# How To Forecast A Well Using Multiple Decline Segments

March 25, 2004

Often times you must generate a production forecast that contains two or more decline segments. An example of such a forecast would be in modeling a waterflood project. MICA has the capability to use any number of decline segments to model production. This paper discusses how to do this.
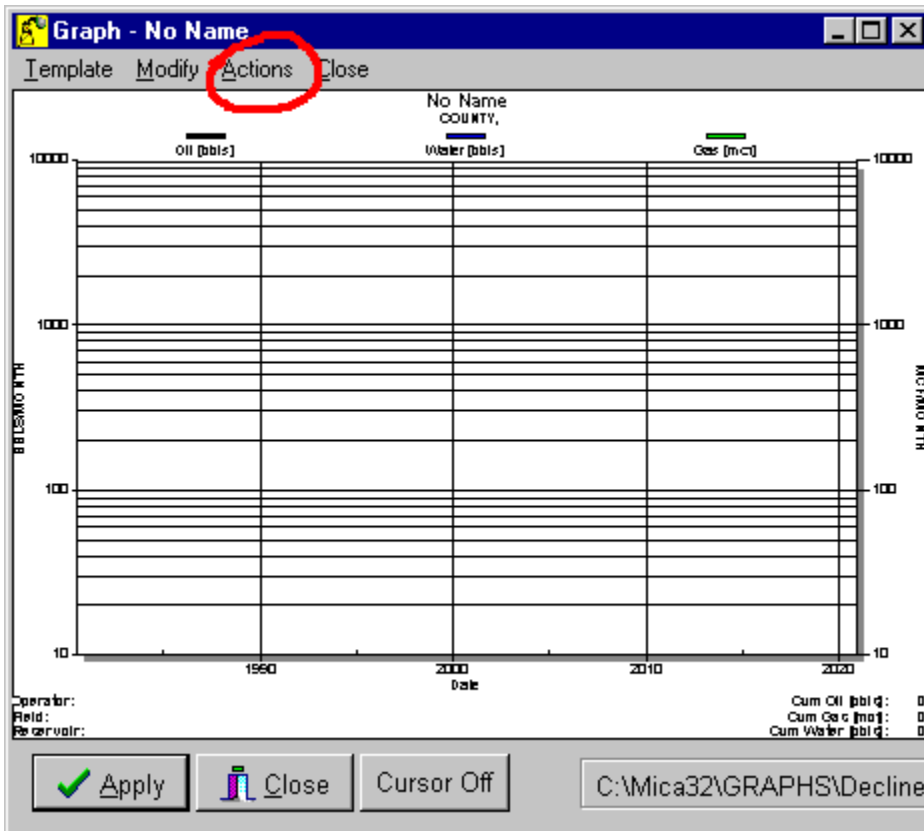
Step 1 – Open a Graph Form. Select the Graph menu item from the Well form (shown below). It is best to use a semi-log decline graph.
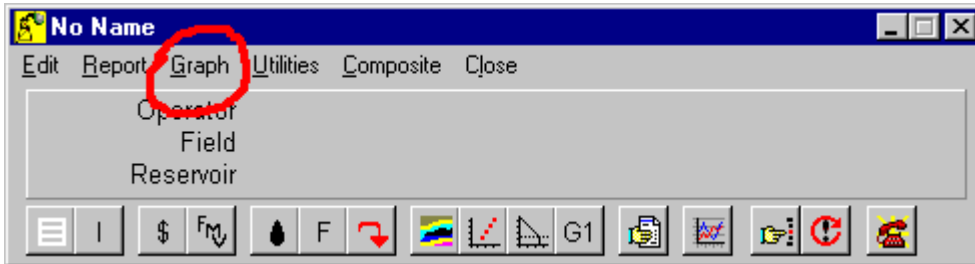
When you do this the Open File – Template form will appear. Select the Decline folder and then select the "Decline [Monthly Rates].GRT" graph template as shown below:
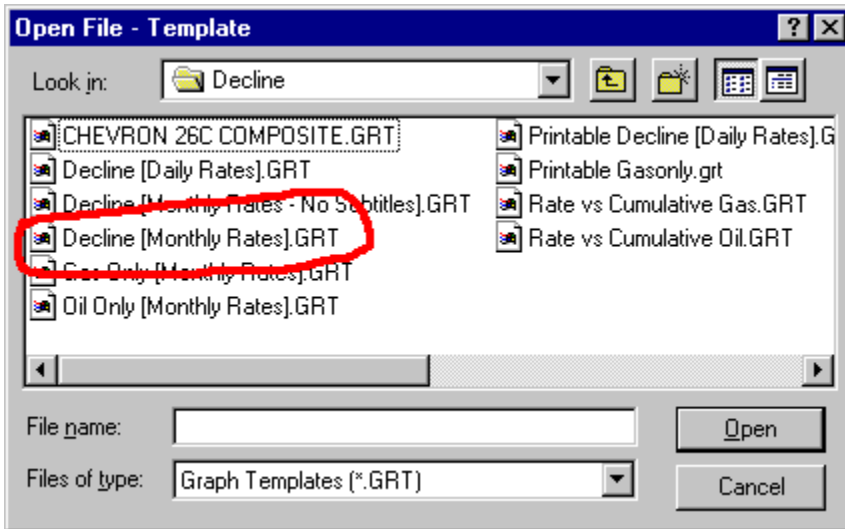
When you click the "Open" button on the form above, a semi-log decline graph will appear. In our example we have no production history so the graph is blank. Your graph may show some data.
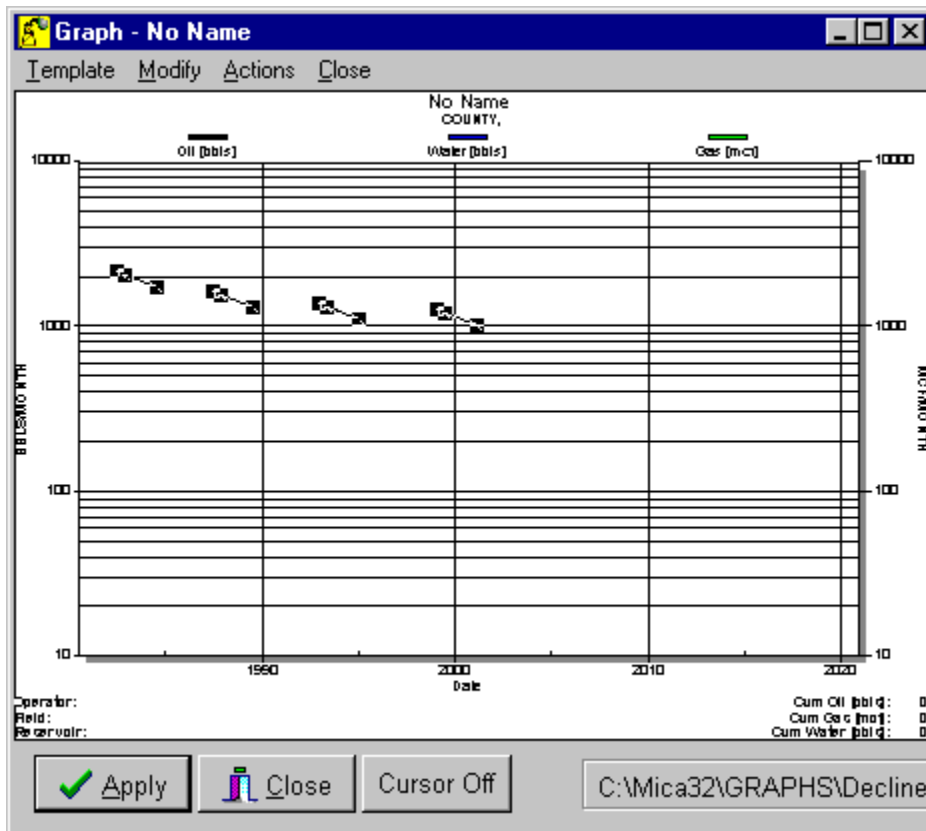
Step 2 – Open the Arps Analysis form. Select the Actions/Arps Analysis menu item on the graph as shown above. When you do this, the Arps Analysis form will appear as shown below.


Step 3 – Select the "New" mode and set the "Product To Project". On the Arps Analysis form select the "New" mode as shown above. Then set the "Product To Project" by clicking the down arrow to the right of the field. In our example we have set

it to oil, but you could set it to gas or any other product. When the field is set to oil, as in this example, all new segments you create on the graph will represent oil production.

Step 4 – Create the desired number of segments on the graph. For our example we want to model a forecast using four segments. So move your mouse cursor to the Graph form and click once. This will create a new decline segment. Move your mouse cursor a little to the right and click again. This will create a second segment. Repeat this process two more times until you have created four new segments. You graph will appear similar to the one shown below:


Step 5 – Position the first segment on the graph. Now select the Move option on the Mode panel of the Arps Analysis form as shown below:
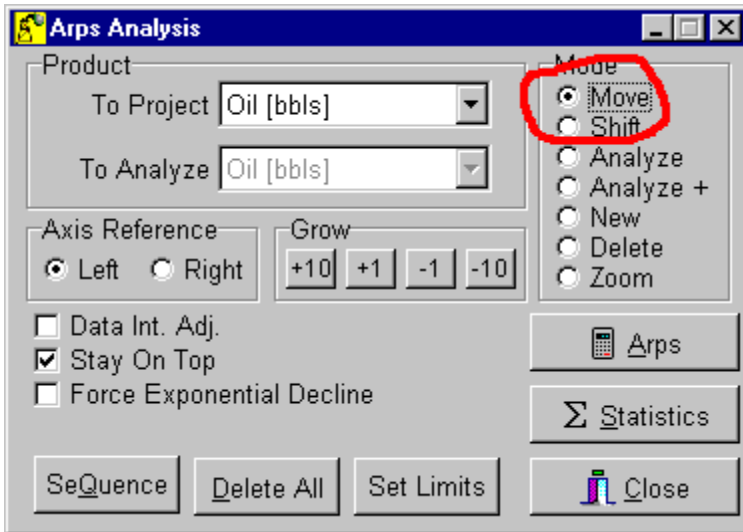
Note: You can select the Mode by simply "right clicking" on the graph itself. When you do this a small pop-up menu will appear displaying the selections in the Mode panel.

Now click and drag the anchor points of the first decline segment on the graph (small black boxes at the beginning, middle, and end of the decline segment) to position it the desired production model. Whenever you move the mouse cursor over an anchor point, the cursor will change from an arrow to a cross hair. Try to set your first segment similar to the one shown below:
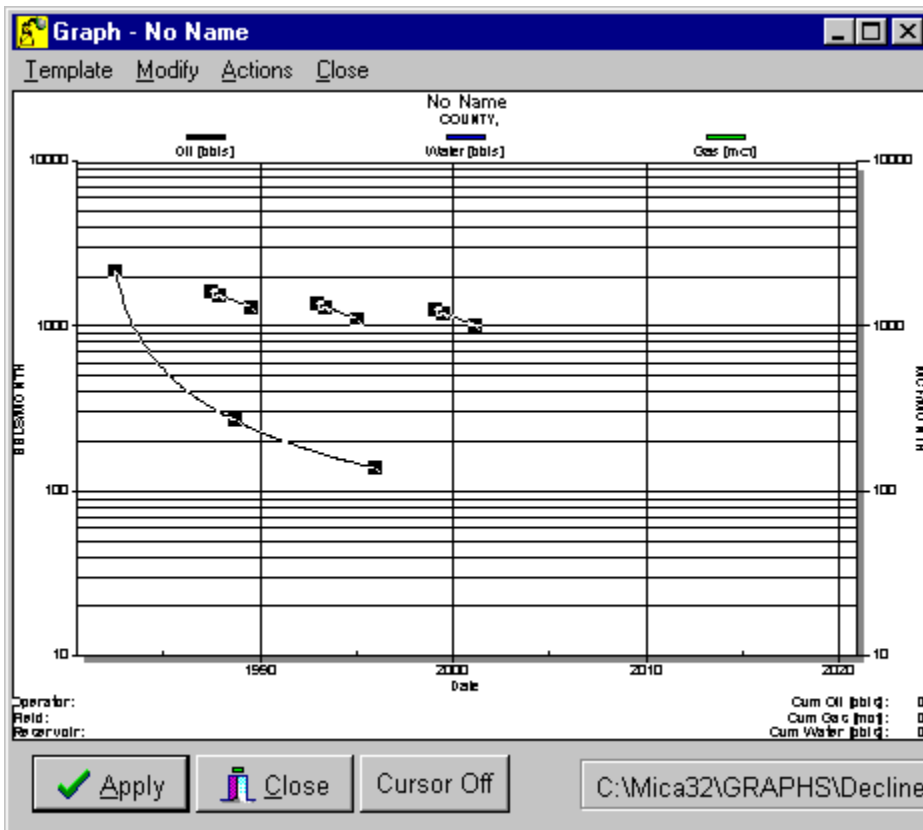
Step 6 – Sequence and position subsequent segments. Now you must move the remaining segments in sequence after the first. This would be very difficult to do by hand graphically, so it is best to use the Sequence button on the Arps Analysis form. Click the "Sequence" button on the Arps Analysis form as shown below:
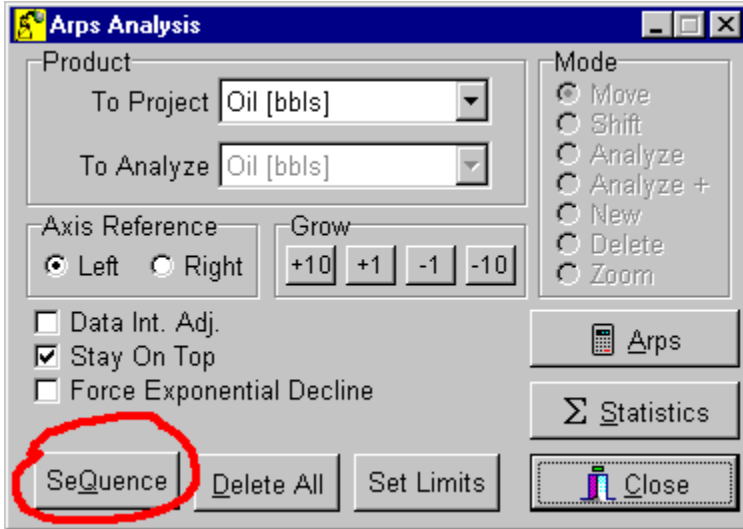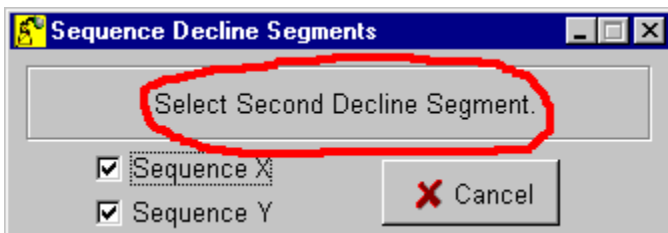

When you do this a Sequence Decline Segments form will appear. This form is asking you to select the first segment of a sequence as shown below:
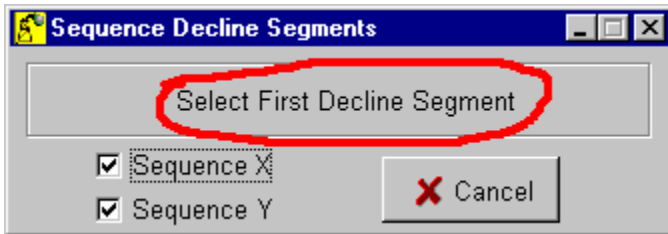

If the "Sequence X" box is checked, then MICA will place the second decline segment immediately after the end of the first decline segment with respect to time. If the "Sequence Y" box is checked then MICA will place the beginning of the second decline segment at the same Y value as the end point of the first decline segment. Leave both boxes checked.

Now we must select the first decline segment of this sequence. Move you mouse cursor over any anchor point on the first decline segment on the graph and click once. When you do this the Sequence Decline Segments form asks you to select the second decline segment of the sequence as shown below:
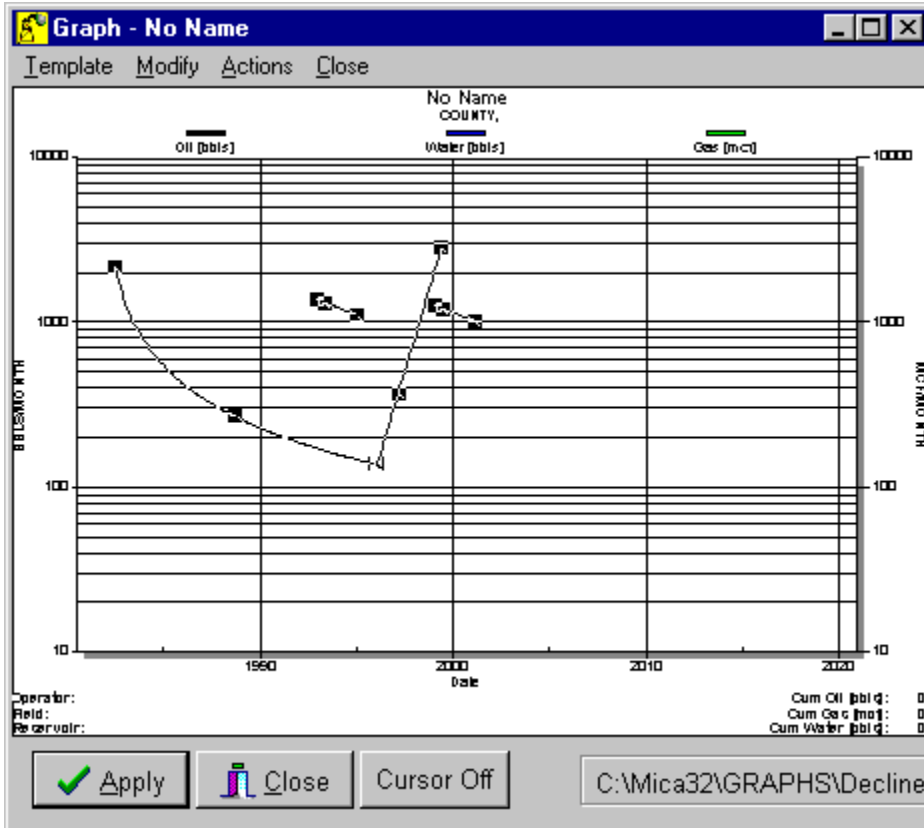
Now we must select the second decline segment of the sequence. Move your mouse cursor over the anchor points of any of the other three unmodified decline segments of the graph and click once. When you do this, the Sequence Decline Segments form will disappear and the second segment will be moved to the end of the first as shown below:
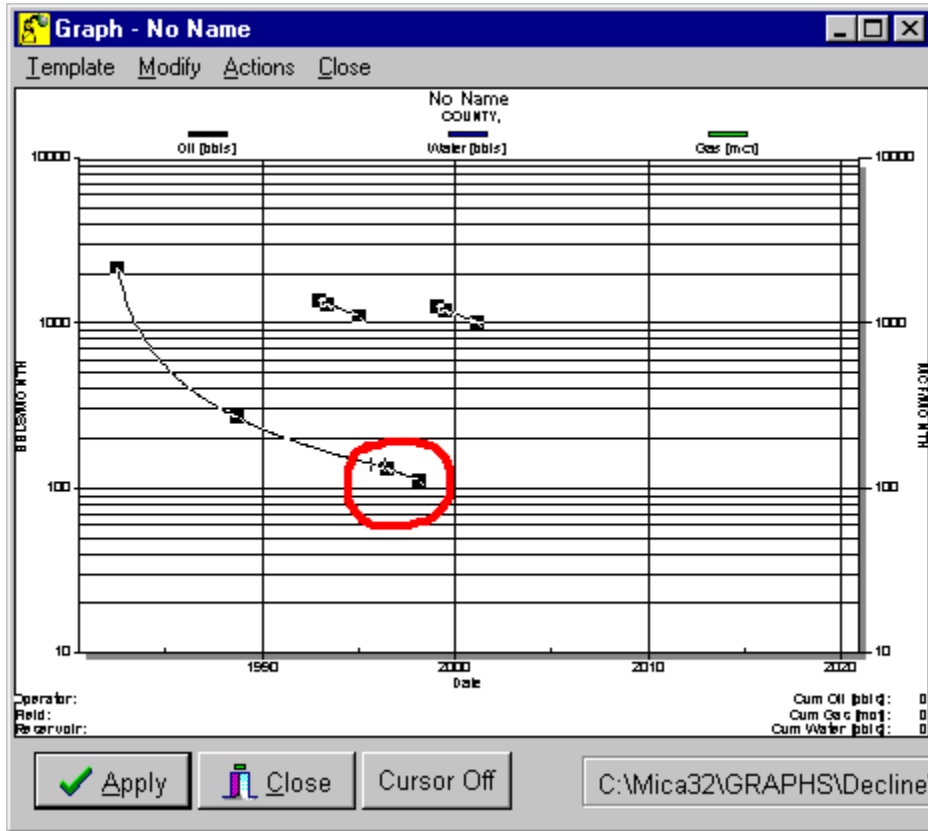

Note: Due to the X axis scale of the graph above, all of the anchor points of the second segment may not be readily visible.

Now drag the right most anchor point (end point) of the second segment to position the second segment to the model you desire. For our example, position it as shown below.
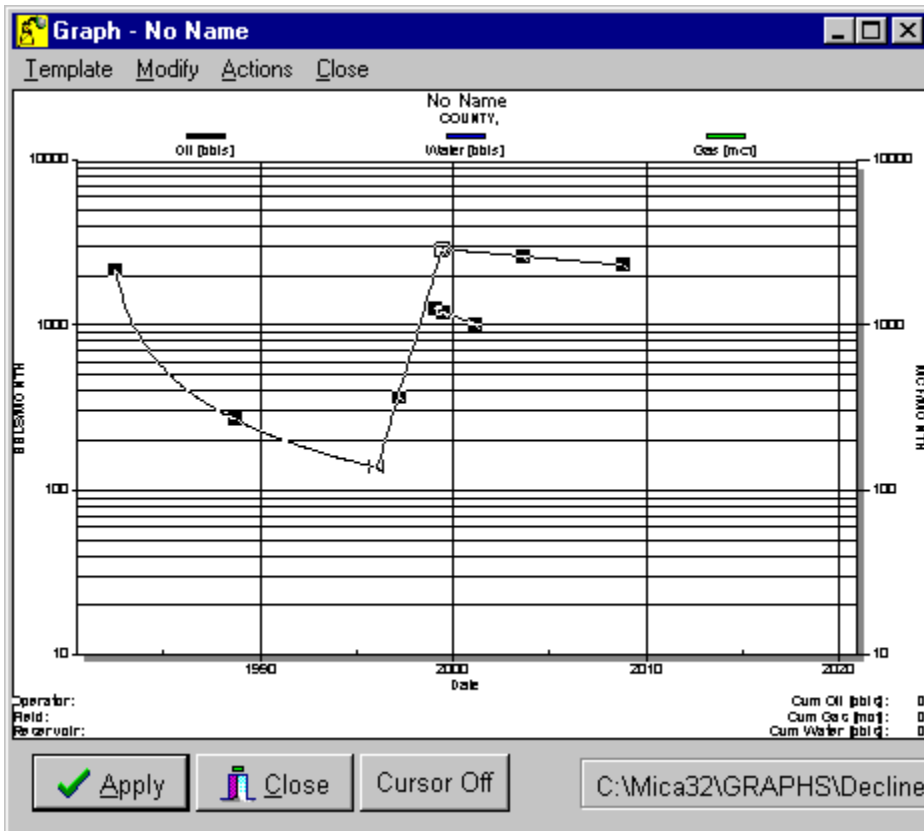
Now we must sequence the third decline segment after the second. This is done in a similar fashion as described above. Click the "Sequence" button on the Arps Analysis form and then click on an anchor point of the second decline segment that we just positioned. After you do this the Sequence Decline Segments form will display "Sequence Second Decline Seqment". This lets you know that MICA is waiting for you to specify the second segment of this sequence. Do this by clicking on any of the remaining two segments that have not be sequenced. After you do this you graph should look similar to the one shown below:
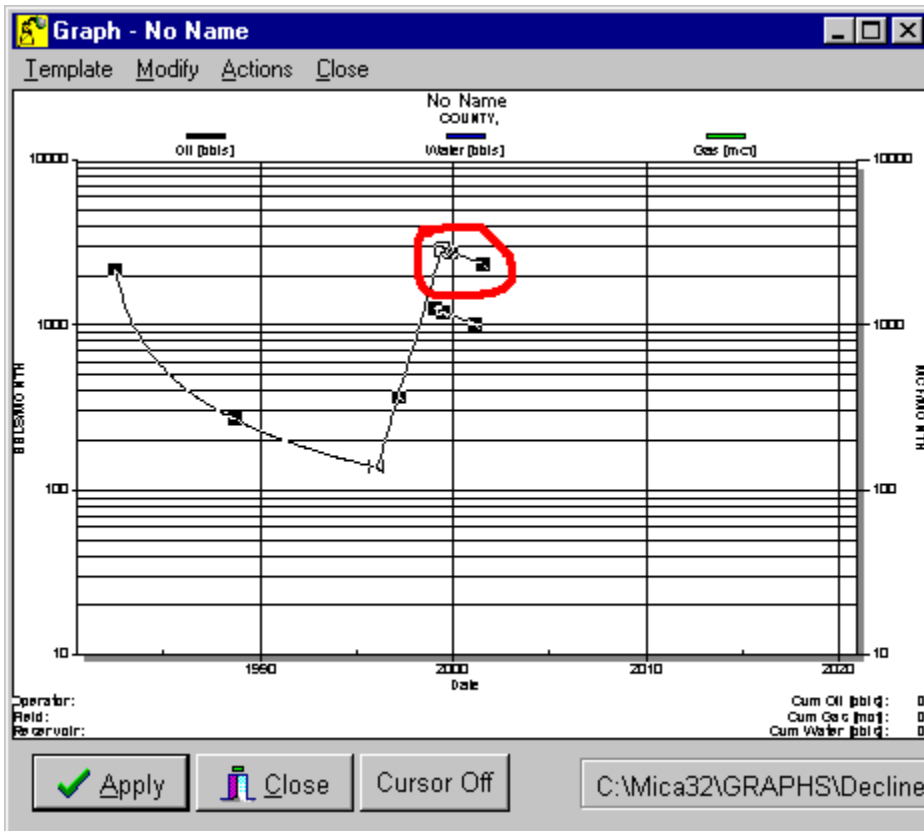
Now drag the end point of the third segment and position it to the desired production model. Make your graph look similar to the one shown below:

And lastly, you must position the last segment. Do this is a similar manner by clicking the "Sequence" button on the Arps Analysis form and selecting the third decline segment and then the last remaining un-sequenced segment. Then drag the end anchor point of the fourth segment to the desired production model. Make you graph look similar to the one shown below:
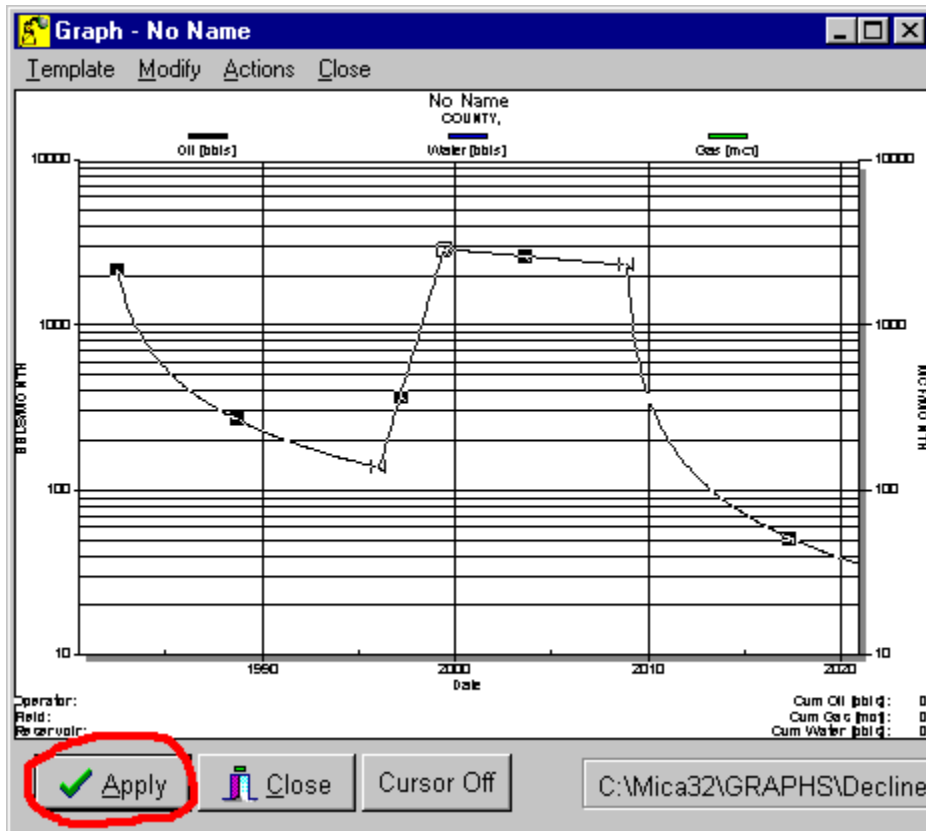
Step 7 – Click the "Apply" button. After you have all of your segments positioned where you want them, click the "Apply" button on the bottom left corner of the Graph form. This will generate a monthly production forecast from the decline segments and if you have set up economics, it will run the economic calculations. When you close the Arps Analysis form, the decline segments will disappear, but the forecast will remain on the graph.

Step review:

Step 1 – Open a Graph Form.
Step 2 – Open the Arps Analysis form.
Step 3 – Select the "New" mode and set the "Product To Project".
Step 4 – Create the desired number of segments on the graph.
Step 5 – Position the first segment on the graph.
Step 6 – Sequence and position subsequent segments.
Step 7 – Click the "Apply" button.