Diamant Guided Session #2

A01 • Requirements

Diamant has the ability to load automatically DMP2 multiple wells production data sets. The DMP2 format is an ASCII format originating from Dwights Detail Production Export format.
The object of this guided session is to illustrate this feature of Diamant and show how production data can be displayed, plotted and manipulated on a well to well and field wide basis.
The session uses the files DmtGS02.dp2 and DmtGS02_contour.txt copied during the Diamant installation and located in the Examples subdirectory.
It is assumed that the user has already followed and completed the Diamant guided session # 1.

B01• Creating a new Diamant project

Launch Diamant standalone or through Ecrin workstation and create a new field by clicking on  or the file menu “New”. Let’s call the field “DmtGS02” with reference date 01 Jan 1979 and reference coordinates of well A01 in decimal degrees W41.87524 N28.08579. See Fig B01.1.

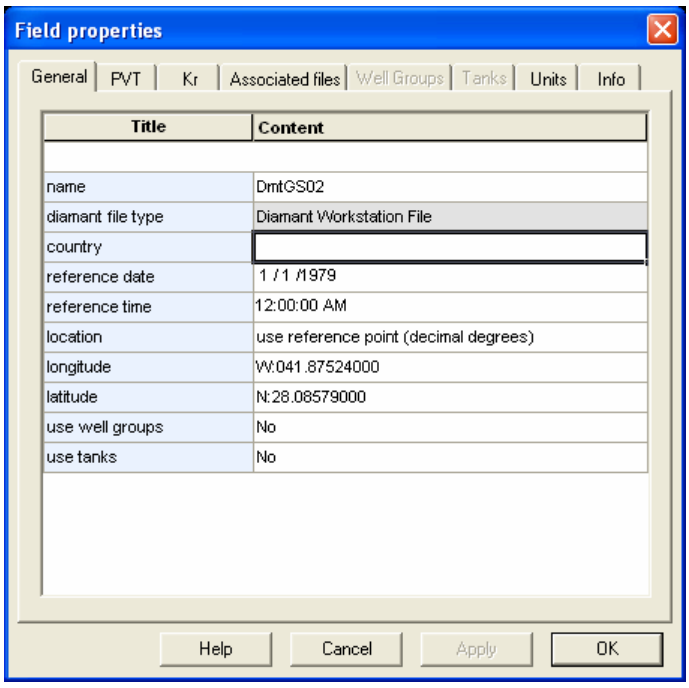
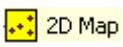


Fig B01.1 – Field properties

Click Ok, the browser now shows the added nodes of field “DmtGS02”, “Technical Objects” and the “2D-Map”. Click on the node  in the browser to display the default 2D-Map (square reservoir), double click on the contour in the 2D Map to access the “Field contour” dialog.



Choose the tab “Trajectory” and click on Load to load the trajectory file “DmtGS02_contour.txt”. There is a warning to the user that “In the current coordinates system, reference point is at location (0,0). Do you want to continue?”, this is in fact equal to the reference coordinates of the field that has been assigned to the latitude and longitude of the first well in the DMP2 file (to be loaded later), thus this well becomes the “reference well”. Click “Yes” to continue and choose the file “DmtGS02_contour.txt”. The load dialog appears and displays the trajectory coordinates automatically recognized as (X,Y). Click Load and Ok. To display the new 2D Map the user need to reset the scale by using in the 2D Map specific toolbar. See Fig B01.2.

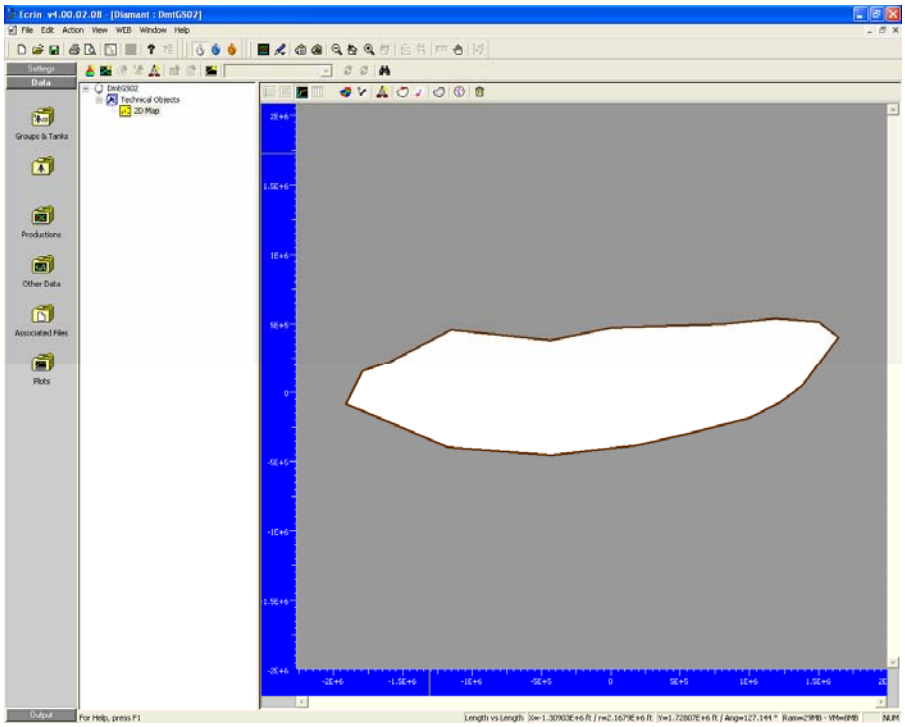
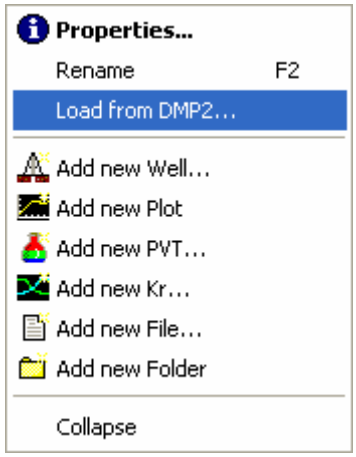


Fig B01.2 2D Map

B01.1 • Loading the DMP2 formatted data

In the hierarchal list right click on the field “DmtGS02” and choose the option “Load” >> “from DMP2…”, browse to the file “DmtGS02.dp2” and proceed to load.



Diamant scans the file and displays the Diamant Load dialog, Fig B01.3.

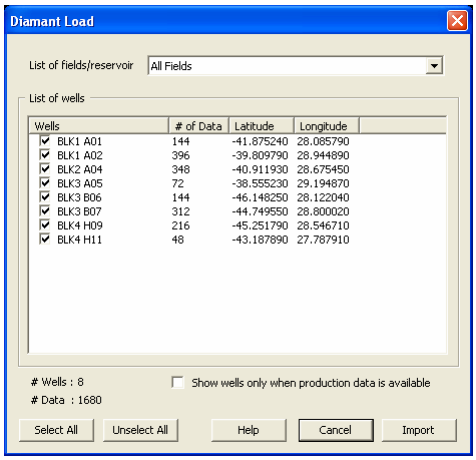
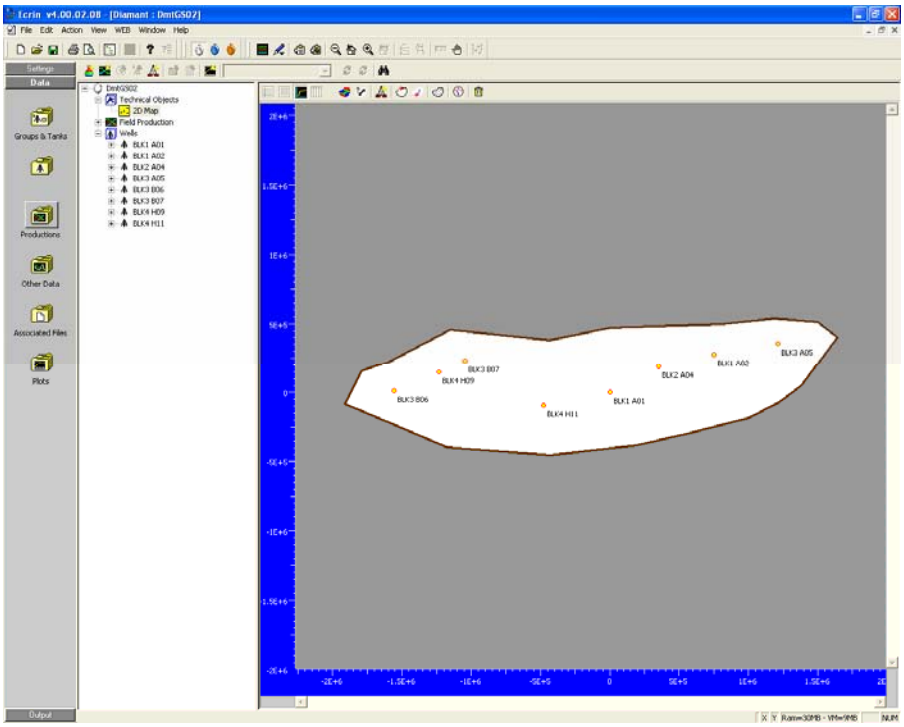


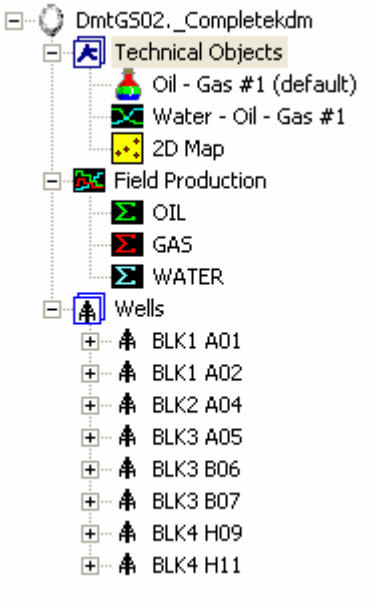
Fig B01.3 – Diamant Load

The DMP2 file may contain more than one field; the user can choose the field in the top droplist; in this example, only one field is available: select “MY FIELD”. A list of the wells for the selected field is displayed. The wells can be checked or unchecked for loading. It is also possible to ignore wells with no production data by checking the appropriate checkbox. Click Import to start the load. Diamant reads all the relevant information in the file and adds the data and the wells to the browser and the 2D Map. Fig B01. 4.


Fig B01.4 – Diamant window after load

For the field, a “Field Production” node is added in the browser with an individual node for the total field oil, gas and water production. Each well node has sub nodes for individual oil, gas and water production and a node for “Other data” and “Associated files”. “Other data” would typically be WHP, BHP, WHT, BHT and any other variable of significance. “Associated files” could be any file pertinent to the well (Saphir, Emeraude, Topaze, Word and Excel files etc.).

Let's add two more technical objects to again illustrate this feature (ref. Guided Session #1). Click on in the browser toolbar to add a "New PVT" object. Just accept the default PVT model by clicking Ok. Add a relative permeability object, click on and accept the default values with Ok. The two new objects are displayed as nodes under the node "Technical Objects".
When the user wishes to add any object in the hierarchy of the browser, the user can always use the popup menu by right clicking on the main node under which the new object will be added.



B01.2 • Displaying production data

There are four display modes for the objects (nodes) in the Diamant hierarchy (browser): List – Info – Plot – Table modes.

View List

View Info

View Plot

View Table

All the node specific toolbars have these four first buttons. They are active or grayed out according to the type and properties of the node activated in the browser.
Display mode selection is kept when changing nodes in the browser if the chosen node allows that of the previously selected type (of display mode). If not, Diamant automatically selects the node's default display mode.

Fields

Click on the Field node DmtGS02.

View List, lists the main objects of the field.

View Info, lists the information about the field entered at startup of the project.

Properties of the field. The user can change data that was entered at startup. Add, delete, rename, display and change properties of the various "Technical Objects" sub nodes associated with the field.

Field Production

Click on the node “Field Production”.

View List, lists the main objects of the “Field Production”. ΣOil, ΣGas, ΣWater. The sum of oil, gas and water from the individual wells defined in the field.

View Plot, plots the value of the main objects of the “Field Production”, in this case the total oil, gas and water rate of the field; the sum of all the production from the individual wells, plotted according to the time scale selected in the droplist in the main toolbar. Click on the icon from the plot toolbar to show the data legend. See Fig 5.

View table. Tabulated values of the objects ΣOil, ΣGas, ΣWater and their cumulatives listed according to the time scale selected in the droplist in the main toolbar.

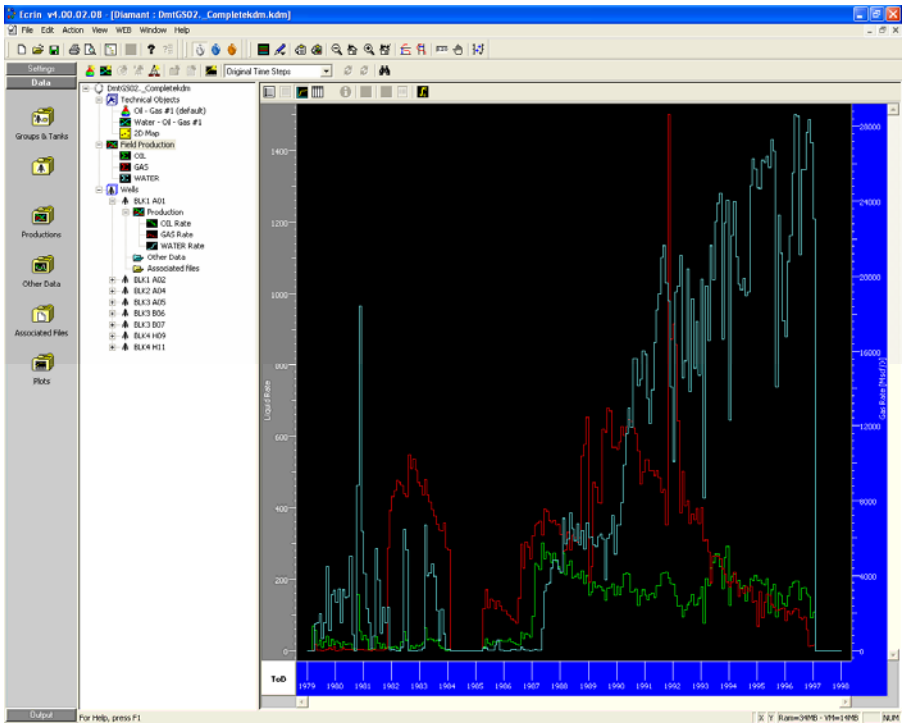


Fig B01.5 – Total Field Production

Clicking on the individual nodes ΣOil, ΣGas, ΣWater, will display the total field production of each phase value as a plot or table according to the user’s time selection in the node specific toolbar.



Wells

Click on the node Wells in the browser.

View List, lists the wells defined for this field.

Individual Wells

Click on well BLK1 A01 in the browser.

View List, lists the main objects associated with this well.

View Info, lists the information about the well as read by Diamant in the DMP2 file. Note that this well has the coordinates equal to the field reference coordinates, thus the X, Y value is (0,0).

View Plot, plots the values of the associated production (oil, gas and water) and any other data that has been loaded (pressure, temperature, choke size etc.)

Properties of the well. The user can modify data that was interpreted from the DMP2 file. Add, delete, rename, update, display and change properties of the various sub nodes associated with the well.

Delete the well and all of its content.

Click on the node 

"Productions" under the well BLK1 A01.

View List, lists the main objects associated with this well's production; oil, gas and water.

View Plot, plots the values of the associated production (oil, gas and water) according to the time scale selected in the droplist in the main toolbar.

View table. Tabulated values of the objects Oil, Gas, Water and their cumulatives listed according to the time scale selected in the droplist in the main toolbar.

Clicking on the individual nodes Oil, Gas and Water, displays the well's production of each phase value as a plot or table (with cumulatives) according to the user's time selection in the main toolbar. The plot can also display the cumulative value of the phase by using the button "Show cumulative volume" from the plot node specific toolbar. Fig 6 gives an illustration of those features for the Gas Rate Production.

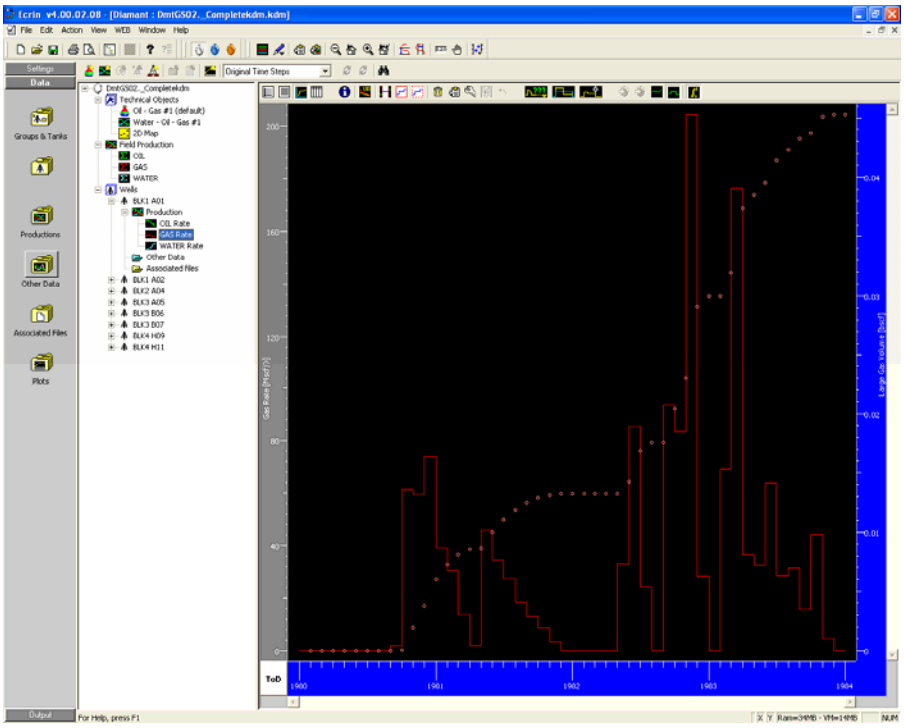
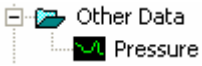


Fig B01.6 – Gas production and cumulative

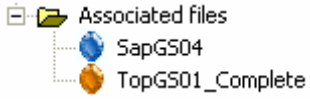
Other Data

Other data (WHP, BHP, WHT, BHT etc.) can be plotted and viewed as the production data.



Associated Files

Any file can be added as an associated file. In the case of Saphir and Topaze files, if the option to generate previews was set in the settings panel (of the application), then the previews are available in Diamant.



B01.3 • Plots and data functions

Customized plots can easily be made within Diamant by a simple “drag and drop”.

Create a new plot by clicking on the button  in the browser toolbar. A node “Plots” and sub node “Plot #1” is added to the browser hierarchy.



The “View Plot” mode  is activated and an empty plot is shown in the Diamant plot window. To illustrate the functionality of this option, activate and unfold the node of the well BLK1 A02. Use the mouse and drag the “OIL Rate” from the browser and drop it in the empty plot window. The oil rate is plotted automatically. Now drag the “WATER Rate” from the browser and drop it on top of the node 

, the oil and the water rate is plotted together. Click on the  icon from the plot toolbar to show the data legend. See Fig B01.7.

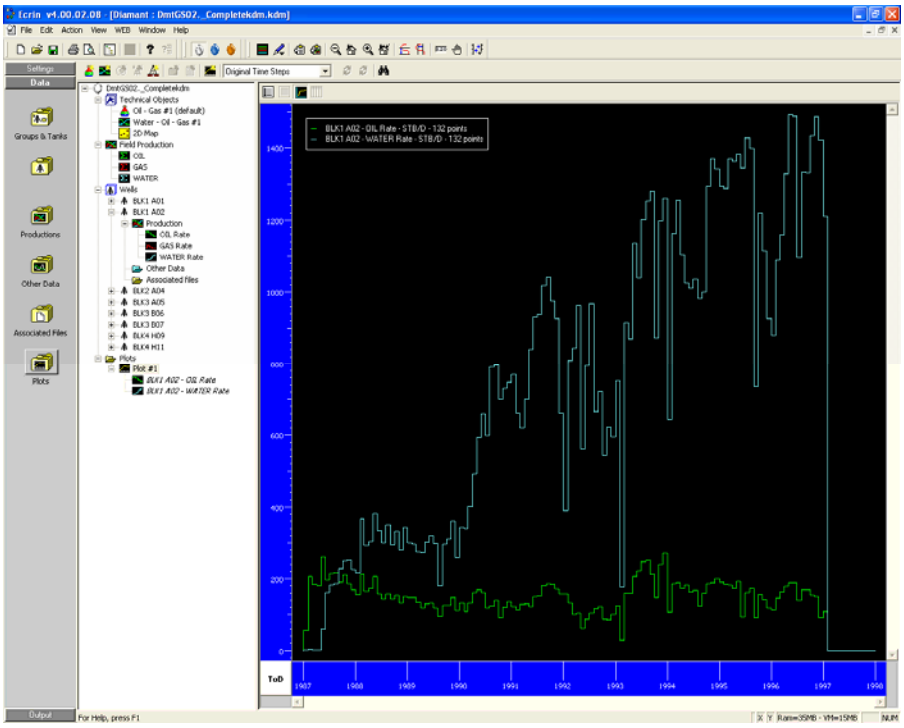


Fig B01.7 – Customized plot, oil and water

Right click on the “DmtGS02” (or the “Plots”) node in the browser to display the context sensitive popup menu, choose to create a new plot. A new plot node is added to the browser and a new “empty” plot window is displayed. Drag and drop the “GAS Rate” from well BLK1 A02 onto the Plot #2 node. The data is displayed in the plot window. Now, activate the node “Plots” and both plots are displayed in the plot window. It is possible to build as many customized plots as necessary and display as plot by plot or all together by activating the appropriate nodes. The split-bars between the plots can be dragged to resize the individual plot windows. Activate the data legend by a click on the icon. See Fig B01.8.

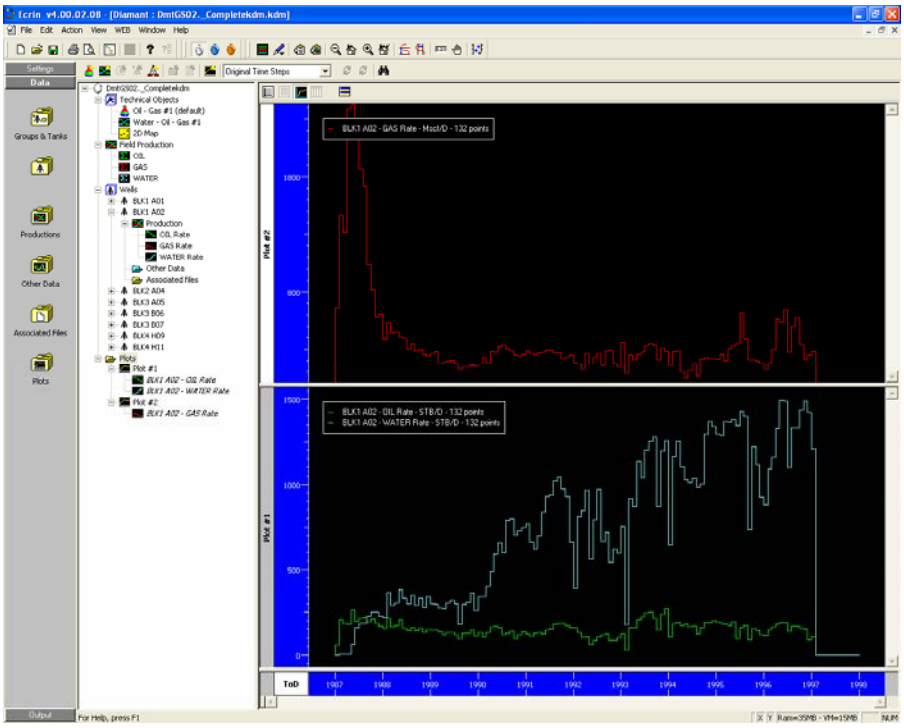


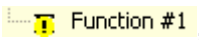
Fig B01.8 – Double plot

Data functions

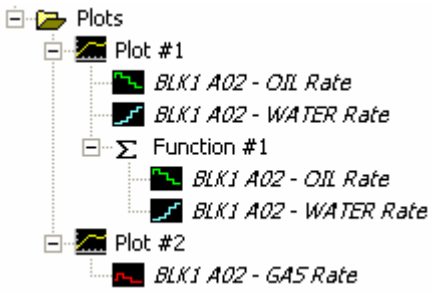
Right click on node “Plot #1” and choose from the popup menu ”Add new Data Function”, “Σ Sum” option. Double click on the new node 

to access the “Data Function properties” dialogThe user can specify the function name, steps or points and the type of time steps to use. Finally the type of function is selected in the right droplist. Currently there are three functions that can be employed: Sum, Ratio and Integral.

Sum takes the sum of data channels of the same type.
Ratio takes the ratio of first dropped channel divided by the rest.
Integral is simply the cumulative of the value.

Now drag and drop the oil and water rate onto the node 

, the sum of the rates are automatically made and displayed on the “Plot #1”. See Fig B01.9.



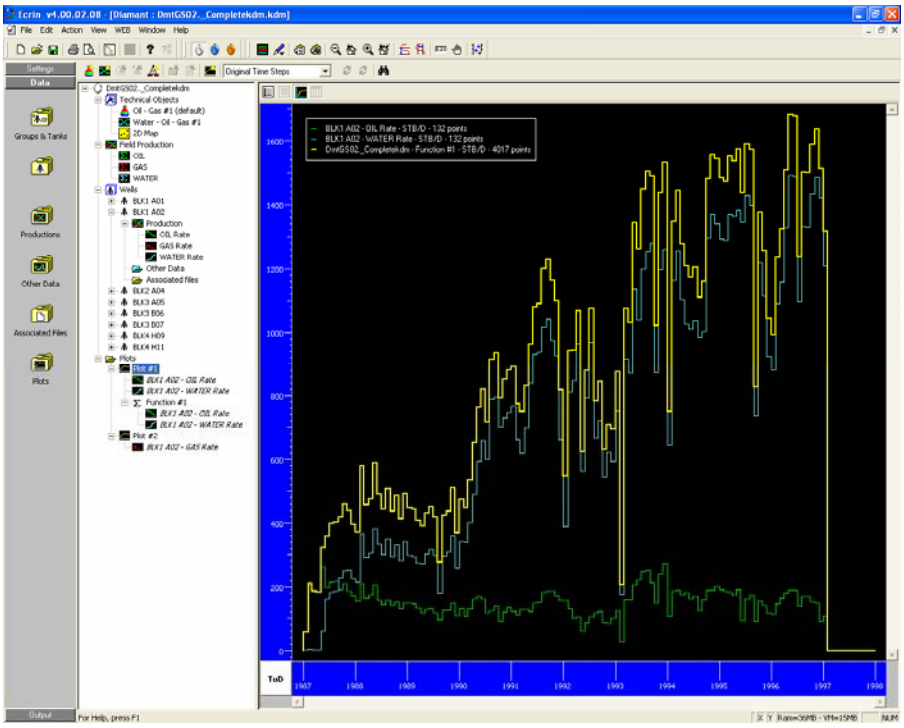


Fig B01.9 – Sum oil/water rate

To display the sum by itself, create a new plot and drop the Function #1 onto it. Activate the “Plots” node and the three plots are displayed. Click on the  icon from the plot toolbar to show the data legend. See Fig B01.10.

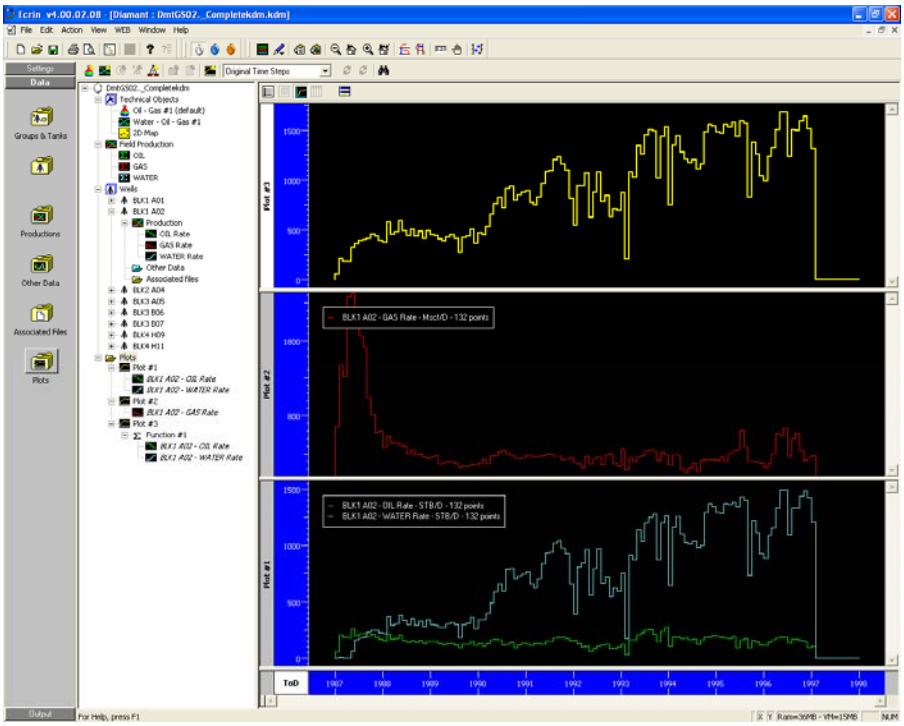


Fig B01.10 – Combination plot

Create a new plot “Plot #4”, drop the “GAS rate” and then the “OIL rate” from the well BLK1 A02 onto the new node. Right click on the node “Plot #4” to add a new function and choose the function type to be a “Ratio”. Drop the rates onto the function and the GOR is automatically constructed and displayed on the plot of “Plot #4”. By double clicking on the function node it is possible to change the plotting aspect of the GOR curve that in this example has been set to white. Fig B01.11.

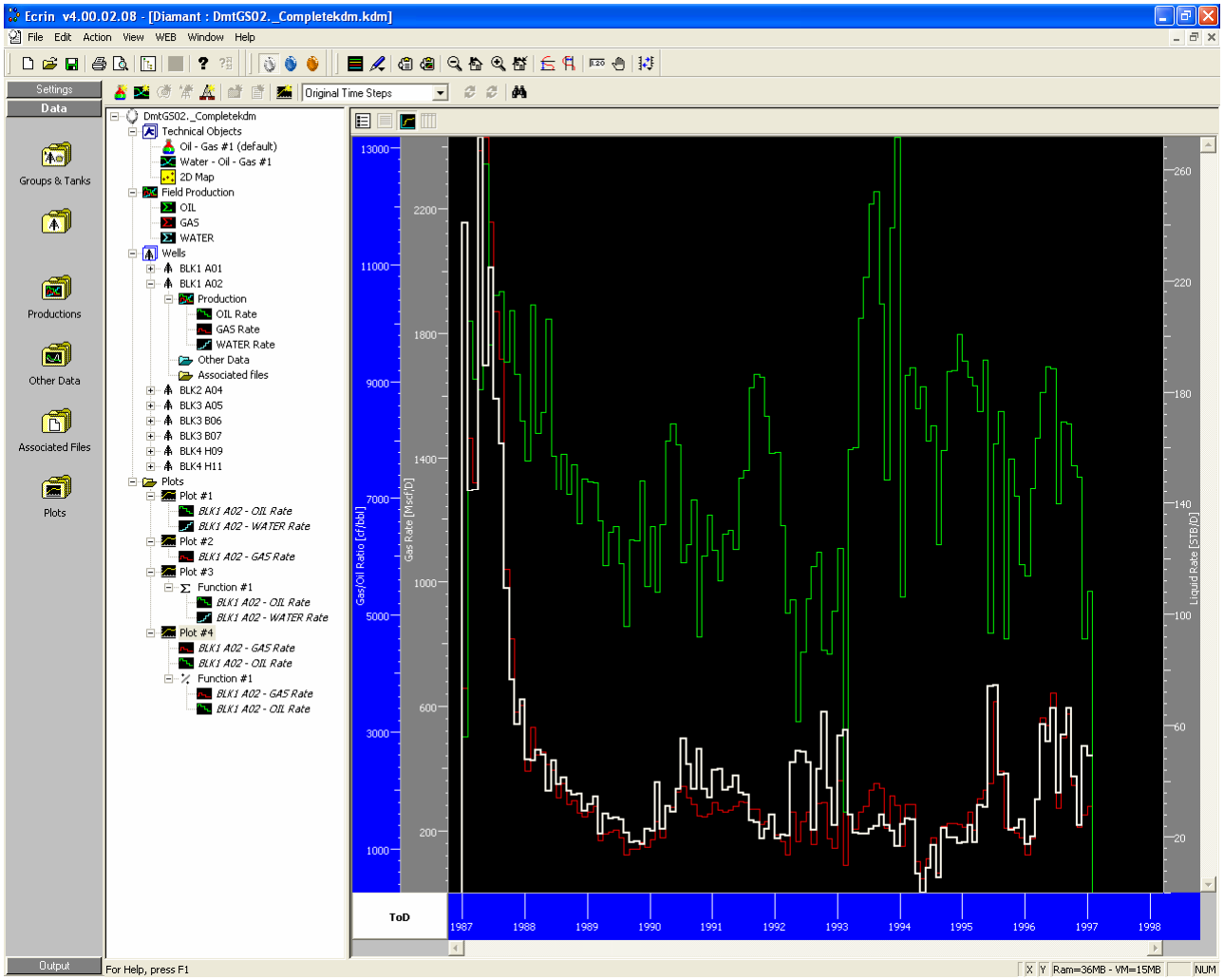


Fig B01.11 – GOR

C01• Arps analysis

Lets choose well BLK2 A04. Click on the oil rate node and the icon to display the plot of the declining oil rate. Show the Arps decline curve by clicking on the icon. Display the cumulative oil rate by clicking on the icon. The automatic match made by Diamant is not very good since it appears that the production at start up was not at its optimum and a possible bean up sequence was made as the production capacity of the surface facilities was increased from year 1986 to 1989. After 1989 we observe a typical production decline except for an attempted but not very successful stimulation or workover in 1993. We will make a decline match of the data after the workover.

Hover the mouse over the first yellow vertical dotted line (production startup) and drag it to just after the production peak in 1993. Then use the lasso option to choose the declining rate after this point in time. Choose to compute the model. The match can be modified using the icon then click and drag in the plot to modify the decline parameters graphically.

The resulting match, decline parameters and ultimate recovery is based upon a default abandonment ratio. The final plot is illustrated in Fig C01.1. The decline parameters and the abandonment ratios can be edited in the results dialog and the new Arps decline match will be reflected in the plot.

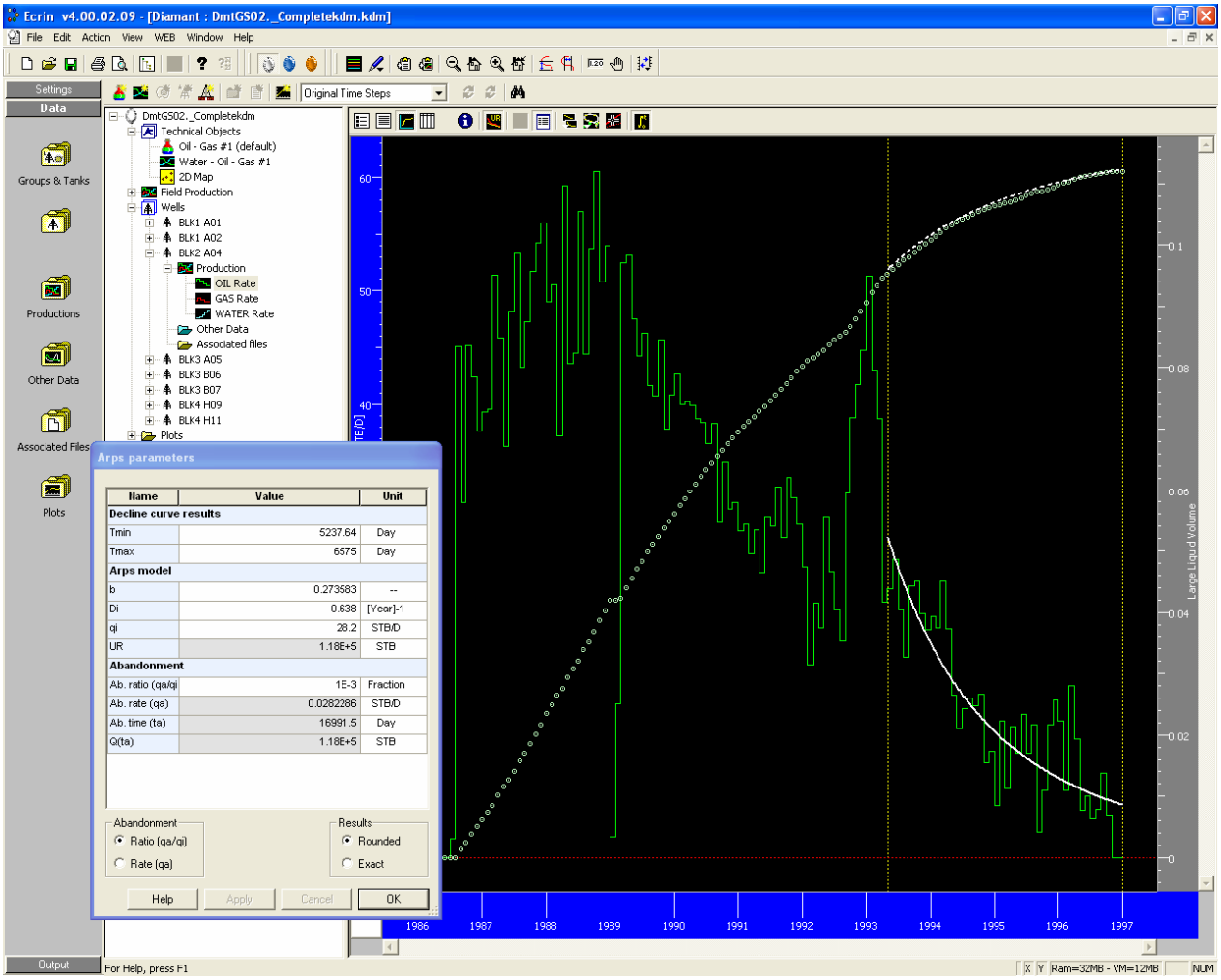


Fig C01.1 Arps decline analysis