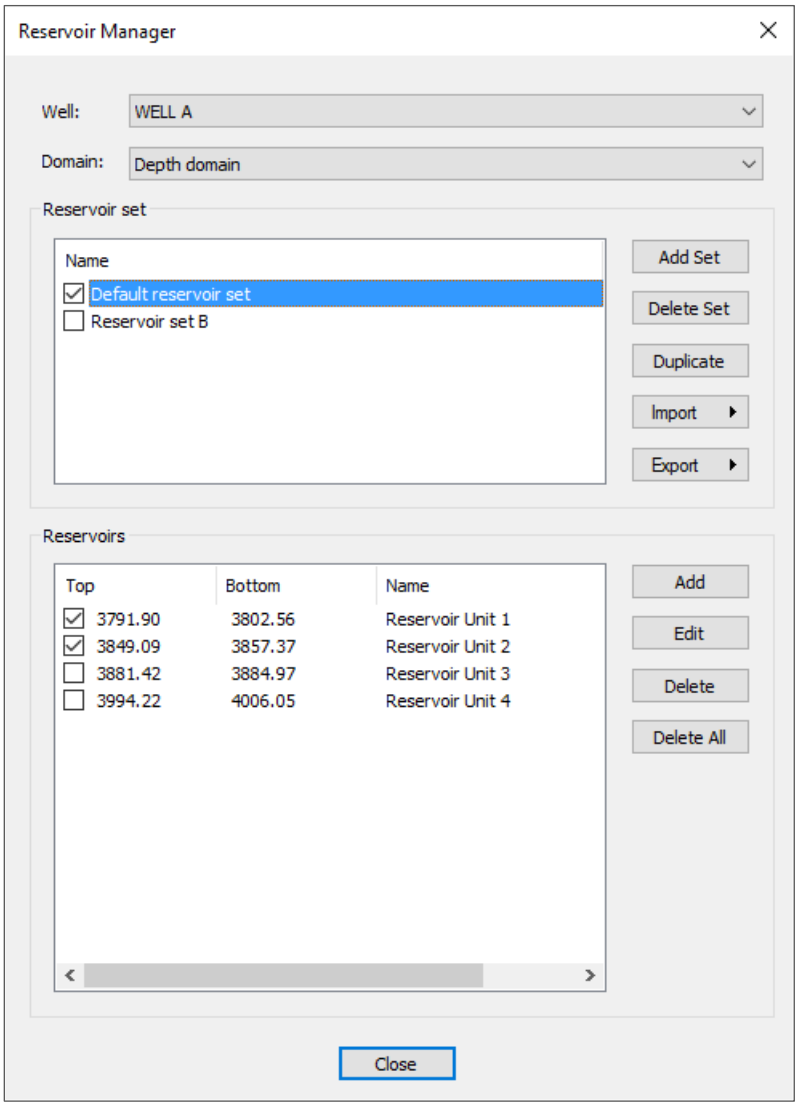
To **import via the Clipboard**:

- Make sure the reservoir data are in the correct (**Top depth, Bottom depth, Name**) format, as in the spreadsheet example illustrated above.
- Select and copy the reservoir data to be imported.
- Open the **Reservoir Manager**.
- **Either**, click on the Reservoir Set to which the reservoirs are to be imported;
- **Or**, create a new, empty, reservoir set (**Add Set**, then give it a name).
- Click **Import** and select **Clipboard**.
- The imported reservoirs will be added to the currently active Reservoir Set.

## 6.10 Displaying and hiding reservoirs

Reservoir sets, and individual reservoirs, can be either displayed or hidden.

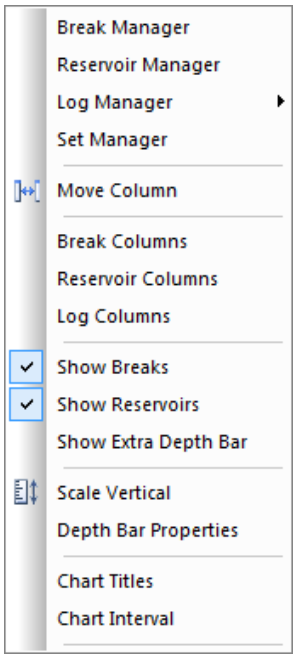
- Open the **Reservoir Manager**.
- Use the check boxes to select which reservoirs and reservoir sets are to be displayed. In the example below, only Default reservoir set is being displayed, and within this set only Reservoir units 1 and 2.



## 6.11 Displaying reservoirs in composite well charts

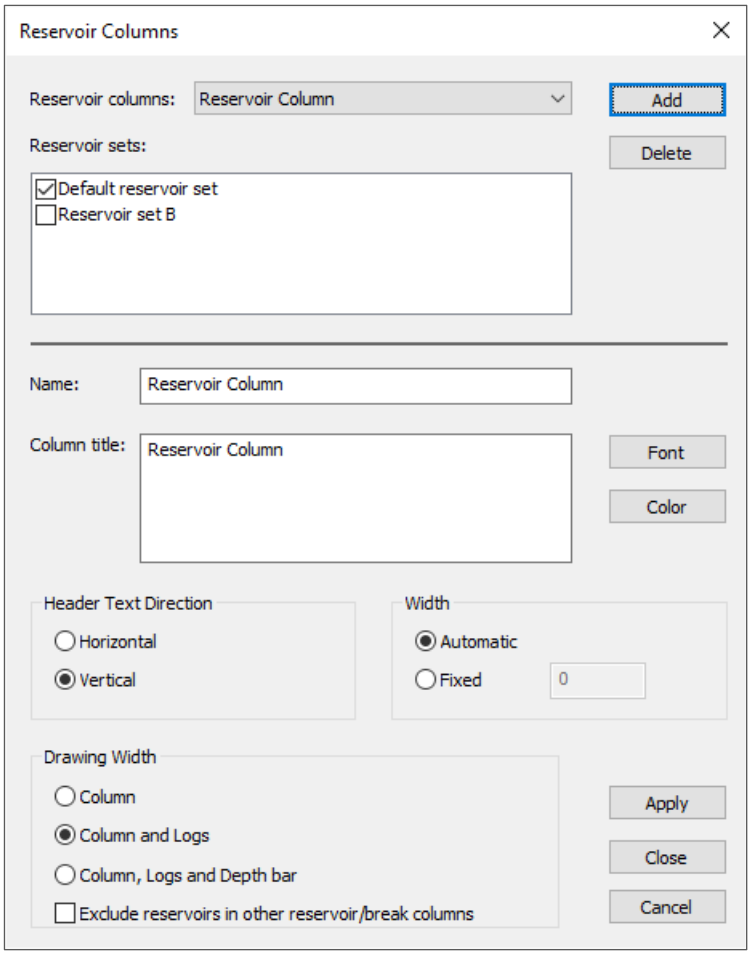
The basic construction of composite well charts was described in part 4 of this tutorial. We now describe the steps needed to add columns to a well composite chart, showing the reservoirs.

- Having made a composite well chart, check that **Show Reservoirs** is enabled in the right-click menu (right-click anywhere over the composite chart, either in a separate pane or in the composite well chart or correlation panel).



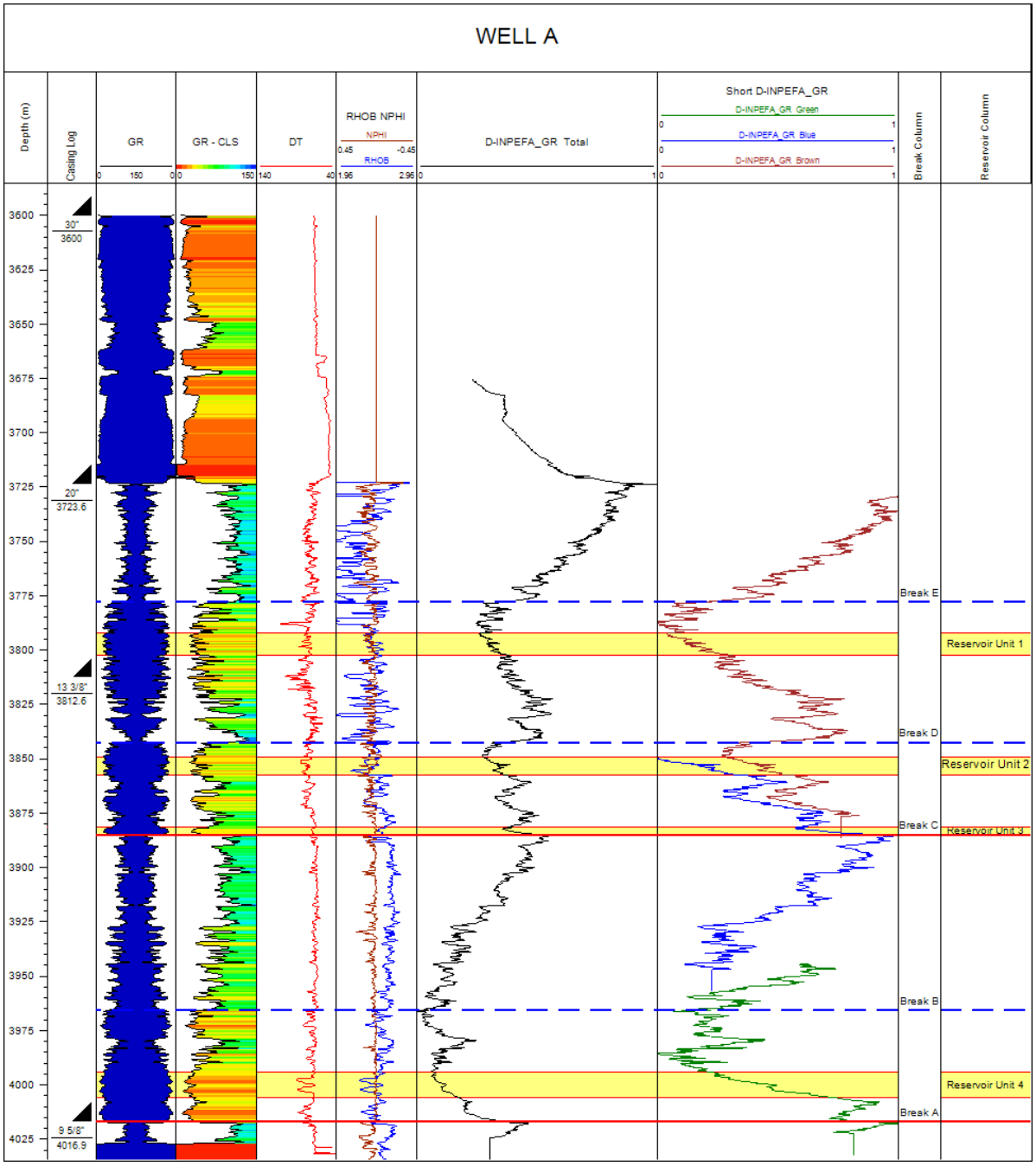
To create a reservoir column in a composite well chart:

- Select **Reservoir Columns** from the right-click menu (right-click anywhere over the active composite well chart) to open the **Reservoir Column** dialog box.
- The input fields will be empty but after clicking on **Add** the dialog box looks like this:




- On the **Reservoir sets** list, check the reservoir set(s) to appear in this column;
- **Name** the reservoir column. The **Column title** (the header for the column) is automatically named after the reservoir column but it can be re-named.
- The default values for the header font, colour, direction and width can all be changed if required, as can the font and colour for the reservoir labels.
- Under **Drawing Width**, you can specify the horizontal extent of the reservoir lines; also, whether or not these reservoirs are to appear in other reservoir or break columns.
- Click **Apply**, then go back to **Add** if you need to add another column.

The result of defining a reservoir column for the Well A composite chart is shown below:



# Part 7 - Adding special logs

## 7.1 Additional log types in CycloLog

CycloLog has the possibility to import log data types that are different from the regular, wireline, logs. These log types are defined in the CycloLog code base as *special* logs and their related functions are more restricted than those for the regular logs.

This section of the tutorial shows you how to add and display the following kinds of log data to a CycloLog project:

- Casing logs
- Interval logs (for e.g., lithostratigraphy, chronostratigraphy, biozones)
- Biostratigraphic logs (for biostratigraphic data)
- Comment logs

## 7.2 Adding a Casing Log

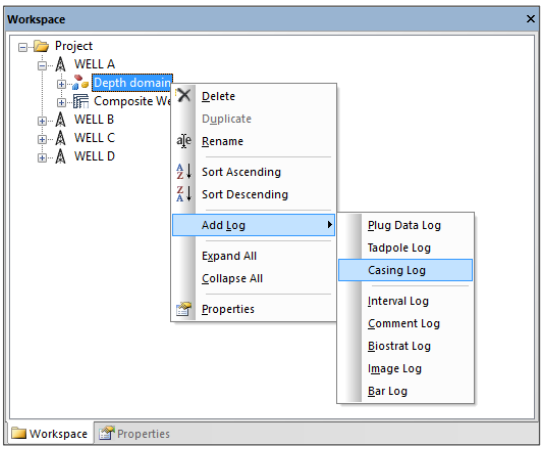
A casing log shows the depth position of casing shoe data. In the example below, the following casing shoe depths are to be loaded into a new Casing Log for the Well A:

| *Depth(m)* | *Diameter* |
|---|---|
| 3600.00 | 30” |
| 3723.65 | 20” |
| 3812.60 | 13 3/8” |
| 4016.90 | 9 5/8” |

The easiest way to load casing shoe data is via the clipboard.

- Type the data *in the format shown* in a spreadsheet or text editor.
- Copy the data to the **Clipboard**.
- Right click over **Depth domain** under the well’s name in the **workspace**.

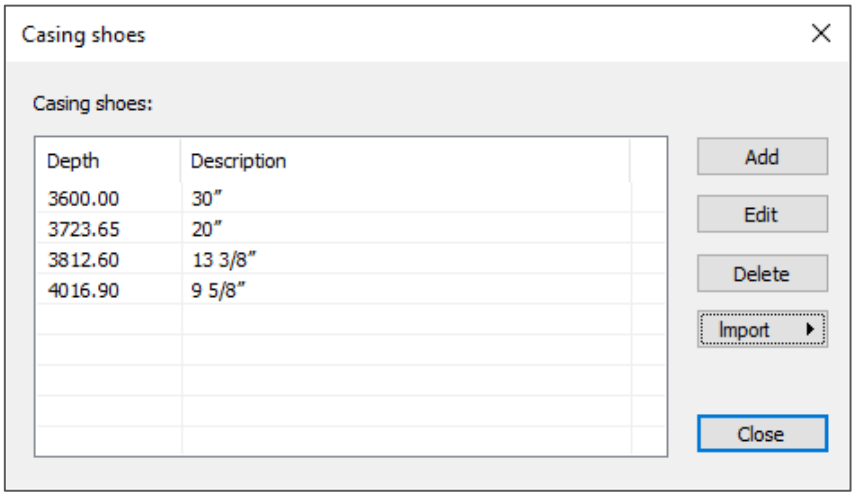
*Note that you can add a casing log from the main menu bar: File → Add Log → Casing Log.*




- In the menu that opens, select **Add Log**.
- In the next menu, select **Casing Log**.
- The **Casing Log** is created, and added to the workspace list.

To add the data to the new Casing Log:

- Open the **Casing Log** (double-click on its name in the workspace);
- Right-click on the casing log pane and select the **Log Data** menu item.
- This opens the **Casing shoes** dialog:




If you have copied the data to the clipboard:

- Click the **Import** button, and select **Clipboard**.
- Click **Close**.

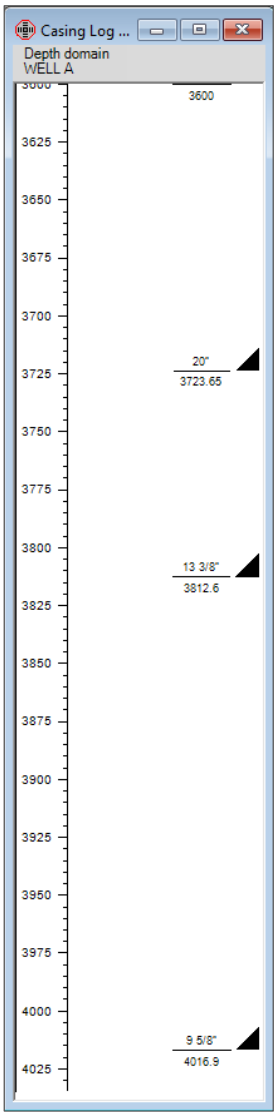
If you have copied the data to a file:

- Click the **Import** button, and select **File**.
- Click **Close**.

Otherwise, you can add the data line by line:

- Click the **Add** button, and type in the **Depth** and **Description** for each item.
- Click **Close**.

The Casing Log now looks as follows:




Note that the Casing Log can be added to a **composite well chart** (see part 4 of this tutorial).

## 7.3 Adding an Interval Log

Interval Logs in CycloLog are a flexible way of adding any kind of information that is expressed in depth intervals. Typical examples are lithostratigraphy (formations, members, etc.), chronostratigraphic age (periods, epochs, stages, etc.), and biozones. Interval logs could also be used to show cored intervals.

To create an Interval log:

- In the CycloLog **workspace**, right click over the well's **Depth Domain**.
- In the menu that opens, select **Add Log**.
- In the next menu, select **Interval Log**.
- The **Interval Log** is created, and added to the Workspace list;
- To rename the new log, right-click over its name in the **workspace** list, and select **Rename** from the menu; type in the new name (e.g. **Lithostratigraphy**).

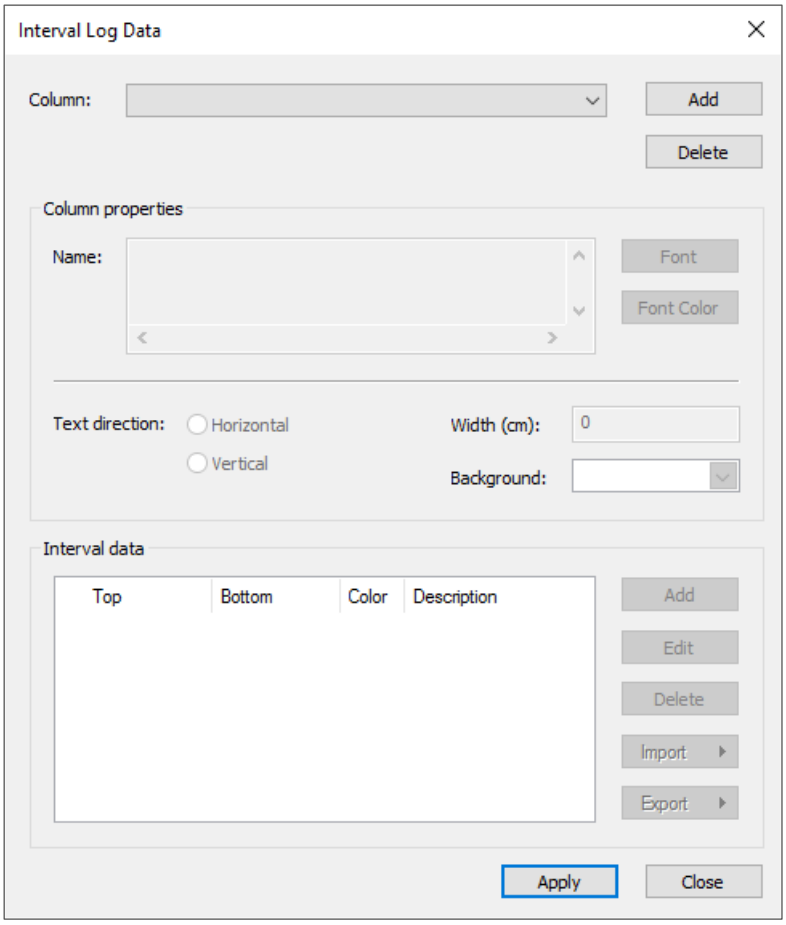
*Note that you can add an interval log from the main menu bar: File → Add Log → Interval Log.*

In the example illustrated, the following formations are to be added to an interval log, which has been renamed 'Lithostratigraphy'.

| *Top* | *Base* | *Name* |
|---|---|---|
| 700.0 | 884.6 | Formation E |
| 884.6 | 1138.6 | Formation D |
| 1138.6 | 1535.2 | Formation C |
| 1535.2 | 2007.0 | Formation B |
| 2022.0 | 2111.6 | Formation A |

To add data to the new interval log:

- Open the **Interval Log** (double-click on its name in the workspace);
- Right-click over the **Interval Log** pane, and select **Log Data**.
- The **Interval Log Data** dialog box opens:



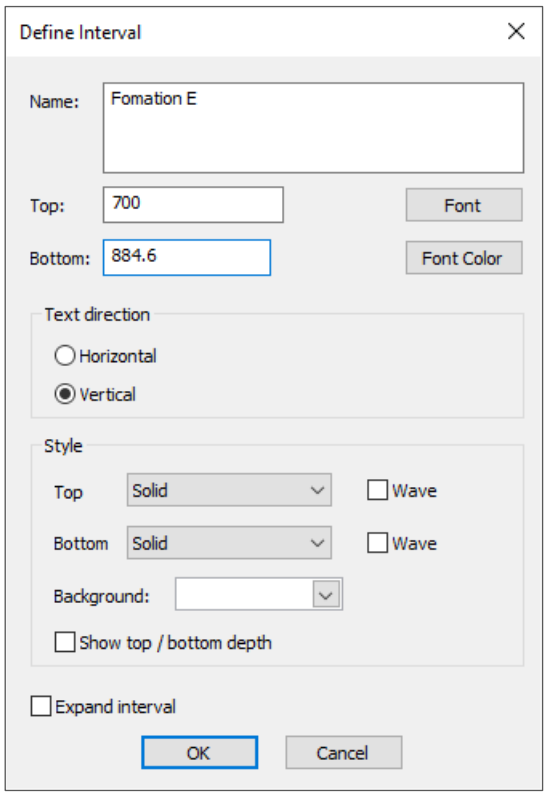

- Click the **Add** button (at the top) to create a column of data.
- The name 'Column' appears in the Column properties field; to change it, click in the **Name** box and delete the name 'Column'. Type in your preferred name (e.g., 'Formations'). This name will appear at the top of the column in a composite well chart.
- The **Font** and **Font Color** buttons allow you to change the appearance of the column header; the **Text direction** of the header can be toggled between **Horizontal** and **Vertical**.
- The width of the column is 1 cm by default, but can be changed: type in your preferred width (in cm).
- The fill of the column can also be defined: click the **Background** down-arrow and select the colour and/or pattern to be used as fill.

You can add data one line at a time, or you can import data from the clipboard or from a file.

To add a line of data:

- Click the **Add** button (under **Interval data**).

- The **Define Interval** dialog box opens:




- Type in the name of the interval, and its top and bottom depths.
- The **Font** and **Font Color** (default = Arial 8, black) can be changed, as can the **Text direction** (horizontal or vertical).
- The style of the lines at the upper and lower limits of the interval is solid by default, but can be changed; there is also an option for either line to be wavy (for an unconformity).
- If **Show top/bottom depth** is checked, the depth will be shown at the limits of each interval.
- The **Background** of each interval can be individually defined: click on the down-arrow in the **Background** box and select the colour and/or pattern.
- If the interval is too narrow to contain the text, you can check **Expand interval** (and/or choose a smaller font size for the text).
- Click **OK**, then click **Add** again, to define the next interval.
- Click **Apply** to save your changes, and **Close** when you have finished.

To add data from the **Clipboard**:

- Copy your data (in the format shown above – Top depth, Bottom depth, Name – for each interval).
- Click the **Import** button on the **Interval Log Data** dialog box.
- Select **Clipboard**, and the data will be added to the interval log.
- You can now **Edit** each item (e.g., to add a different background).

To import data:

- Note that the file format must consists of tabulated data (*.asc) with the following three columns: 1) a top depth, 2) a bottom depth, and, 3) a description column.
- Click the **Import** button on the **Interval Log Data** dialog box.
- Select **Plain File**, and the data will be added to the interval log.
- Select **Edit** to assign color and other Style properties manually.

***NOTE: To export or edit several* Interval Logs *in one go, see the section on the* Set Manager *in* part 8 *of this tutorial.***

## 7.4 Adding a Biostratigraphic Log

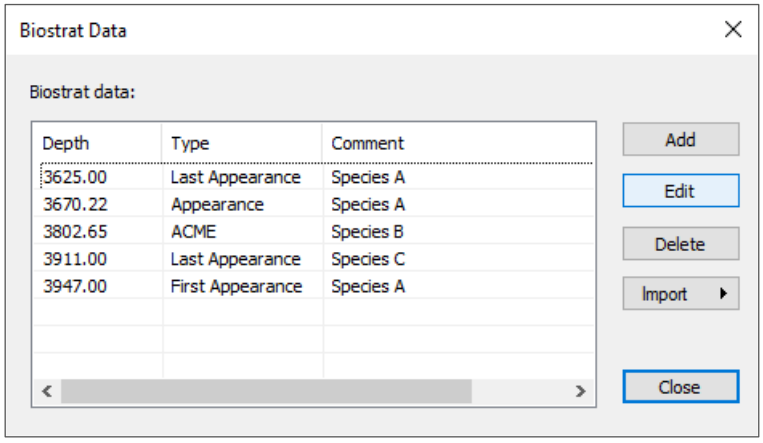
**Biozones** are best expressed in CycloLog as **Interval Logs**: see the instructions given earlier in this part of the tutorial.

Biostratigraphic data in the form of **First Appearances**, **Acmes**, and **Last Appearances** can be added to a **Biostratigraphic Log**, as follows:

- Right click over **Depth domain** under the well's name in the **workspace**.
- Select **Add Log**, then **Biostrat Log**.

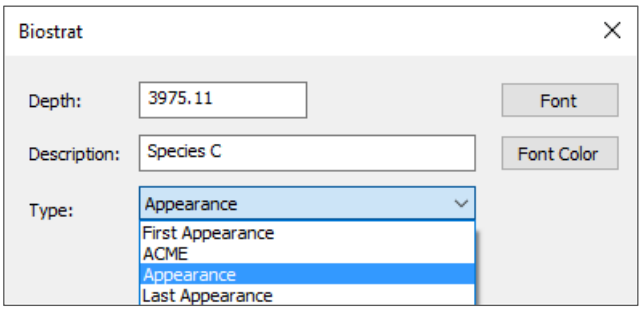
*Note that you can add a biostrat log from the main menu bar: File → Add Log → Biostrat Log.*

- The new log appears in the workspace list: open the log by double-clicking over its name.
- To add data to the new log, right-click over the opened Biostrat Log.
- Select **Log Data** to open the **Biostrat Data** dialog box (shown here with some data already entered):




To add a single line of data:

- Click the **Add** button to open the following dialog box:

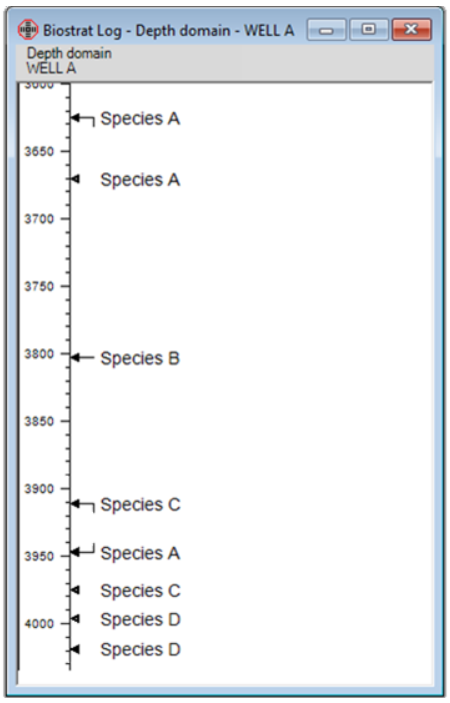


- Enter the Depth, and the **Description** text to appear on the log.
- Under **Type**, select the type of biostratigraphic event from the drop down list.
- Note that the **Font** and **Font Color** can be changed from the default; changing the font size may be useful if the events are very crowded on the log.
- Click **OK**.

To add several lines of data from the clipboard or from a file, suppose that the following events are to be added:

| *Depth* | *Type* |
|---|---|
| 3975.11 | Species C |
| 3996.20 | Species D |
| 4019.00 | Species D |

- Format the data as above in a text editor or spreadsheet: *note that the type of event cannot be specified until the data have been entered*.
- **Copy** the data (without the column headings) to the clipboard.
- On the **Biostrat Data** dialog box (see above), select **Import**, and then **Clipboard** (or **File** if you have created a file with the tabulated data).
- The new data are added to the **Biostrat Log**; all are assumed to be **Appearances**: **Edit** those lines of data for which the event type is to be different.
- The **Biostratigraphic Log** now appears like this:




Note the different arrow symbols for First Appearance, Appearance, Acme, and Last Appearance.

## 7.5 Adding a Comment Log

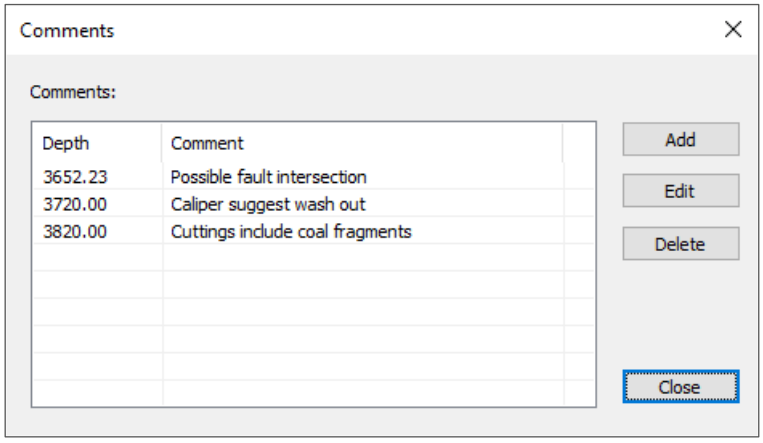
A **Comment Log** can be created when you need to be able to show text comments at specific depths in the well.

To add a **Comment Log**:

- Right click over **Depth domain** under the well's name in the **workspace**.
- Select **Add Log**, then **Comment Log**.

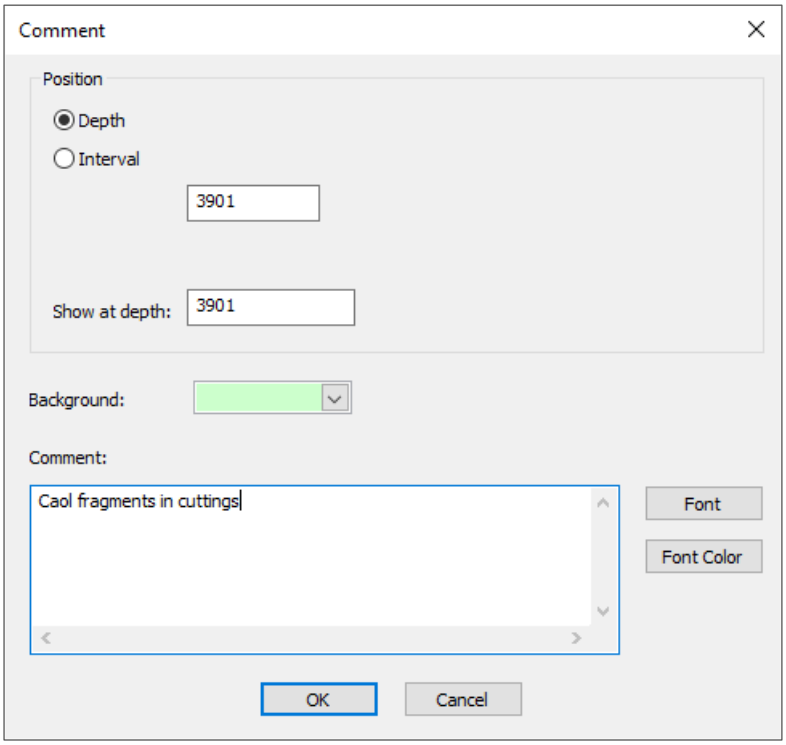
*Note that you can add a Comment log from the main menu bar: File → Add Log → Comment Log.*

- The new log appears in the workspace list: open the log by double-clicking over its name.
- To add data to the new log, right-click over the open **Comment Log**.
- Select **Log Data** to open the **Comments** dialog box (shown here with some data already entered):

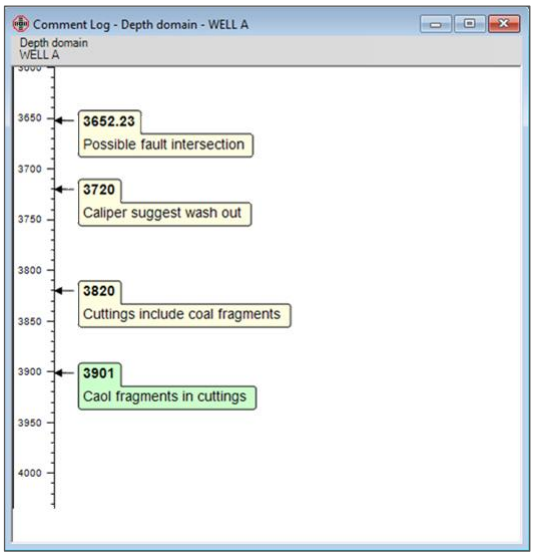



To add a comment:

- Click the **Add** button.




- Your comment can apply to a single depth, or to a depth interval: select **Depth** or **Interval**.
- In case there are several comments close together, you can show a comment at a different depth: put the depth at which it is to appear in the **Show at depth** box.
- Select a fill colour from the **Background** box.
- Type your comment into the **Comment** box, and change the **Font** and **Font Color** if you wish. *(If there are many comments, reduce the font size.)*
- Click **OK**.
- The following shows the appearance of the **Comment Log**: if there is overlap between Comments, you can (1) increase the vertical scale; (2) reduce the font size of individual Comments, or (3) change the **Show at Depth** for one or more comments.




## 7.6 Other special log types

Other types of log are also available in the Depth domain right-click menu (See CycloLog Help for details):

- Tadpole logs
- Core plug data logs
- Image logs
- Bar Log

## 7.7 Adding special logs to a composite well chart

All types of special logs can be added to a **composite well chart**. To do this:

- Open a composite chart (or create a new one – see CycloLog tutorial, part 4).
- Right-click with the cursor over the composite chart.
- Select **Log manager**, then **Manager Composite logs**.
- In the Composite Chart Logs dialog, click **Add Column**.
- Select the log that you wish to add, specify the width of the column it is to appear in, and click **OK**. Note that you can add only one column at a time.

See part 4 of this tutorial for advice on modifying the appearance of the new column, or changing its position in the chart.

# Part 8 - Advanced data management

## 8.1 Advanced data management functions in CycloLog

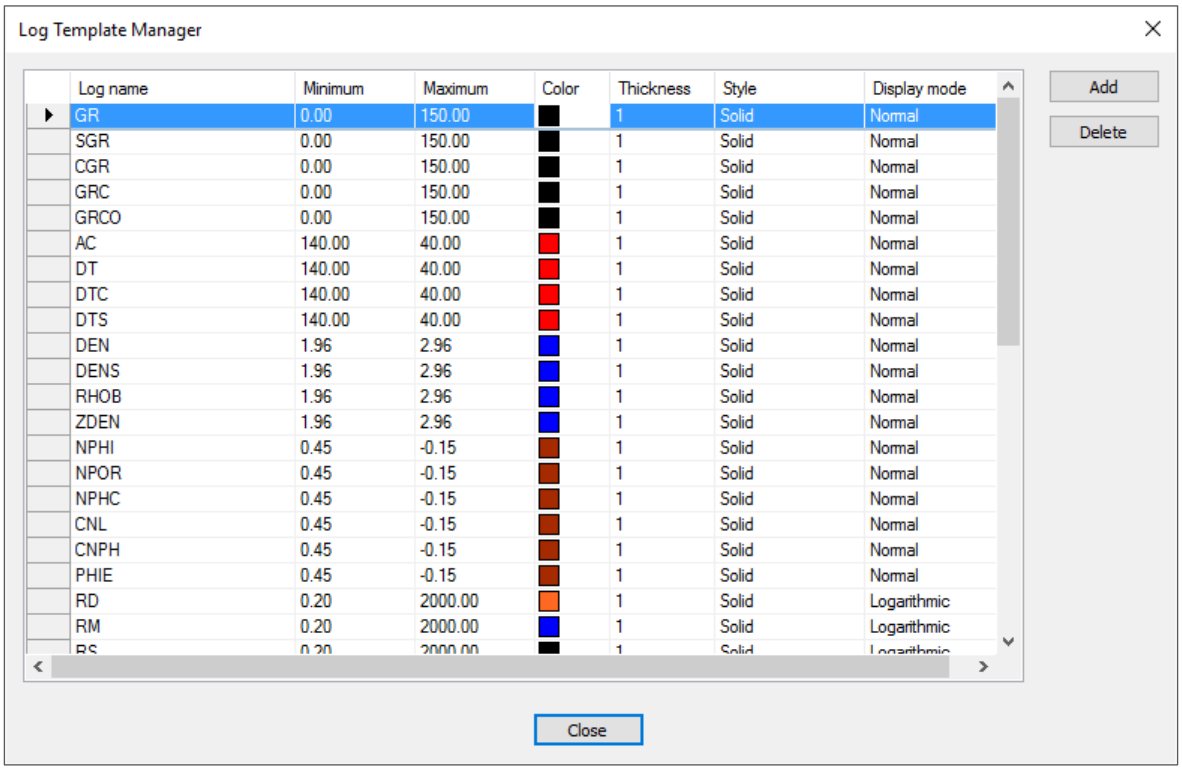
This section of the Tutorial describes the basic use of several features that have been designed to speed up the management of data in CycloLog, such that larger datasets can be handled more efficiently.

## 8.2 Log template manager

Prior to the batch import of LAS files, the basic display properties for each log can be set using the **Log Template Manager**. The Log Template Manager offers standard settings for each type of recognized log; it also establishes the order in which the logs will appear under each well in the Workspace after batch import. Default settings are available, but all of these settings can be changed to the users preferred values. Also, special log types can be added to the default scheme.

To use the **Log Template Manager**:

- Prior to (batch) importing of LAS files, select from the main menu bar: **Tools → Log Template Manager**.
- The illustrated example shows the **Log Template Manager** open, with the information for the GR log selected.




| Log name | Minimum | Maximum | Color | Thickness | Style | Display mode |
|---|---|---|---|---|---|---|
| GR | 0.00 | 150.00 | | 1 | Solid | Normal |
| SGR | 0.00 | 150.00 | | 1 | Solid | Normal |
| CGR | 0.00 | 150.00 | | 1 | Solid | Normal |
| GRC | 0.00 | 150.00 | | 1 | Solid | Normal |
| GRCO | 0.00 | 150.00 | | 1 | Solid | Normal |
| AC | 140.00 | 40.00 | | 1 | Solid | Normal |
| DT | 140.00 | 40.00 | | 1 | Solid | Normal |
| DTC | 140.00 | 40.00 | | 1 | Solid | Normal |
| DTS | 140.00 | 40.00 | | 1 | Solid | Normal |
| DEN | 1.96 | 2.96 | | 1 | Solid | Normal |
| DENS | 1.96 | 2.96 | | 1 | Solid | Normal |
| RHOB | 1.96 | 2.96 | | 1 | Solid | Normal |
| ZDEN | 1.96 | 2.96 | | 1 | Solid | Normal |
| NPHI | 0.45 | -0.15 | | 1 | Solid | Normal |
| NPOR | 0.45 | -0.15 | | 1 | Solid | Normal |
| NPHC | 0.45 | -0.15 | | 1 | Solid | Normal |
| CNL | 0.45 | -0.15 | | 1 | Solid | Normal |
| CNPH | 0.45 | -0.15 | | 1 | Solid | Normal |
| PHIE | 0.45 | -0.15 | | 1 | Solid | Normal |
| RD | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| RM | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| RS | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |

The information for the display of each log includes:

- **Minimum** and **Maximum** values for the horizontal scale.
- The **Color**, **Thickness** and line **Style** of the log curve.
- The **Display mode** of the horizontal scale: whether linear ('normal') or logarithmic.

To change the **Minimum** and **Maximum** scale values:

- Click in the relevant box and type the required value.

To change the line **Color**, **Thickness** or **Style**:

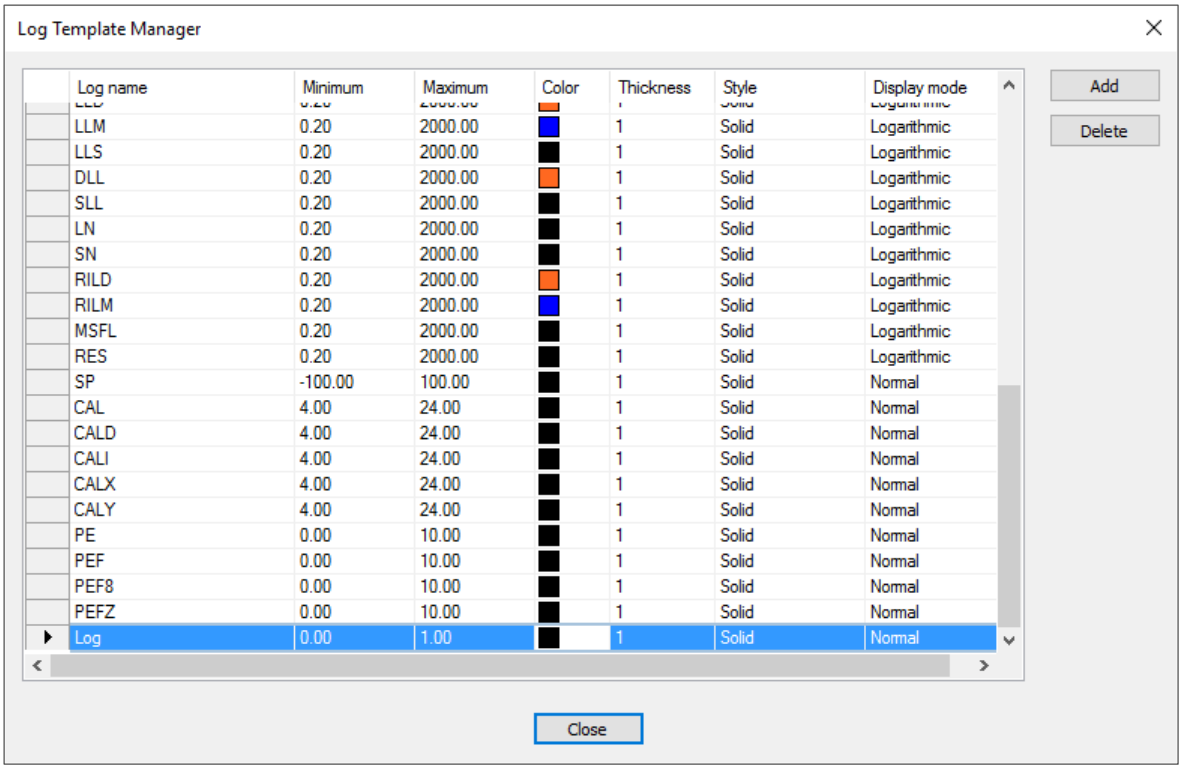
- Select the log by clicking on the box at the left end of the line – this reveals drop-down lists.
- Select the colours or values you want from the drop-down lists.

To change between linear and logarithmic in the **Display mode**:

- Select the log by clicking on the box at the left end of the line – this reveals drop-down lists.
- Select Normal or Logarithmic from the drop-down list.

To add another type of log to the Log Template Manager:

- Click the **Add** button once for each new log.
- Scroll to the bottom of the list where the log is added.
- The new log(s) will be listed with the name 'Log':




| Log name | Minimum | Maximum | Color | Thickness | Style | Display mode |
|---|---|---|---|---|---|---|
| LLM | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| LLS | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| DLL | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| SLL | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| LN | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| SN | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| RILD | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| RILM | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| MSFL | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| RES | 0.20 | 2000.00 | | 1 | Solid | Logarithmic |
| SP | -100.00 | 100.00 | | 1 | Solid | Normal |
| CAL | 4.00 | 24.00 | | 1 | Solid | Normal |
| CALD | 4.00 | 24.00 | | 1 | Solid | Normal |
| CALI | 4.00 | 24.00 | | 1 | Solid | Normal |
| CALX | 4.00 | 24.00 | | 1 | Solid | Normal |
| CALY | 4.00 | 24.00 | | 1 | Solid | Normal |
| PE | 0.00 | 10.00 | | 1 | Solid | Normal |
| PEF | 0.00 | 10.00 | | 1 | Solid | Normal |
| PEF8 | 0.00 | 10.00 | | 1 | Solid | Normal |
| PEFZ | 0.00 | 10.00 | | 1 | Solid | Normal |
| Log | 0.00 | 1.00 | | 1 | Solid | Normal |

- Change ‘Log’ to the correct log name.
- Edit the other values as described above.

To delete a log from the Log Template Manager:

- Select the log by clicking on it on the left (it must be highlighted in blue).
- Click the **Delete** button.

To apply the settings in the Log Template Manager:

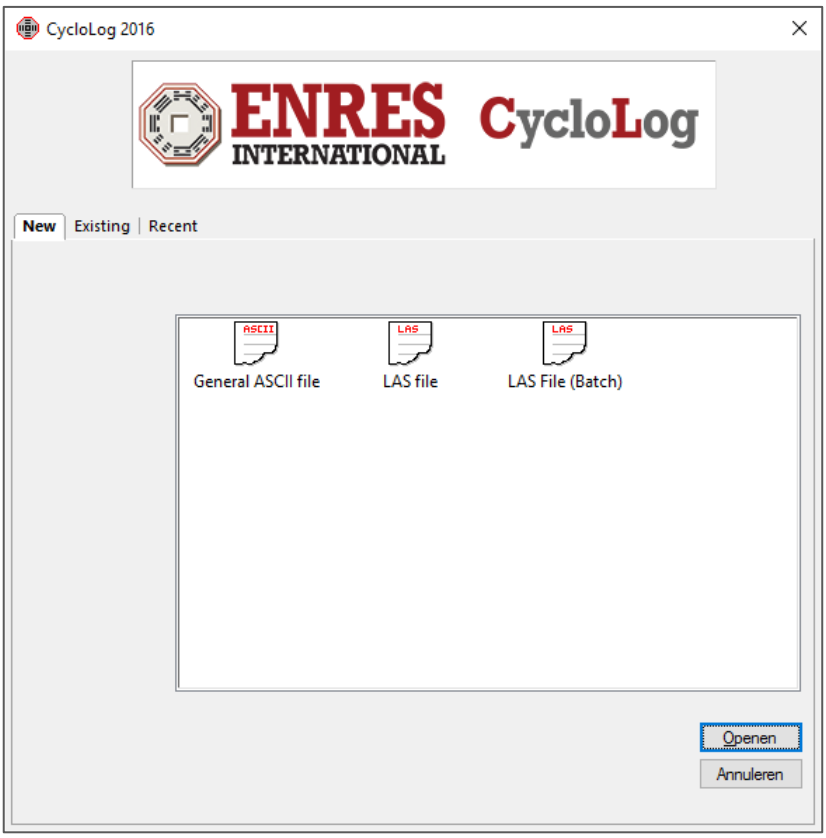
- Click the **Close** button.
- Now you can batch import files using the predefined log settings. To batch import log files, follow the steps as described below.

## 8.3 Batch import of logs

Importing logs, and standardizing their horizontal scales and other features of their display, can take up a significant amount of time. CycloLog offers a means of importing logs contained within multiple wells in batches, giving the same type of logs the same properties.

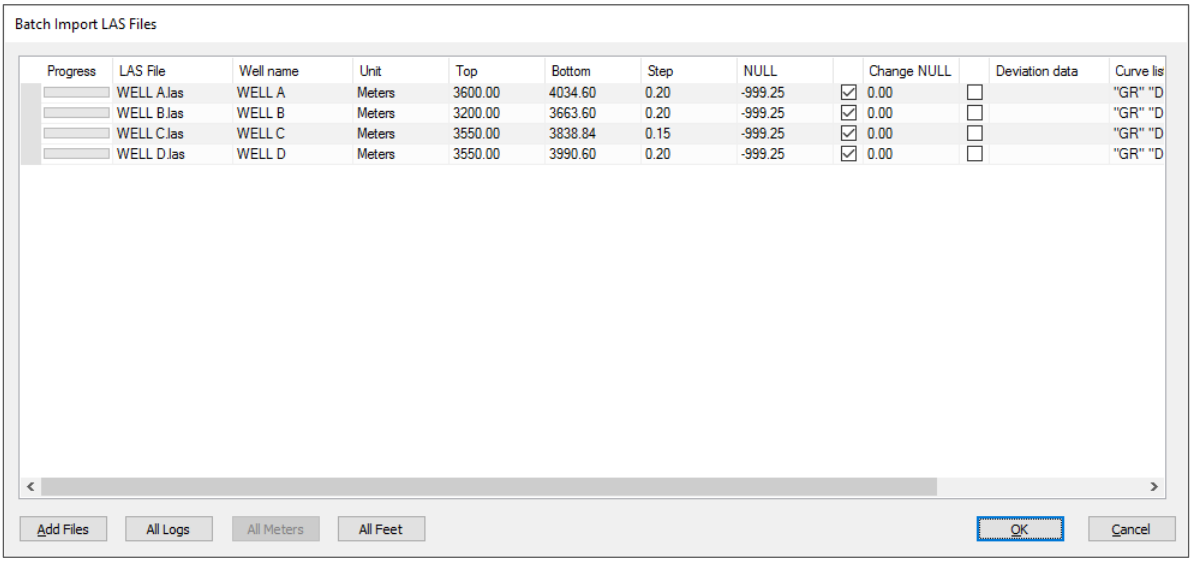
To import a batch of logs:

- For all wells to be entered, assemble their LAS files into one folder.
- From the **File** menu, click on **New** (or use the shortcut **CTRL+N**).
- The following dialog window opens:

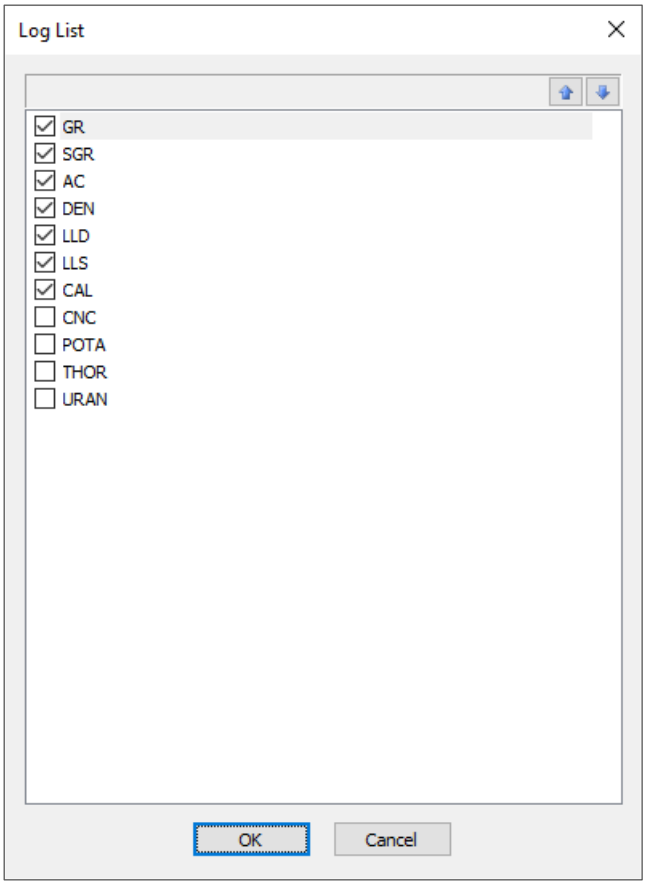



- Select the **New** tab.
- Select **LAS File (Batch)** and click **Open**.
- Navigate to the folder with the required LAS files.
- Select the LAS files for all the wells to be imported.
- Click **Open**.

- CycloLog loads the wells (this may take some time – see the **Progress** bars at the left of the following display):




- This interactive display shows which wells have been loaded and allows you to add more wells (click **Add Files**) and to change some key parameters.
- LAS files need to have the same depth units when loaded into CycloLog. To unify the **Depth Units**, click on **All Meters** or **All Feet** to select the required unit.
- To change the depth step for a well, enter the required value in the **Step** column.
- The default setting for **NULL** values is to change all Null values to zero. To leave Null values unchanged, uncheck the box; to change all Null values to a different value, enter the required value in the **Change NULL** column.
- If the well is deviated and a deviation survey is available:
  - check the box in the **Deviation data** column, then
  - click in the space to the right of the check box
  - click on the button showing three dots to open the **Deviation Survey** dialog box (see **part 2 of this tutorial**).
- To change the selection of log curves and to arrange their order, click on the curve list, then click again on the button showing three dots to open the **Log List**:

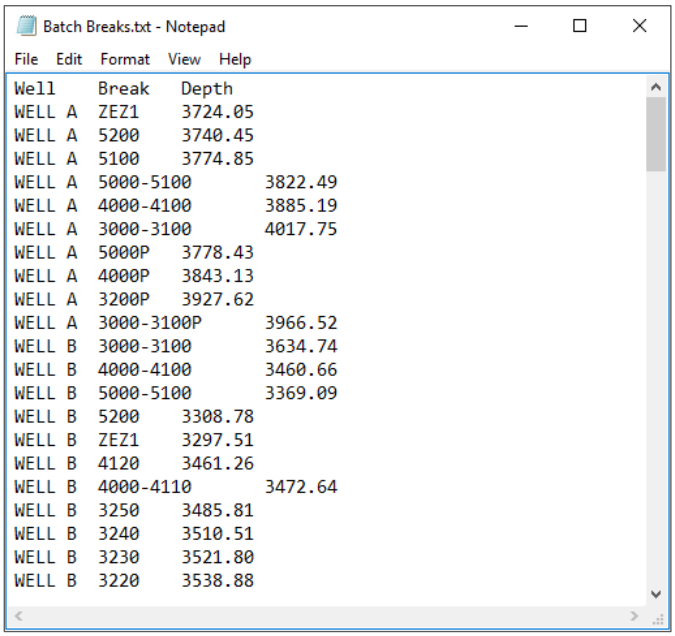



- Check the logs that you wish to import.
- Use the **Up** and **Down** arrow buttons to move a selected log up or down the list until they are in the required order.
- Click **OK**.
- Repeat the above steps for the remaining wells in the batch.
- Click **OK** when you have made all necessary changes.
- CycloLog creates a new project file, with all wells and all their logs shown in the workspace.
- **Save** the new project as a *.clg file.

## 8.4 Batch import of breaks and reservoirs

Batch importing can also be done for both breaks and reservoirs. Batch importing of breaks is illustrated here; batch importing of reservoirs is similar as described for breaks.

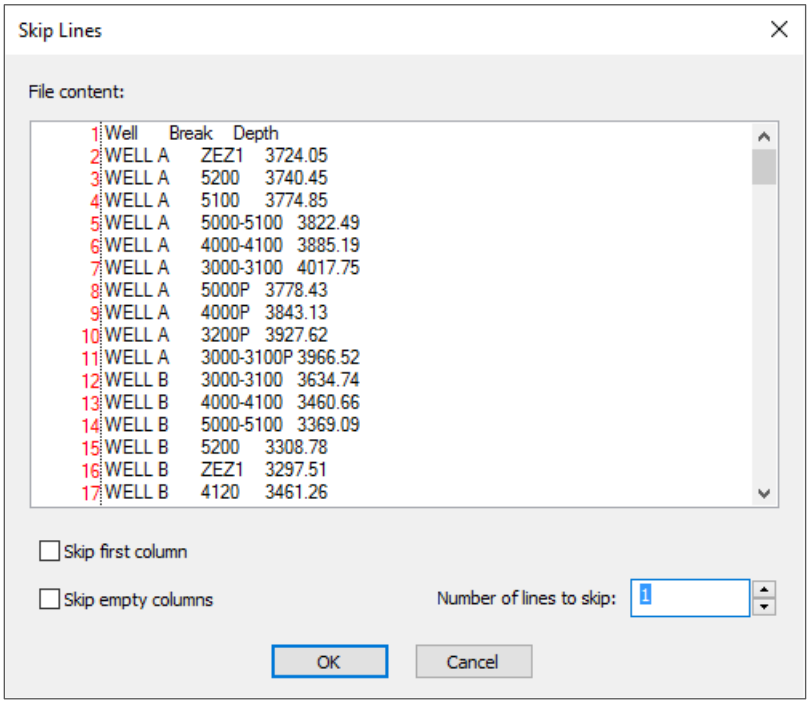
The breaks to be imported must first be saved in a tabulated text file. The name of the well must exactly match its name in the CycloLog project file.




```
Well     Break    Depth
WELL A   ZEZ1     3724.05
WELL A   5200     3740.45
WELL A   5100     3774.85
WELL A   5000-5100        3822.49
WELL A   4000-4100        3885.19
WELL A   3000-3100        4017.75
WELL A   5000P    3778.43
WELL A   4000P    3843.13
WELL A   3200P    3927.62
WELL A   3000-3100P       3966.52
WELL B   3000-3100        3634.74
WELL B   4000-4100        3460.66
WELL B   5000-5100        3369.09
WELL B   5200     3308.78
WELL B   ZEZ1     3297.51
WELL B   4120     3461.26
WELL B   4000-4110        3472.64
WELL B   3250     3485.81
WELL B   3240     3510.51
WELL B   3230     3521.80
WELL B   3220     3538.88
```

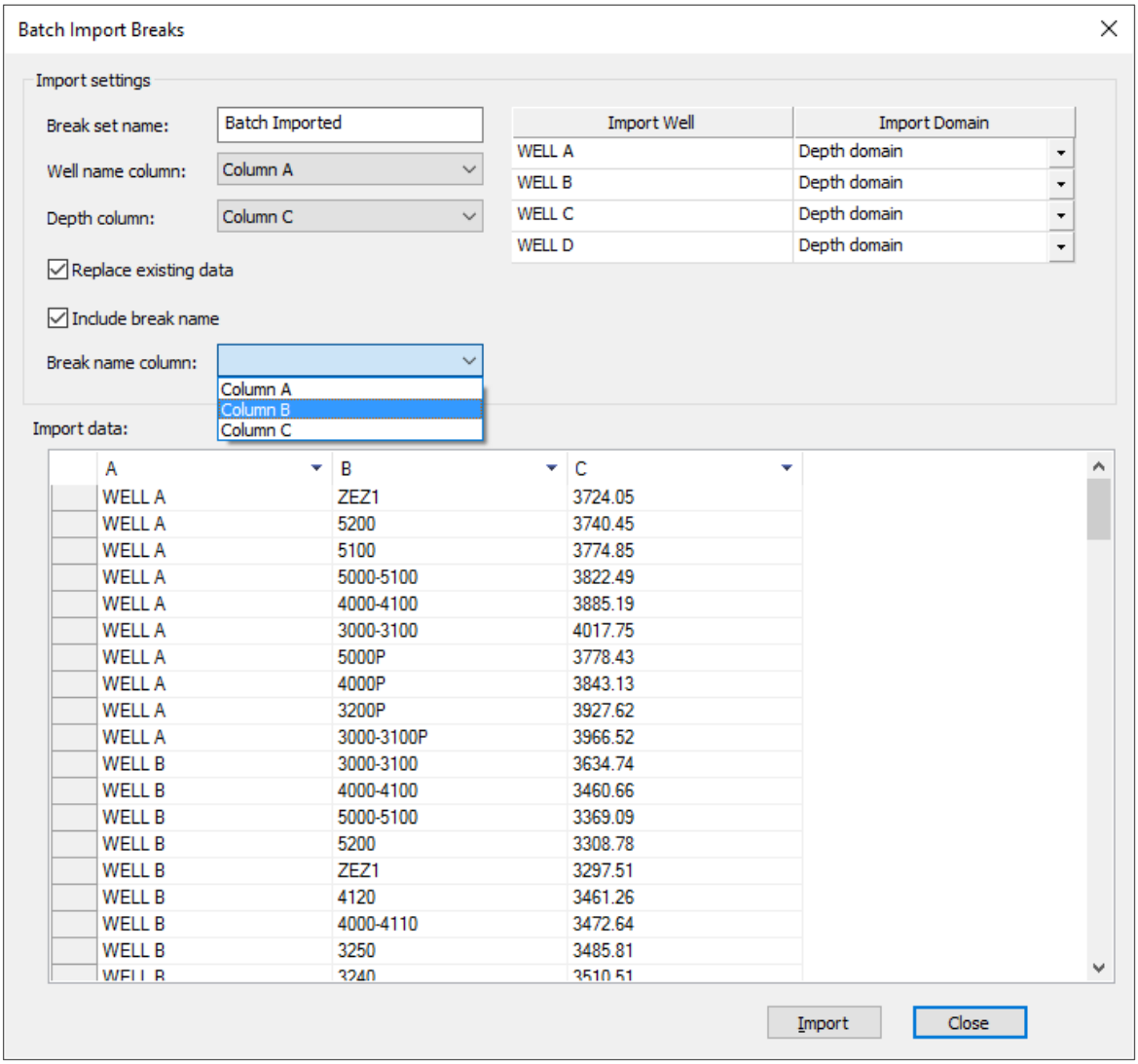
To import this information:

- Go to the **File** menu and select **Import**.
- Select **Batch Import Breaks**.
- Navigate to the file containing the tabulated breaks, and click **Open**.




The data from the text file appears in the **Skip Lines** dialog:

- Set the **Number of lines to skip** equal to the number of lines of header data in your file (1 line in the example shown).
- Click **OK**;
- The **Batch Import Breaks** dialog box opens:



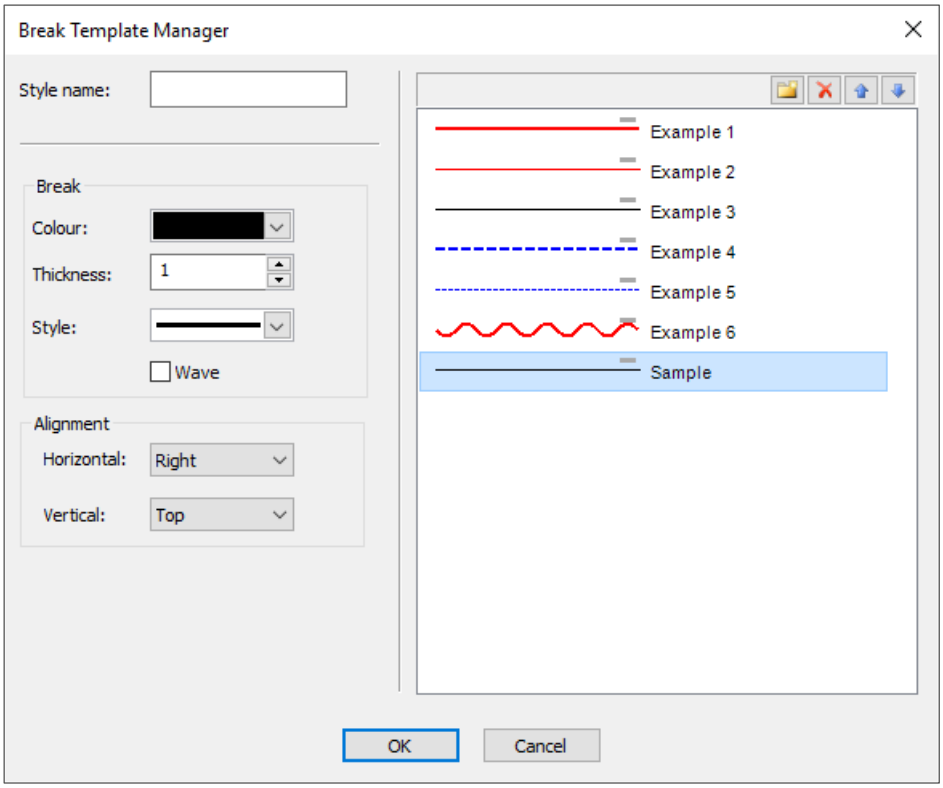

- The default name in the **Break set name** field will be **Batch Imported**; change this if you wish to (e.g., into Default break set, as in the example).
- In **Well name column**, select the column that contains the well name(s).
- In **Depth column**, select the column that contains the break depths.
- To include the names of the breaks, check the **Include break name** box, and, in **Break name column** field, select the column that contains the break names.
- If necessary (for example, you have for some wells also data in the TVD domain) indicate for each well the domain into which the breaks need to be imported.
- Click **Import**.
- The breaks are imported; **Close** the **Batch Import Breaks** dialog.
- Open the **Break Manager** (**Edit Breaks**, from the **Edit** menu) if you wish to edit the newly imported breaks (see CycloLog tutorial, Part 5).

## 8.5 Break template manager

CycloLog users may like to develop their own preferred line styles for showing different kinds of breaks. The **Break Template Manager** allows the user to set up and name preferred break line styles. These styles can then be selected with a single click when editing a break.

To open and use the Break Template Manager:

- Go to the main menu bar and select **Tools → Break Template Manager** (you also can access this manager through the **Break Manager** by double-clicking on a break. The **Edit Break** dialog allows access to the break template manager through the **Templates** button).




The **Break Template Manager** already shows a number of predefined line styles (Example 1, Example 2, etc.). You can modify or delete any of these; you can also add new styles.

To rename any of these line styles:

- Select the style to be renamed in the box on the right (the figure shows 'Sample' selected).
- Type the new name into the **Style name** box at the top left of the dialog box.

To add a new line style:

- Click the yellow **New (Insert)** button at the top right of the dialog box.
- A new style is added to the list on the right, initially named 'Sample': by default, it is a 1-pixel thick solid black line.
- To rename the new style, type a name in the **Style name** box.
- Define the **Colour**, **Thickness** and **Style** (solid, dashed, etc.) from the drop-down lists.
- Select the Alignment of the break name, i.e., whether it is to appear at the Left, Center, or Right of the break (**Horizontal** alignment), and whether the name should appear on the Top, Middle, or Bottom of the line (**Vertical** alignment).

To change the order of appearance of the styles:

- Select a style and use the **Up** and **Down** arrow icons to move it up or down the list.
- Repeat until the styles are in your preferred order.

To delete any of these line styles:

- Select the style to be deleted in the box on the right (the figure shows 'Sample' selected).
- Click the **Delete** icon (**X**) at the top right of the dialog box.

When you have finished:

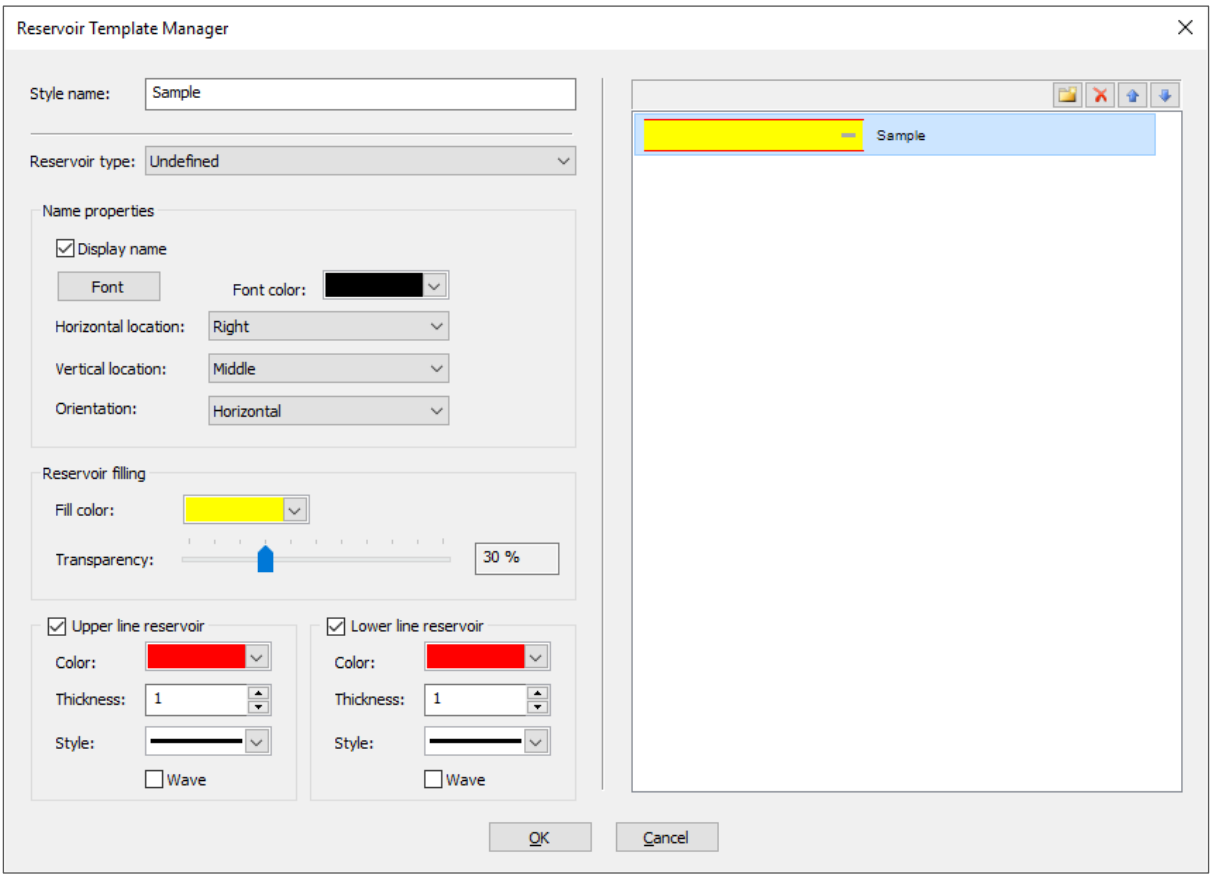
- Click **OK** to save your changes.

## 8.6 Reservoir template manager

Users may develop their own preferred styles for showing different kinds of reservoirs; the **Reservoir Template Manager** allows the user to set up and name preferred reservoir styles. These styles can then be selected with a single click when editing a reservoir.

To open and use the Reservoir Template Manager:

- Go to the main menu bar and select **Tools → Reservoir Template Manager** (you also can access this manager through the **Reservoir Manager** by double-clicking on a reservoir. The **Edit Reservoir** dialog allows access to the reservoir template manager through the **Templates** button).




The **Reservoir Template Manager** initially shows only one predefined style, with the default name 'Sample'. This style can be changed, and/or renamed, and others can be added.

To modify an existing reservoir style:

- Select 'Sample' on the right.
- Make changes as described for a new style (below).
- Click **OK**.

To add a new reservoir style:

- Click the yellow **New (Insert)** button at the top right of the dialog box.
- A new style is added to the list on the right, initially named 'Sample'. By default, it has yellow fill and no upper or lower lines.
- To rename the new style, type a name in the **Style name** box.
- Under **Name properties**, select the **Font**, **Font color**, the **Horizontal** and **Vertical location**, and **Orientation** of the reservoir name from the drop-down lists.
- If you want the reservoir to be bounded by upper and lower lines, check the **Upper line reservoir** and/or **Lower line reservoir** boxes, and specify the properties of the lines (note that upper and lower lines can have different properties).
- Click **OK** to save your changes.

To change the order of appearance of the styles:

- Select a style and use the **Up** and **Down** arrow icons to move it up or down the list.
- Repeat until the styles are in your preferred order.

To delete a reservoir style:

- Select the style to be deleted in the box on the right (the figure shows Sample selected);
- Click the **Delete** icon (**X**) at the top right of the dialog box.

When you have finished making changes:

- Click **OK** to keep your changes.

## 8.7 Log Set Manager

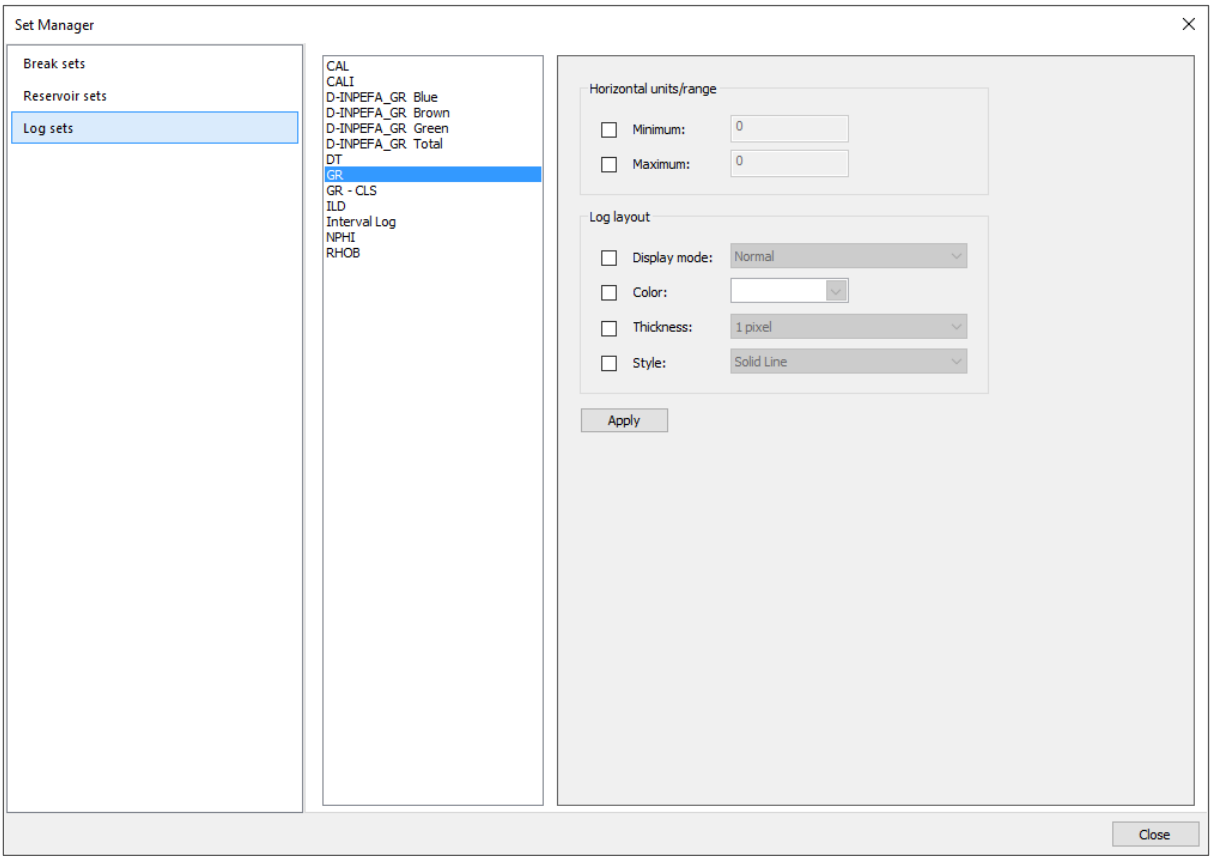
The **Set Manager** is a powerful tool to change many properties simultaneously for multiple wells.

To open the **Set Manager**:

- Go to the main menu and select **Edit → Set Manager**, or select **Set Manager** from the right-click menu on a composite well chart.
- In the **Set Manager** dialog window, select **Log Sets** from the left-hand column.
- The right-hand column will display all the log types found in all the wells in the project.

To define properties of all logs of a particular type:

- Select the required type of log (in the example below the 'GR' log has been selected).




- Check the boxes for the log display properties that you wish to define.
- Enter the required properties, or select them from the drop-down lists.

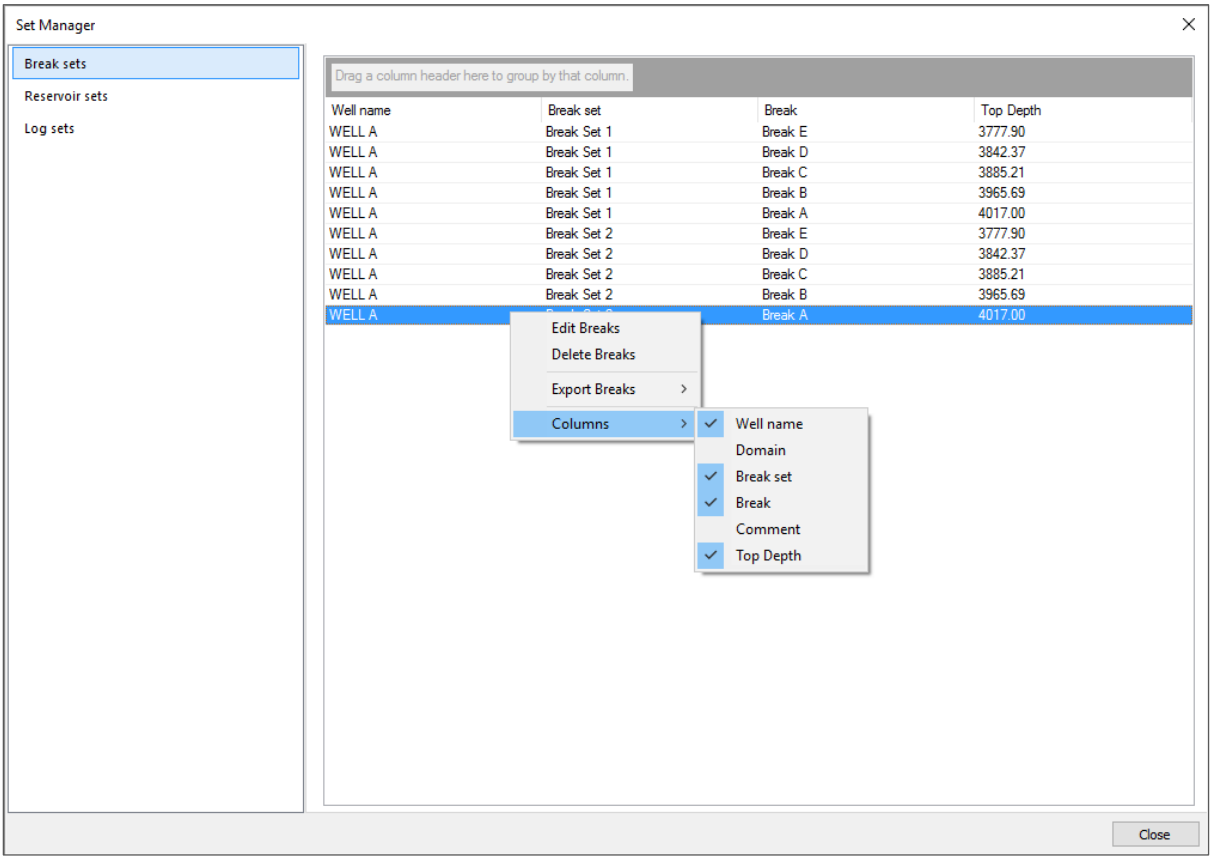
- Click **Apply**.
- Click the name of the next log, and repeat until you have made all your changes, always clicking **Apply** before you move on to the next log.
- Click **Close**.
- All logs of the types defined will have their properties set to the specified values.

Note that properties of special logs, such as the Bar, Interval, Plug, and Tadpole logs, also can be edited.

## 8.8 Using the Break Set Manager (and Reservoir Set Manager)

The **Break** and **Reservoir Set Managers** allow you to make changes to multiple breaks/reservoirs simultaneously. The use of the **Break Set Manager** is described here: using the **Reservoir Set Manager** is analogous.

- In the **Set Manager** dialog window, select **Break sets** from the left-hand column.
- The Set Manager displays a list of all break sets and breaks present in all the wells in the project:



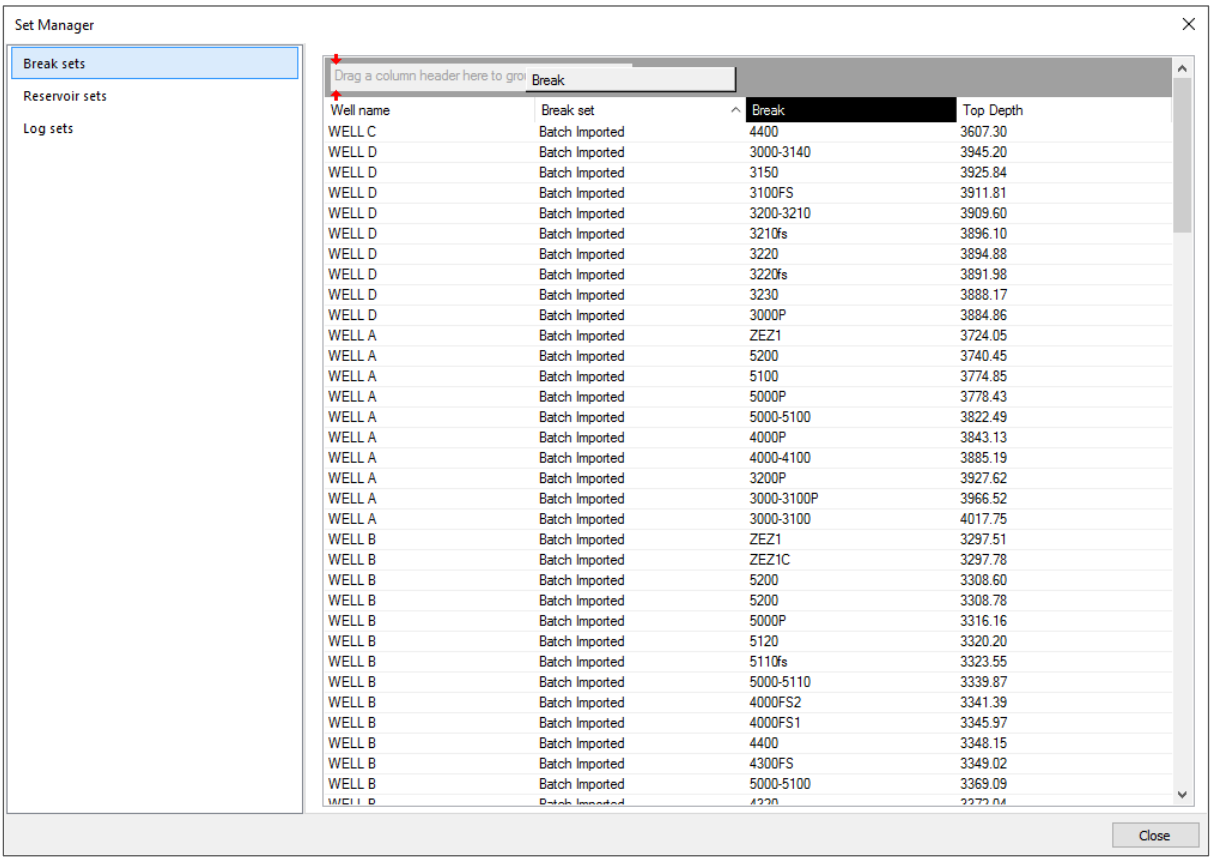

You can reduce or increase the number of columns displayed:

- Right-click with the mouse on the window.
- From the context menu; select the **Columns** you want to have displayed.

Note that the list of breaks is initially sorted by **Well name**.

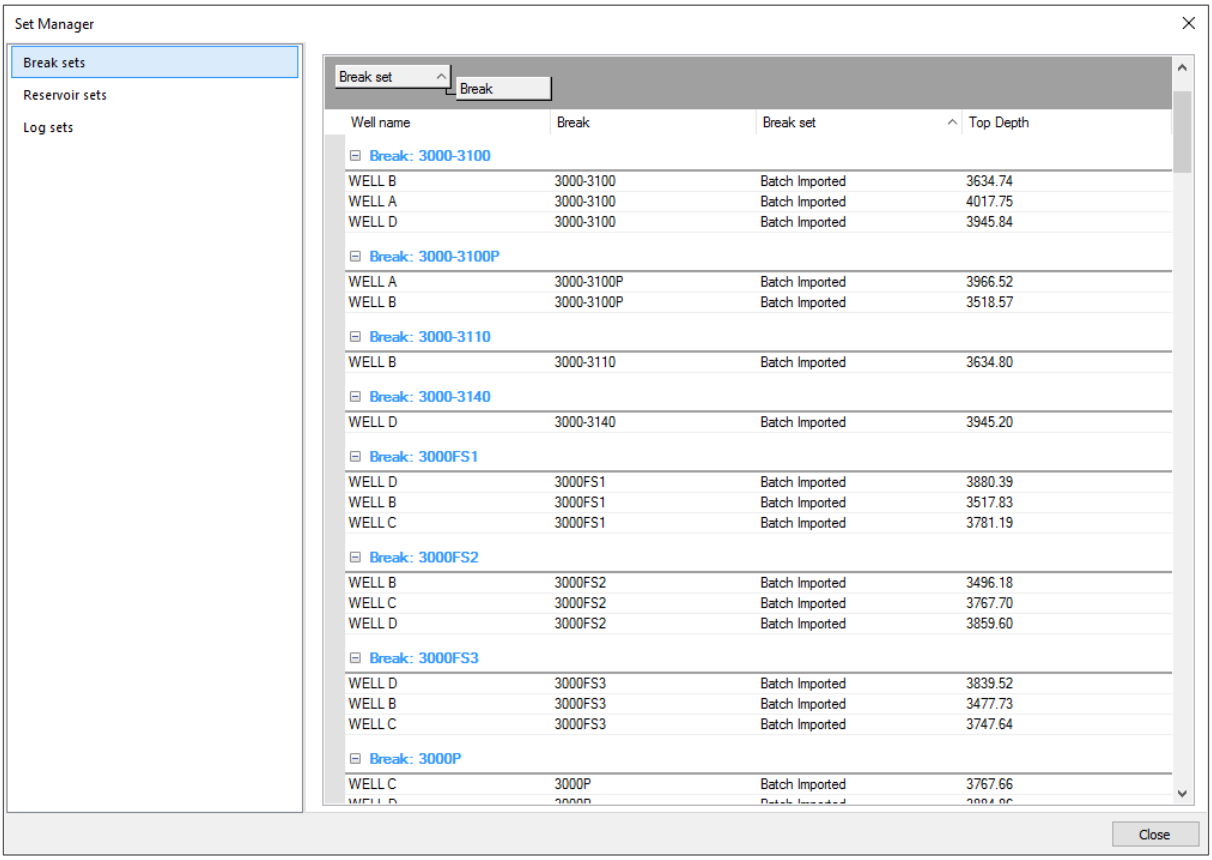
To change the sorting order:

- Click on the name of the column by which to sort the data, and drag it to the grey box at the top (see below).




| Well name | Break set | Break | Top Depth |
|---|---|---|---|
| WELL C | Batch Imported | 4400 | 3607.30 |
| WELL D | Batch Imported | 3000-3140 | 3945.20 |
| WELL D | Batch Imported | 3150 | 3925.84 |
| WELL D | Batch Imported | 3100FS | 3911.81 |
| WELL D | Batch Imported | 3200-3210 | 3909.60 |
| WELL D | Batch Imported | 3210fs | 3896.10 |
| WELL D | Batch Imported | 3220 | 3894.88 |
| WELL D | Batch Imported | 3220fs | 3891.98 |
| WELL D | Batch Imported | 3230 | 3888.17 |
| WELL D | Batch Imported | 3000P | 3884.86 |
| WELL A | Batch Imported | ZEZ1 | 3724.05 |
| WELL A | Batch Imported | 5200 | 3740.45 |
| WELL A | Batch Imported | 5100 | 3774.85 |
| WELL A | Batch Imported | 5000P | 3778.43 |
| WELL A | Batch Imported | 5000-5100 | 3822.49 |
| WELL A | Batch Imported | 4000P | 3843.13 |
| WELL A | Batch Imported | 4000-4100 | 3885.19 |
| WELL A | Batch Imported | 3200P | 3927.62 |
| WELL A | Batch Imported | 3000-3100P | 3966.52 |
| WELL A | Batch Imported | 3000-3100 | 4017.75 |
| WELL B | Batch Imported | ZEZ1 | 3297.51 |
| WELL B | Batch Imported | ZEZ1C | 3297.78 |
| WELL B | Batch Imported | 5200 | 3308.60 |
| WELL B | Batch Imported | 5200 | 3308.78 |
| WELL B | Batch Imported | 5000P | 3316.16 |
| WELL B | Batch Imported | 5120 | 3320.20 |
| WELL B | Batch Imported | 5110fs | 3323.55 |
| WELL B | Batch Imported | 5000-5110 | 3339.87 |
| WELL B | Batch Imported | 4000FS2 | 3341.39 |
| WELL B | Batch Imported | 4000FS1 | 3345.97 |
| WELL B | Batch Imported | 4400 | 3348.15 |
| WELL B | Batch Imported | 4300FS | 3349.02 |
| WELL B | Batch Imported | 5000-5100 | 3369.09 |

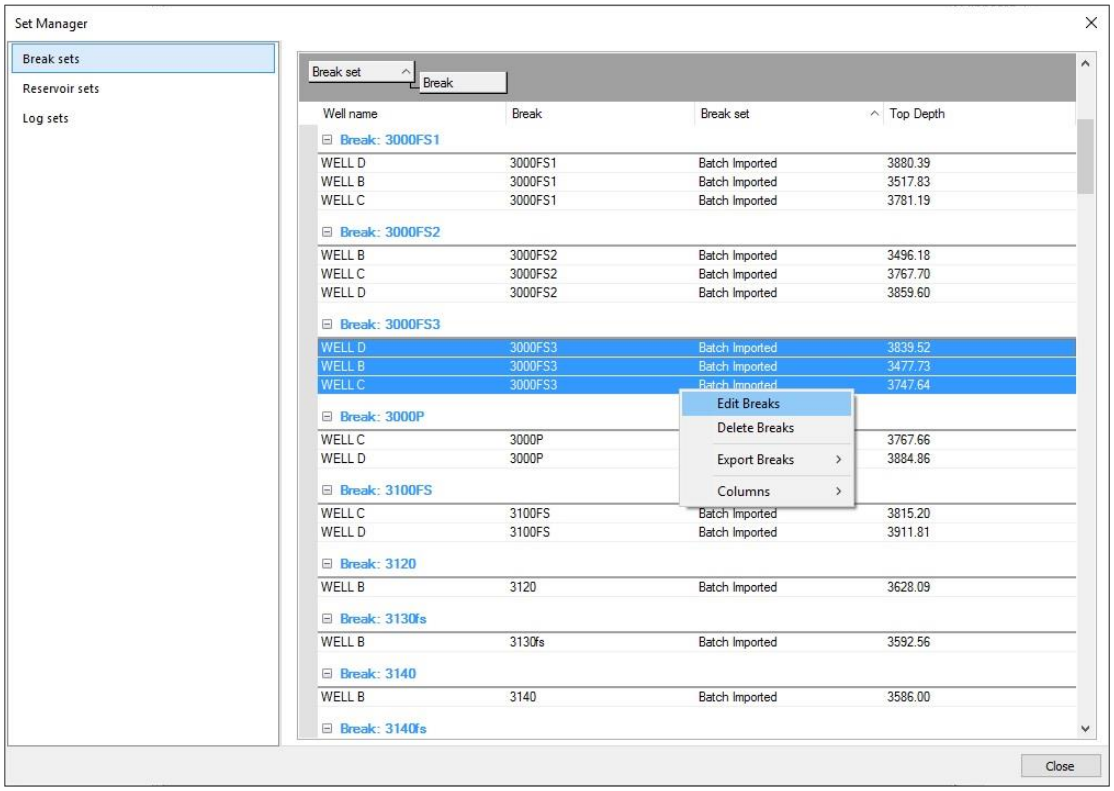
- You can do this more than once: the example below shows breaks sorted by break set, and then by break.



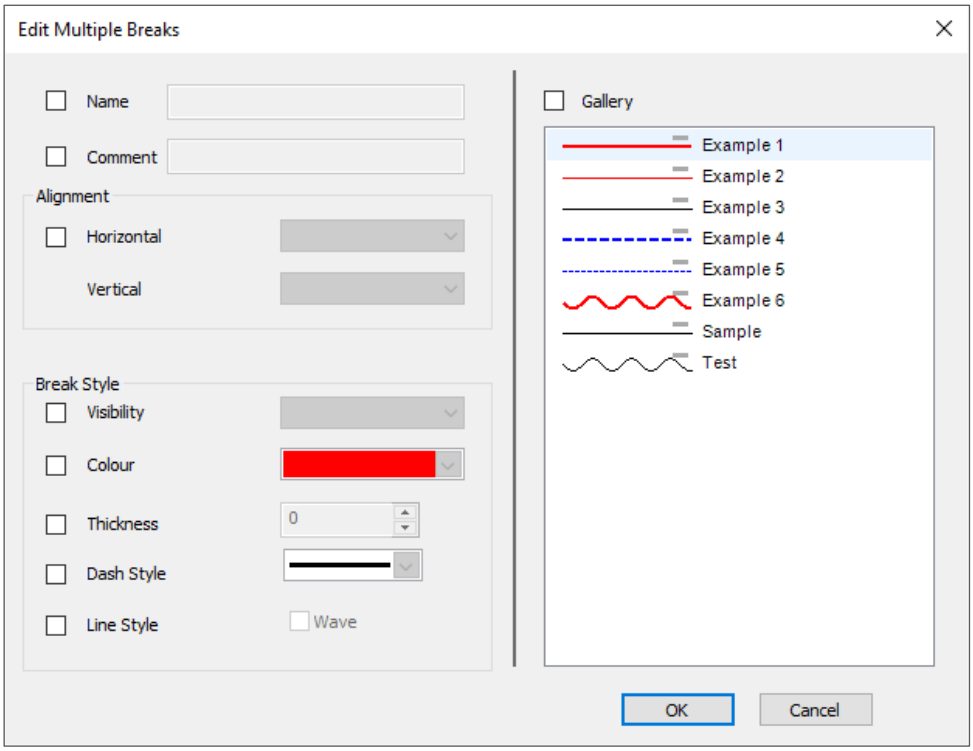

- To remove a sorting parameter, drag its name away from the grey area.
- Note that you also can change the order of the columns by dragging a column to the left or right.

To make changes to the break properties:

- In the Set Manager dialog box, sort the breaks into a convenient order.
- Select the breaks whose properties you wish to edit.



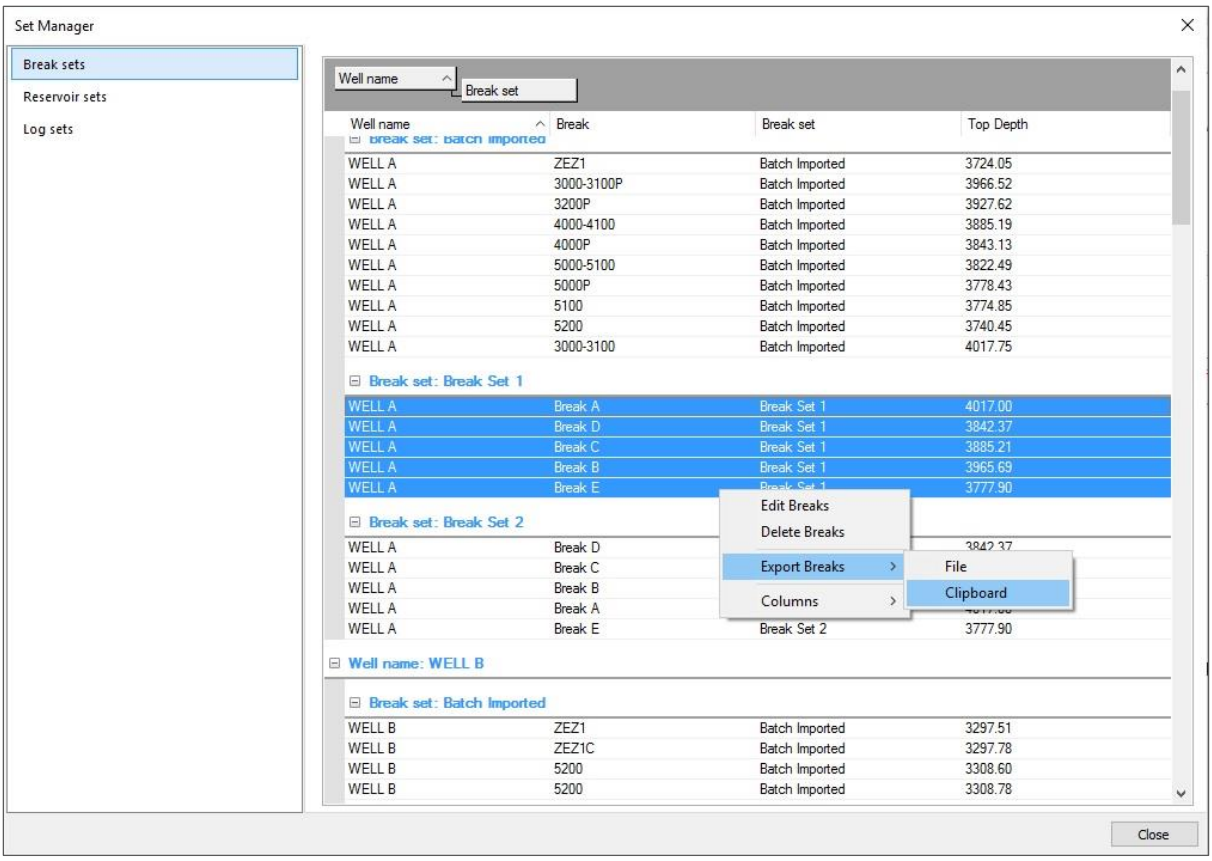

- Right-click with mouse button to open the context menu, and select **Edit Breaks**.
- The **Edit Multiple Breaks** dialog box opens.



- Check the boxes for the properties that you wish to change/define for all of the selected breaks.
- For each selected property, enter the required value, or select from the drop-down lists.
- To use the predefined styles in the Gallery, first check the **Gallery** box, then click on the style.
- Click **OK** to apply the properties to all selected breaks.

To export breaks:

- In the **Set Manager**, sort the break sets (and wells) that you wish to export (by dragging columns to the grey area, see above).
- Select the breaks and then right-click to open the context menu (to select multiple breaks, hold down Shift).




- Select **Export Breaks;** you can either save the breaks as a tabulated data **File** or save them to the **Clipboard**.

Note that selected breaks can also be deleted using the **Delete Breaks** option in the context menu.

# Part 9 - Correlation Panel

## 9.1 Correlation Panels in CycloLog

Correlation panels in CycloLog comprise a selection of composite well charts. The correlation lines defined in each composite chart can be connected automatically. Comprehensive editing functions for the correlation panel allows to add more lines, depict unconformities, and add textual and graphical information, thereby finalising the layout of the panel, which can be printed or exported as required.

This section of the tutorial gives basic instructions on how to construct a simple correlation panel.

## 9.2 Preliminaries

To make a correlation panel, please note the following important conditions:

- All wells that are to appear in a correlation panel must be in the same CycloLog project. (See **tutorial part 2** on how to import additional wells into a CycloLog project file.)
- All wells that are to appear in a correlation panel must have composite well charts generated first.
- If you wish CycloLog to automatically draw correlation lines between wells, the equivalent breaks must be in break sets that have exactly the same name in each well. Also the breaks must have identical names.

## 9.3 Planning a correlation panel

A correlation panel is a collection of composite well charts linked by correlation lines. You can use composite charts that you have already created for another purpose, or you can create them especially for your correlation panel. Although you can change the layout later (including the layout of each composite chart) it is best to start by considering the overall layout of the panel:

- How many wells, and in what order from left to right?
- How many columns are essential in each composite chart (it is good practice to keep the width of each chart to the minimum)?
- What vertical scale would be best? (It does not have to be the same in all wells.)
- Can you estimate the overall paper size that will be needed?

## 9.4 Customizing composite charts for use in a correlation panel

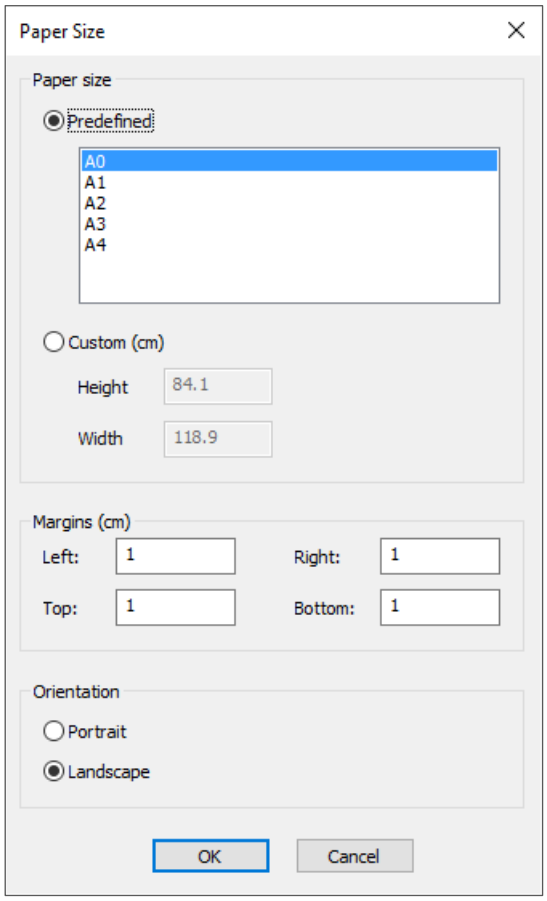
If you wish to use a modified (e.g., reduced) version of an existing composite well chart:

- Make a duplicate of the chart (right-click over its name in the **workspace**, and select **Duplicate**).
- The name of the duplicated chart will have the suffix '- Copy'.
- Rename the chart if you wish (right-click over its name in the workspace, and select **Rename**).
- Open the duplicated chart: you may now wish to make some changes to it (see also CycloLog tutorial, part 4).

## 9.5 Creating a Correlation Panel

To create a new correlation panel:

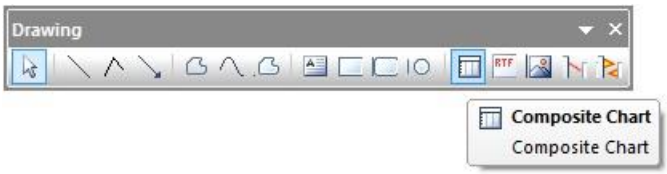
- Go to the **Output** menu, and select **Correlation Panel**.
- The **Paper Size** dialog window opens:



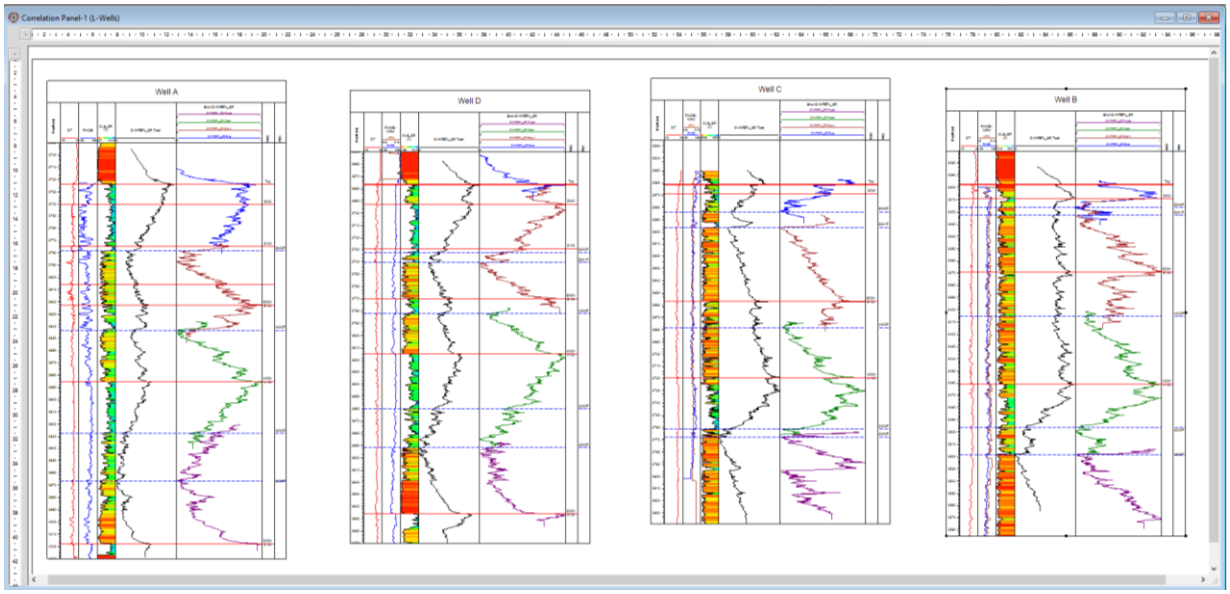
- Specify the **Paper Size** (this can be changed later: it is better to start with it too large rather than too small).
- You can use one of the **Predefined** sizes (A0 to A4), or you can select **Custom** and specify the size (in centimeters) yourself.
- Specify the **Margins** (this can also be changed later).
- Specify the **Orientation** (**Portrait** or **Landscape**).
- Click **OK**.
- A blank Correlation Panel is created and opens in CycloLog's main window. It also appears in the tree structure in the workspace, where it can be renamed.

To add composite well charts to the panel:

- EITHER go to the main menu bar and select **Layout → Insert → Composite Chart**.
- OR click the **Composite Chart** icon on the Drawing toolbar:




- Move the cursor over the correlation panel pane: it changes to a cross.
- Move the cross to where you would like the top left corner of the first composite chart to appear (its position can be changed later).
- Click the left mouse button.
- In the dialog box that opens, navigate to the wells you want, then select the required charts from the list of **Available composite charts**.
- Click **OK**.
- The chosen composite charts appear on the correlation panel.
- The chart will now appear something like this:

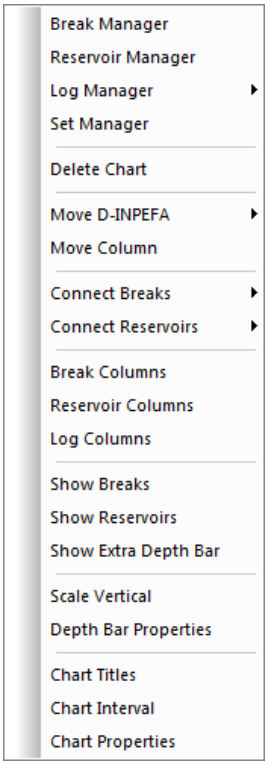



You can adjust the position of the individual charts, as follows:

- Click on a chart to select it.
- You can use the arrow keys to move the chart, or you can hold down the left mouse key, and drag the chart to its new position.

## 9.6 To edit composite charts from the well correlation panel

Modifications to a composite well chart within a correlation panel can be made in the same way as for a separate composite well chart (see Cyclolog tutorial, part 4). Use the right-click menu to access the editing options:



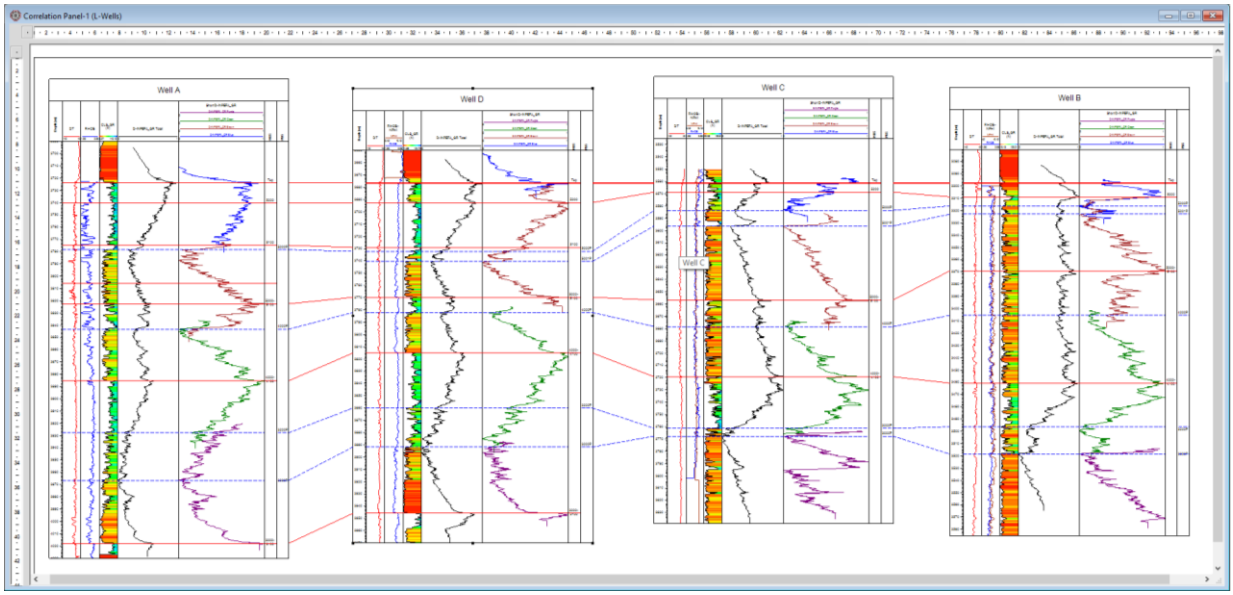

From these editing options, the following are only accessible from the correlation panel: Delete Chart, Connect Breaks and Connect Reservoirs.

## 9.7 To connect breaks/reservoirs automatically

To connect breaks or reservoirs in adjacent wells, correlation lines can be drawn automatically. The workflow for connecting reservoirs is analogous to that of breaks. Therefore, only the workflow for breaks is shown here. In order to be connected, the names of the break sets and their respective breaks must be the same for all wells.

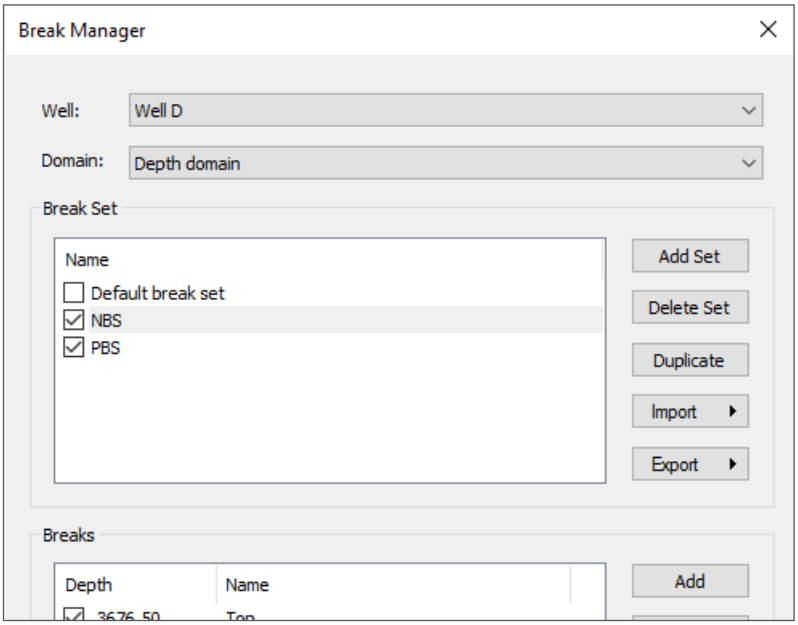
To check which breaks will be connected by CycloLog:

- Right-click on a composite well chart, select **Connect Breaks**, and select a break set.
- Breaks recognised by CycloLog as being the same are connected.
- You can connect more than one break sets as long as they have the same name in all wells.




Use this display to check that the breaks have been connected as expected. If not, check the following:

- Breaks are given *exactly* the same name in each well.
- Breaks are in a break set having *exactly* the same name in each well.
- Breaks are checked in the **Break Manager** (right-click on a composite chart and select Break Manager, see below for checked of Break Set boxes (NBS and PBS).



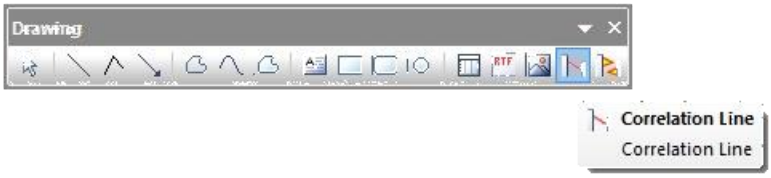
## 9.8 Adding correlation lines manually

Correlation lines can also be drawn manually to connect breaks or reservoirs in adjacent wells. The workflow for manually connecting reservoirs is analogous to that of breaks. Therefore, only the workflow for connecting breaks manually is shown here.

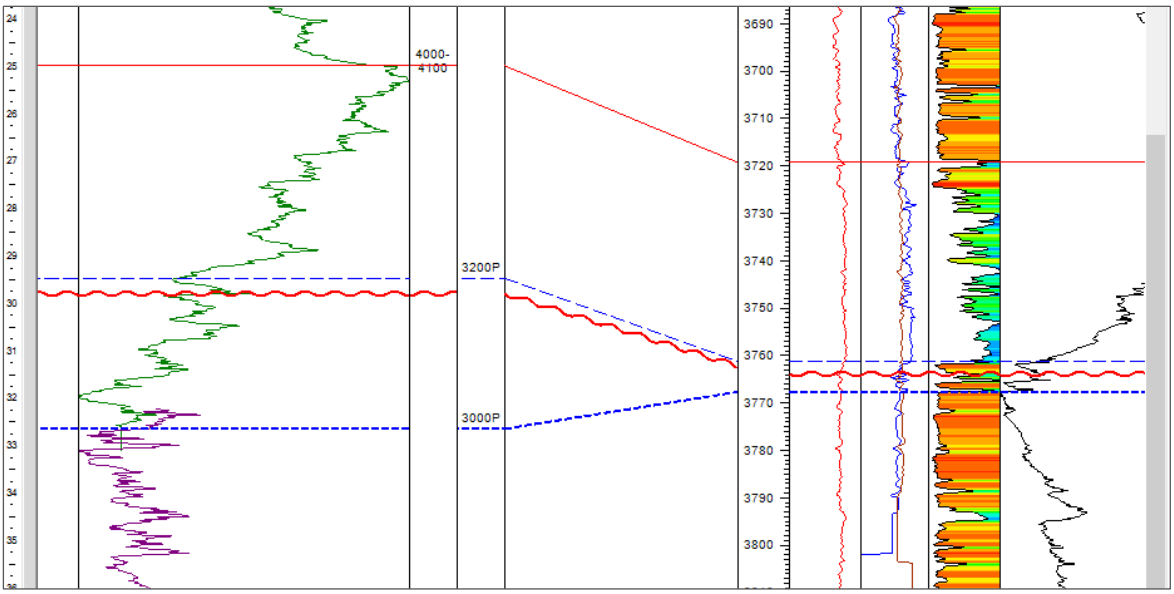
Breaks in one well that have no equivalent in an adjacent well will not be connected automatically by CycloLog. However, you may wish to add more correlation lines, to make your interpretation clearer.

How to add a correlation line manually:

- On the **Drawing** toolbar, click the **Correlation Line** icon:

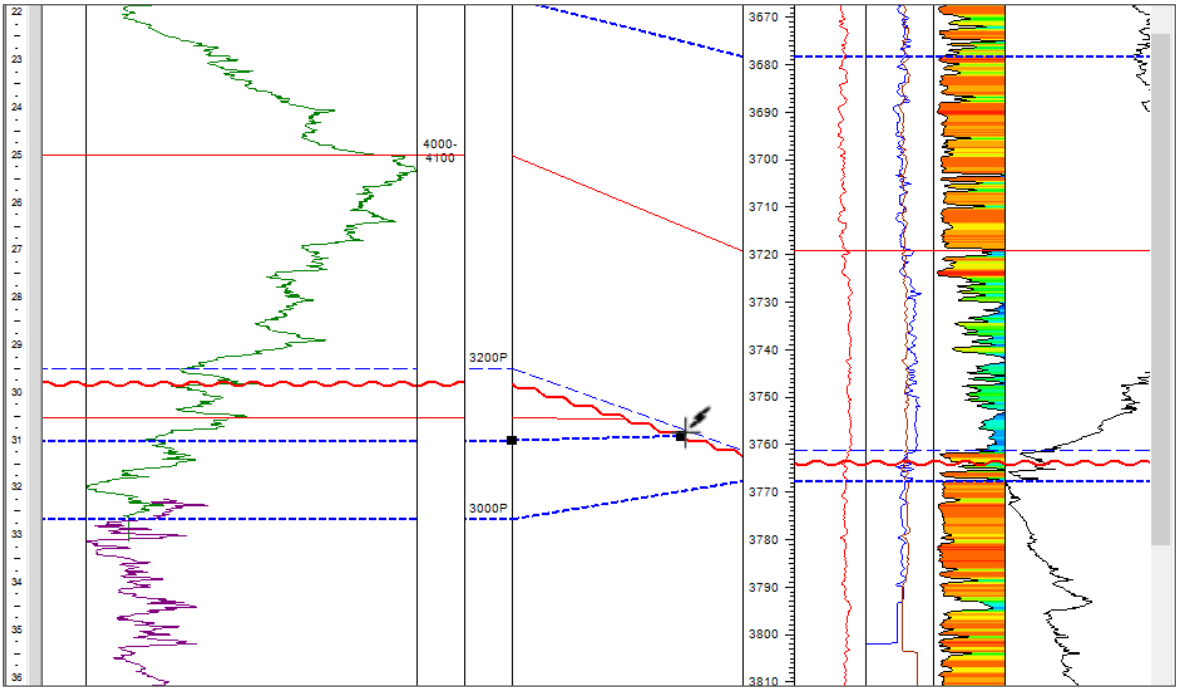



- (Alternatively, select from the main menu bar **Layout → Insert → Correlation Line**.)
- When the cursor is moved close to the edge of one of the composite charts, *and* close to the position of a break, the cursor changes to a cross and a flash:
- Position the cursor at one end of the line you wish to draw (the position need not be exact).



- Hold down the left mouse button, and drag the cursor to the break on the adjacent well that you wish to connect (cursor changes to cross-and-flash again).
- Release the mouse button; CycloLog completes the line.
- Once the action is completed, switch off the 'correlation line' functionality, by clicking on the 'select arrow' in the drawing toolbar, or 'somewhere in the correlation panel'.

You can also use the same operations to connect a break in one well to anywhere along a correlation line:




To delete a correlation line:

- Click on the correlation line to be deleted.
- Small black squares appear at the ends of the selected line (see above).
- Click the keyboard **Delete** key.

## 9.9 Changing the hang level

CycloLog can change the vertical alignment (the 'hang level') of the wells in a correlation panel. The wells can be 'hung' by depth, by break, or (if reservoirs have been defined) by reservoir.

To set, or change, a hang level:

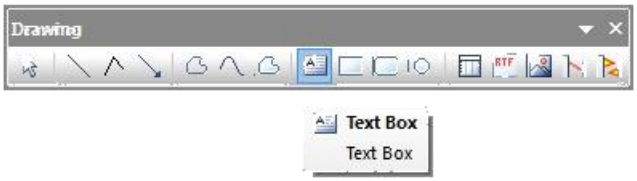
- From the main menu bar, select **Layout → Actions → Hang Level**.
- From the dialog box, select **Use Depth**, **Use break**, or **Use reservoir**.
- If a break or a reservoir is used, the dialog box will offer a drop-down list of all the breaks (or reservoirs) defined in this project. Select the break (or reservoir) to be used as hang level, and click **OK**.
- The vertical alignment of the wells changes such that the chosen hang level (depth, break, or reservoir) is horizontal.

## 9.10 Adding a title box or a graphic

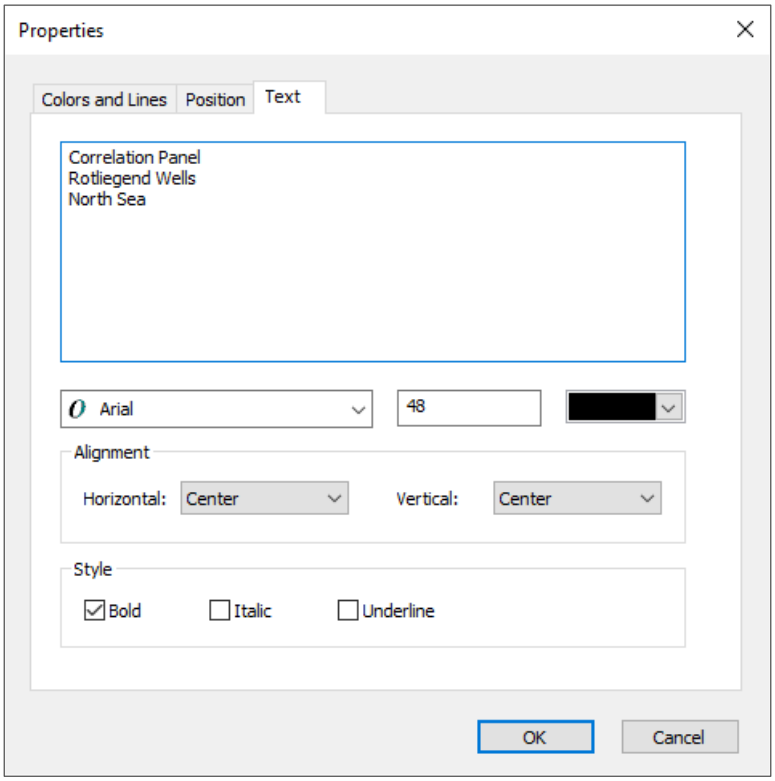
Two kinds of text boxes are available: a simple **Text Box**, and a **Rich Text Box**. A simple Text Box can display text without or with less formatting than a Rich Text Box. Both textboxes can be used to create a title box, or to add any other kind of textual information in a correlation panel.

To add a **Text Box** to a correlation panel:

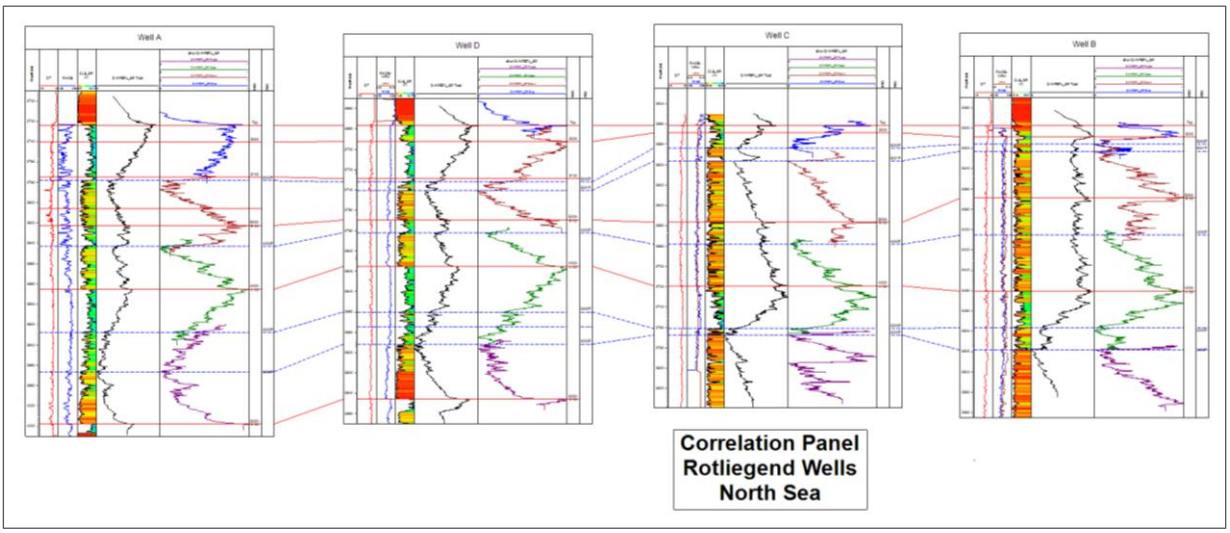
- Click on the **Text box** icon on the **Drawing Toolbar**:




- Alternatively, go to the main menu bar and select **Layout → Insert → Text Box**.
- Position the cursor on the correlation panel where you would like the top-left corner of the text box to appear (it can be moved later).
- Click the left mouse button.
- The following dialog box opens:




- Enter the required text.
- Select the font, font size, font style, and colour: these will apply to all the text in the box (if you need more variety, use the Rich Text Box).
- On the **Colors and Lines** tab you can:
  - select a colour fill for the text box, and
  - change the style of the line around the box (use white if you don't want any line).
- On the **Position** tab, you can specify the exact position of the text box.
- Click **OK** when you have finished:




To move the text box, position the cursor over the text box, hold down the left button, and drag the box to the required position.

To modify the text or any other feature of the text box, double-click over it to re-open the **Text Box Properties** dialog box.

## 9.11 Adding a Rich Text Box

To create a **Rich Text Box**:

- Set up your text, including formatting, in a word processor.
- Save your text as a **Rich Text** (*.rtf) file.
- Create a Rich Text Box EITHER by clicking on the RTF icon on the **Drawing** toolbar, OR go to the main menu bar and select **Layout → Insert → Rich Text Box**.
- Position the cursor on the correlation panel where you would like the top-left corner of the text box to appear (it can be moved later).
- Double-click on the Rich Text Box to open the **Properties** dialog.
- On the **Text** tab, click on the **Import** button and navigate to the *.rtf file.
- Click **Open** to import the contents of the file.
- Use the **Colors and Lines** tab to change the color fill and the style of the line bounding the box.
- The position of the box can either be specified on the **Position** tab, or it can be moved using the mouse.
- The size of the box can be adjusted by clicking and dragging on its side and corner handles.

*Note that you cannot modify the contents of a Rich Text Box within CycloLog: if textual changes are required, make these changes to the *.rtf file in the word processor, then re-import it.*

## 9.12 Adding a graphic to a correlation panel

Graphics objects can also be added to a correlation panel:

- EITHER click the **Image** icon on the **Drawing Toolbar**, OR go to the main menu bar and select **Layout → Insert → Image**.
- Click once over the correlation panel to indicate the location of the top left corner of the image.
- In the dialog box that opens, navigate to the image file to be added.
- Click **Open**.
- The image can be moved and resized interactively in the correlation panel.
- Right-click over the image to access its **Properties** dialog, in which you can specify the colour and thickness of the line bounding the image.

## 9.13 Printing and exporting a correlation panel

Correlation panels can be either printed directly from CycloLog, or exported as graphics files for use in another application.

To prepare a correlation panel for printing:

- To check the overall size of the panel, go to the main menu bar and select **Output → Chart size**. Write down the size values in mm.
- Use **Page Setup** and **Print Setup** (from the **File** menu) in the usual way, to set paper size, orientation and margins, and to select a printer.
- Use **Print Preview** to check the layout.

To export a correlation panel:

- Go to the main menu bar and select **Output**.
- Select the required graphics format (Bitmap, GIF, JPG, PNG, or TIFF).
- Navigate to the required folder, and give the file a name.
- Click **Save**.

You can also export the Correlation Panel as a PDF file (for details refer to the Help manual in CycloLog). To do so:

- Check the size of the correlation panel. Go to the menu bar and select **Output → Chart Size**. Write down the size values in mm.
- Go to **File → Print Setup**. Select the pdf print option (you will have to have a PDF driver installed on your machine).
- In **Print Setup** select the custom page size and use the size dimensions you wrote down above.
- Set the resolution quality. Usually, 300 dpi is sufficient.
- In **File → Page Setup**, you may add 2 or 3 mm's to the page margins.
- Check the customized dimensions with **File → Print Preview** or **Print Preview** from the Standard toolbar.
- If necessary, adjust the size and margins as described here above.
- Print the PDF.

# Part 10 - Exporting data from CycloLog

## 10.1 Exporting data from CycloLog

In addition to a comprehensive range of possibilities for exporting data and graphics, CycloLog comprises additional export function for reservoirs that enables direct communication with other platforms. The exported files, however, can also be imported into other platforms. Some export options have been mentioned elsewhere in the CycloLog Tutorial: here the most important functions are brought together for the convenience of the user.

In the table below, an overview is given of the different data export options for wells, breaks and reservoirs in CycloLog. The function of each export option and the reference to the Tutorial in which they are discussed are also indicated.

| *Data Type* | *Export Option* | *Function* | *Tutorial Base Module* |
|---|---|---|---|
| Wells | File → Export → LAS File | Exports (selected) logs per well | This part 10.2 |
| | File → Export → General ASCII | Exports (selected) logs per well | This part 10.2 |
| | File → Export → CycloLog File | Exports (selected) logs per selected well | This part 10.2 |
| | File → Export → Batch Export LAS | Exports (selected) logs for selected wells | This part10.2 |
| Breaks | Edit → Edit Breaks: Break Manager | Per well, exports (selected) breaks from a selected break set | Part 5.8 and this part 10.3 |
| | Edit → Set Manager… | For selected wells, exports (selected) breaks from selected break sets | Part 8.8 |
| Reservoirs | Edit → Edit Reservoirs: Reservoir Manager | Per well, exports (selected) reservoirs from a selected reservoir set | Part 6.8 and this part 10.4 |
| | Edit → Set Manager… | For selected wells, exports (selected) reservoirs from selected reservoir sets | Part 8.8 |

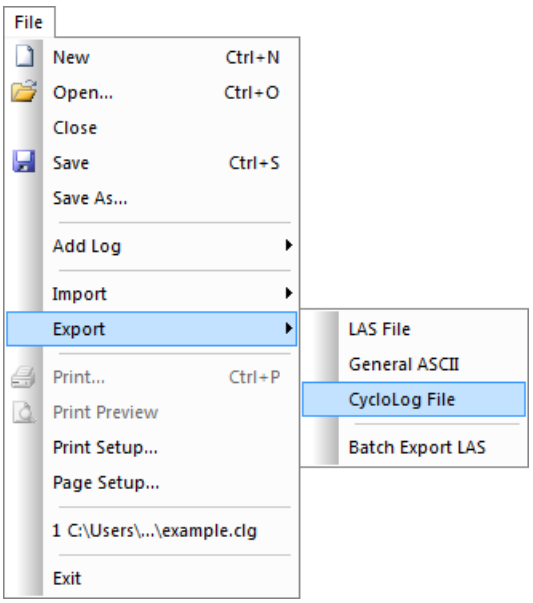
## 10.2 Exporting wells

Wells can be exported from CycloLog as (1) a CycloLog file, (2) a LAS file, or (3) an ASCII (text) file.

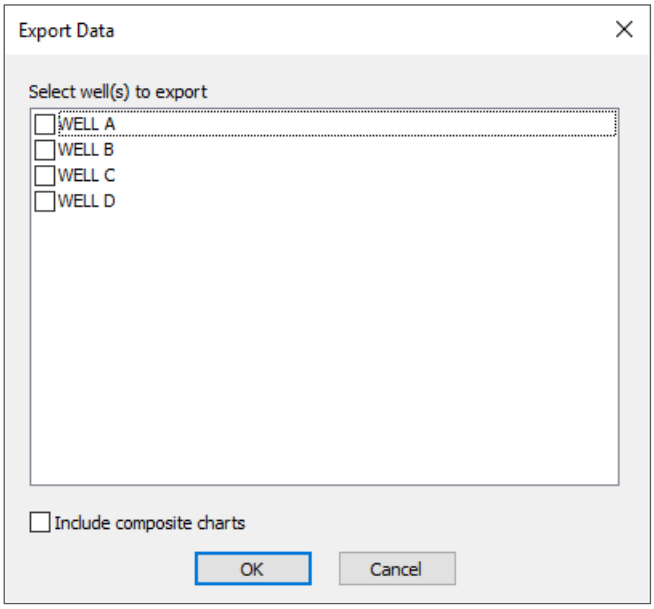
### *10.2.1 Exporting wells as CycloLog files*

Given a CycloLog project file with a number of wells in it, you may wish to export a single well as a separate CycloLog file. To do this:

- Go to the main menu bar and select **File → Export → CycloLog File**.




- The following dialog box opens:



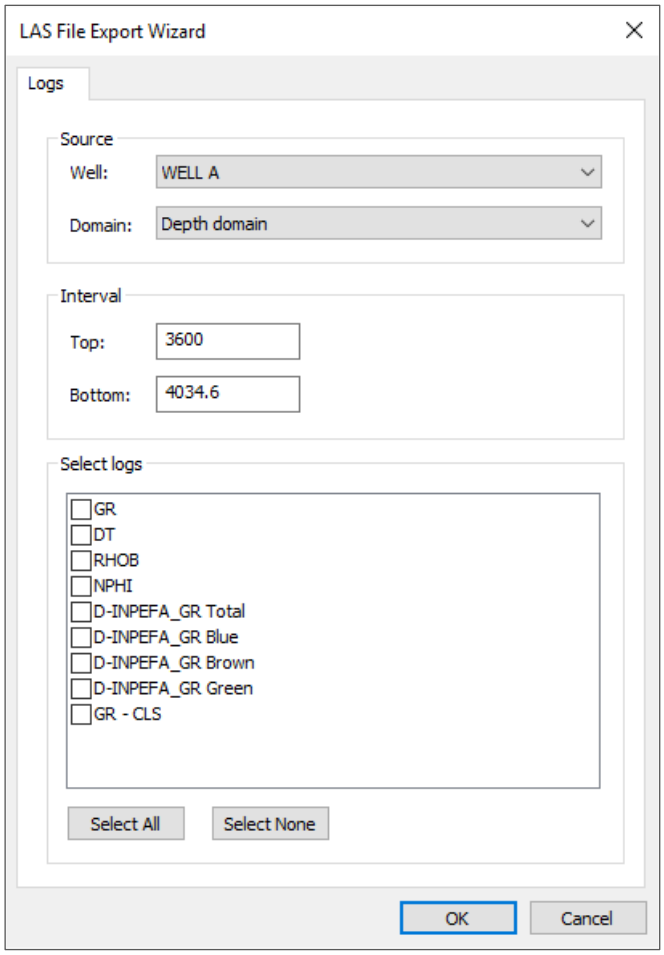
- Check the well(s) that you wish to export.
- Check the **Include composite charts** box if you want any composite charts to be included in the export.
- Click **OK**.
- In the **Save As** dialog box, name the new *.clg file and navigate to the folder you want to save it in.
- Click **Save**.
- CycloLog creates the new *.clg file.

### *10.2.2 Exporting wells as LAS files*

It is also possible to export wells from CycloLog as standard LAS files: this can be useful for exporting (for example) INPEFA curves in a form that can be easily loaded into another application.

To export a well to LAS:

- Go to the main menu bar and select **File → Export → LAS File**. The following dialog box opens:

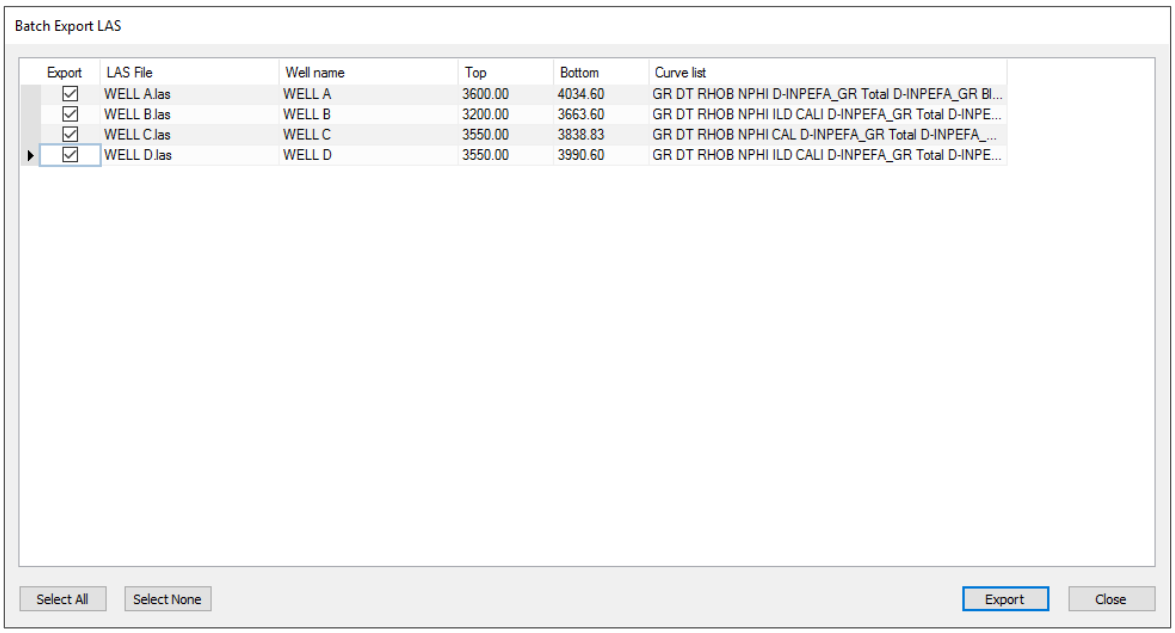


- In the **LAS File Export Wizard**:
  - Select the well for export from the **Well** drop-down list.
  - Specify the **Depth Interval** for export (the default is the full depth interval in the current CycloLog project).
  - Under **Select logs**, check the logs to be exported (or, use **Select All**).
  - Click **OK**.
  - In the **Save As** box, specify the file name and folder.
  - Click **Save.**

### *10.2.3 Batch export of LAS files*

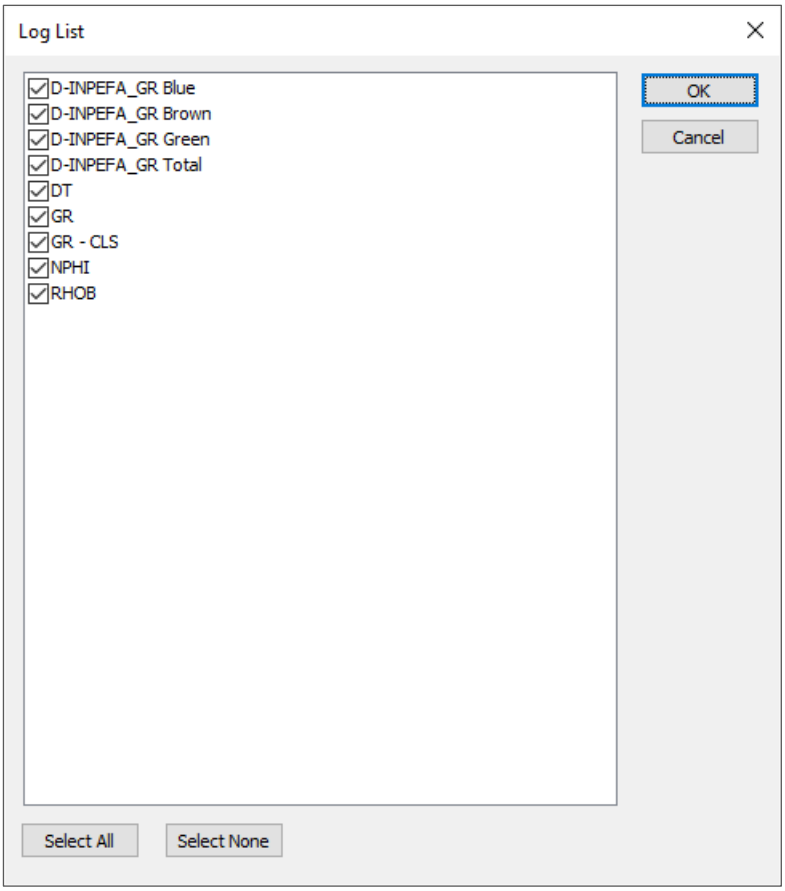
From a CycloLog project file with more than one well, you can export several (or all) wells to LAS files at the same time.

- Go to the main menu bar and select **File → Export → Batch Export LAS**. The following dialog box opens:




- Either use the **Select All** button to select all the wells, or check the boxes in the left-hand (**Export**) column for a selection of wells.
- In the **LAS File** column, CycloLog suggests a filename for each LAS file to be created: to change any of these, click over the file name and make your changes.

- By default, CycloLog will export the whole depth interval, but you can select part of the interval by changing the depths in the **Top** and **Bottom** columns.
- By default, CycloLog will export all of the logs for each well: the names of the first few logs will appear in the **Curve list** column. To change your selection of logs, click in the curve list and then on the button with three dots at the right hand end of the Curve list column. This will open the full list of logs:



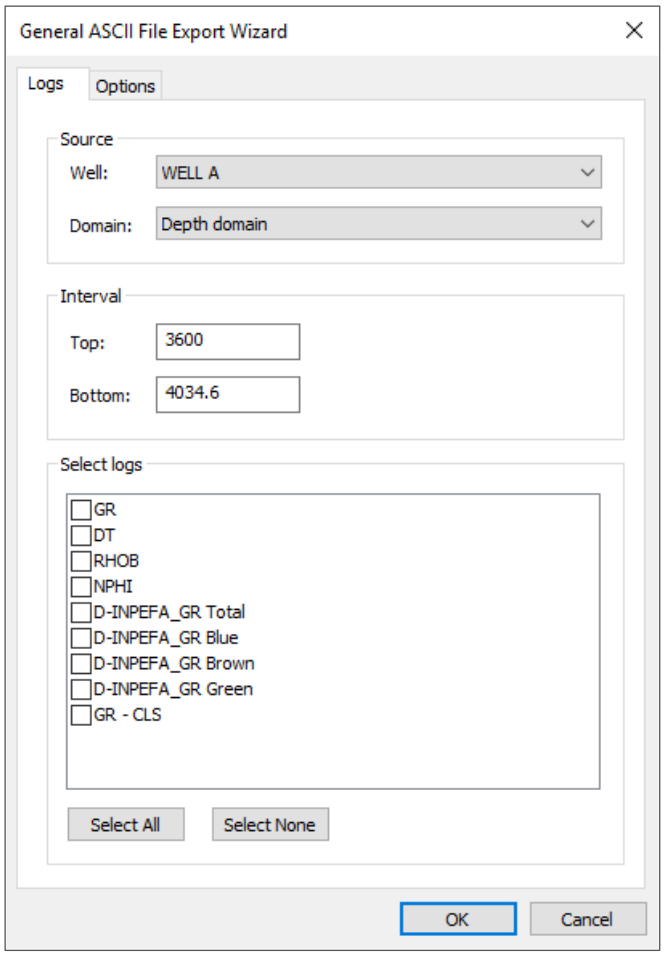

- Uncheck the logs that you that you do not wish to export (or, **Select None**, then check those that you wish to export) and click OK.
- Back in the **Batch Export LAS** dialog box, click on the **Export** button.
- In the next dialog box, navigate to the folder into which the LAS files are to be saved (click on **Make New Folder** button for a new folder).
- Click **OK** to export the selected wells and logs to the new files.

### *10.2.4 Exporting wells as ASCII files*

It is also possible to export wells from CycloLog as a simple ASCII file. This may be your preferred route if you wish to load the log data (including logs such as INPEFA curves that you may have generated in CycloLog) into a spreadsheet or other application.

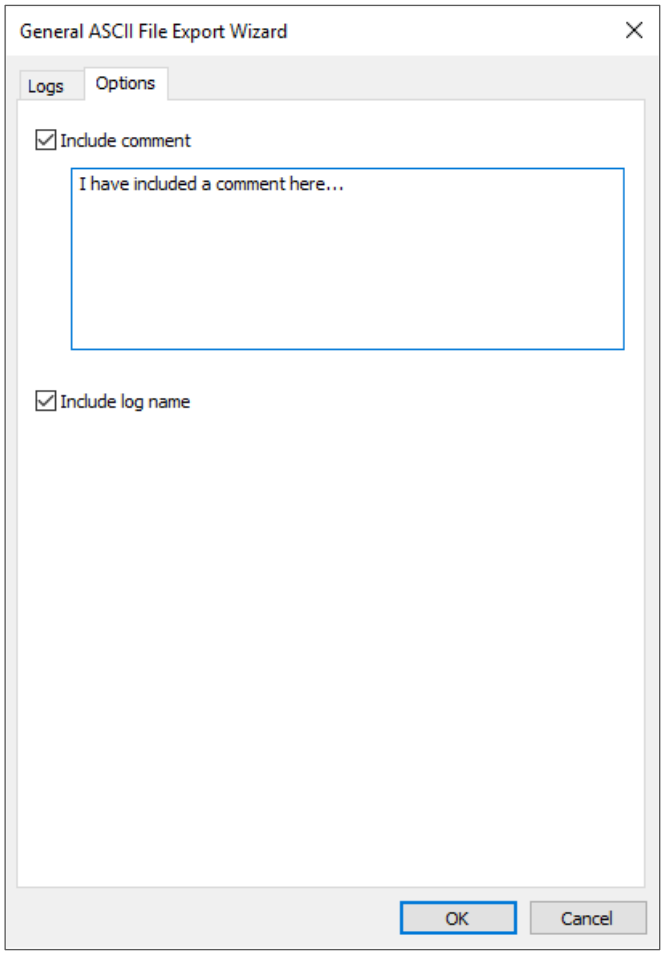
To export a well to ASCII:

- Go to the main menu bar and select **File → Export → General ASCII**. The following dialog box opens:




- The **General ASCII File Export** dialog box has two tabs:
  - The **Logs** tab, which is identical to the dialog box for LAS export (see also above).
  - The **Options** tab.
- On the **Logs** tab, specify the well, the depth interval, and the logs to be exported.
- Go to the **Options** tab if you wish to include a text comment in the exported file, and/or to include the names of the logs in the file.

- Check the **Include comment** box and type a comment.




- Check the **Include log name** box, if you want the names of the logs to be included in the file.
- Click **OK** and specify the file name and folder in the **Save As** dialog: by default, the file will be saved as *.asc; change this (e.g. to *.txt) if you wish.

If you have opted to include a comment and the log names (as in the illustrated dialog box above), the start of the new ASCII file will look like this:

```
I have included a comment here....
DEPTH
GR
DT
RHOB
NPHI
D-INPEFA_GR Total
D-INPEFA_GR Blue
D-INPEFA_GR Brown
D-INPEFA_GR Green
GR - CLS
3600.000000     8.291000   68.081497  0.000000   0.000000
     0.000000   0.000000   0.000000   0.000000   8.291000
3600.200000     20.959200  67.850197  0.000000   0.000000
     0.000000   0.000000   0.000000   0.000000   20.959200
3600.400000     54.639599  68.026199  0.000000   0.000000
     0.000000   0.000000   0.000000   0.000000   54.639599
3600.600000     57.169800  68.301102  0.000000   0.000000
     0.000000   0.000000   0.000000   0.000000   57.169800
3600.800000     57.303699  68.265099  0.000000   0.000000
     0.000000   0.000000   0.000000   0.000000   57.303699
3601.000000     19.155800  67.964798  0.000000   0.000000
     0.000000   0.000000   0.000000   0.000000   19.155800
3601.200000     16.259001  67.728500  0.000000   0.000000
```

## 10.3 Exporting breaks

A set of stratigraphic 'breaks' is often the most important result from a study using CycloLog. Therefore, it is important to be able to export the break data.

To export a set of breaks from a single well (see also part 5):

- Open the **Break Manager**. This can be done in several ways:
  - From the main menu, select: **Edit → Edit Breaks**.
  - From the **Edit Breaks** icon on the **Break Bar** toolbar.
  - From the right-click menu over any open Lag Data pane.
  - From the right-click menu over a composite well chart.
- Select the break set for export by clicking once on it in the **Break Set** list.
- Click **Export**.
- Select either **File** (to export to a file), or **Clipboard** (to transfer the data to another application such as a spreadsheet).
- If you select **File**, note that two formats are available:
  - **Break File** (*.brk), in which all of the break properties (depth, name, line style, comments, etc.) are preserved. This file can only be read by CycloLog.
  - **Tabular File** (*.asc), in which only the break depth and break name are preserved.

*To export a batch of wells and their break sets and breaks, use the Set Manager see part 8.8.*

## 10.4 Exporting reservoir data

Like sets of Breaks, Reservoirs can be exported from a CycloLog project to an ASCII file, either for use in another application, or for importing to another CycloLog project.

To export a set of reservoirs (see also part 6):

- Open the **Reservoir Manager**. This can be done in several ways:
  - From the main menu, select: **Edit → Edit Reservoirs**.
  - From the **Edit Reservoirs** icon on the **Reservoir Bar** toolbar.
  - From the right-click menu over any open Lag Data pane.
  - From the right-click menu over a composite well chart.
- Select the **Reservoir set** to be exported.
- Uncheck any of the reservoirs that are not to be included in the export.

- Click **Export**.
- Select **Clipboard** (for immediate use in another application) or **File** (for export to a file).
- If you selected **File**, browse to the appropriate folder, and give the file a name.
- The file will be saved as a simple table with only top depth, bottom depth, and name (*.asc file). Select from the **Save as type** list in the **Save As** dialog.

*To export a batch of wells and their break sets and breaks, use the Set Manager see part 8.8.*

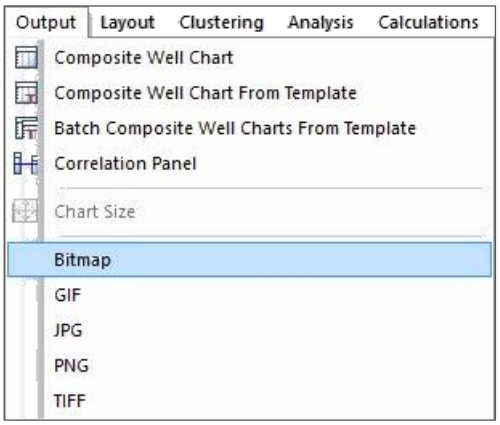
## 10.5 Exporting graphics

Several kinds of CycloLog graphics can be exported, including:

- Individual logs.
- Composite well charts.
- Correlation panels.

To export an individual log as a graphic file:

- Open the log data pane (double-click its name in the workspace).
- Make sure the log you want is active, by clicking once over its display (this important if more than one log is displayed).
- Click on the **Output** menu at the top of the screen.




- From the list of available graphics formats, select one.
- In the **Image Width** dialog, specify the width of the log column in the output file (default width is 5 cm). *(For JPG output, you may also specify the quality of the output, on a scale from 0 – 100; the default value is 80).*

- Click **OK**.
- In the **Save As** dialog, specify the name of the file and the folder to which it is to be saved.
- Click **Save**.
- The file is saved and may be imported into other applications.

To export a **composite well chart**:

A composite well chart can be directly printed from CycloLog, or exported as a graphics file.

- Open the composite chart, or (if several data panes are open), click on the chart's display pane to make it the active pane.
- To print, use **File → Print Setup** and **File → Page Setup** to set the appropriate page and print parameters, then select **File → Print** (see for more details in part 4).
- To export a composite chart as a graphics file, go to the **Output** menu, and select from the available formats: **Bitmap**, **GIF**, **JPG**, **PNG** or **TIFF**.
- You will be prompted for a file name and folder.
- Click **Save**.

To export a **Correlation Panel**:

A correlation panel can be either directly printed from CycloLog, or exported as a graphics file.

- Open the correlation panel, or (if several data panes are open), click on the chart's display pane to make it the active pane.
- Check the overall size of the panel, go to the **Output** menu and select **Chart Size** (see for more details in part 4).
- Use **Page Setup** and **Print Setup** (from the **File** menu) in the usual way, to set paper size, orientation and margins, and to select a printer.
- Use **Print Preview** to check the layout.
- Make any necessary changes then click **Print**.
- To export a correlation panel as a graphics file, go to the **Output** menu, and select from the available formats: **Bitmap**, **GIF**, **JPG**, **PNG** or **TIFF**.
- You will be prompted for a file name and folder.
- Click **Save**.