Problem:

Model the artificial aquifer experiment of Fishman - infiltration and redistribution of a DNAPL in a homogeneous, isotropic, variably saturated sand (see figure next slide).

Given experimental data:

- soil and fluid properties
- moisture retention data
- initial conditions
- boundary conditions
- video images of experiment at different snap-shots in time.

A 3-stage experiment

1.) Given the initial condition $S_W = 1$, drop the water table to an elevation of 31.5 cm. Let the system come to equilibrium.

2.) Apply the DNAPL (200 ml infiltrates in 143 seconds)

3.) remove the source and allow the DNAPL to redistribute.

OUTLINE of the ArgusONE problem

1.) **task1.mmb:** a simple 1-D problem used to simulate Part 1. Use this example to obtain an understanding of the S-P fitting parameters S_{Wr}, a_d and n

2.) **ic.mmb**: simulate Part 1 for the 2-D experimental cell.

3.) **force.mmb**: simulate Part 2 for the 2-D experimental cell.

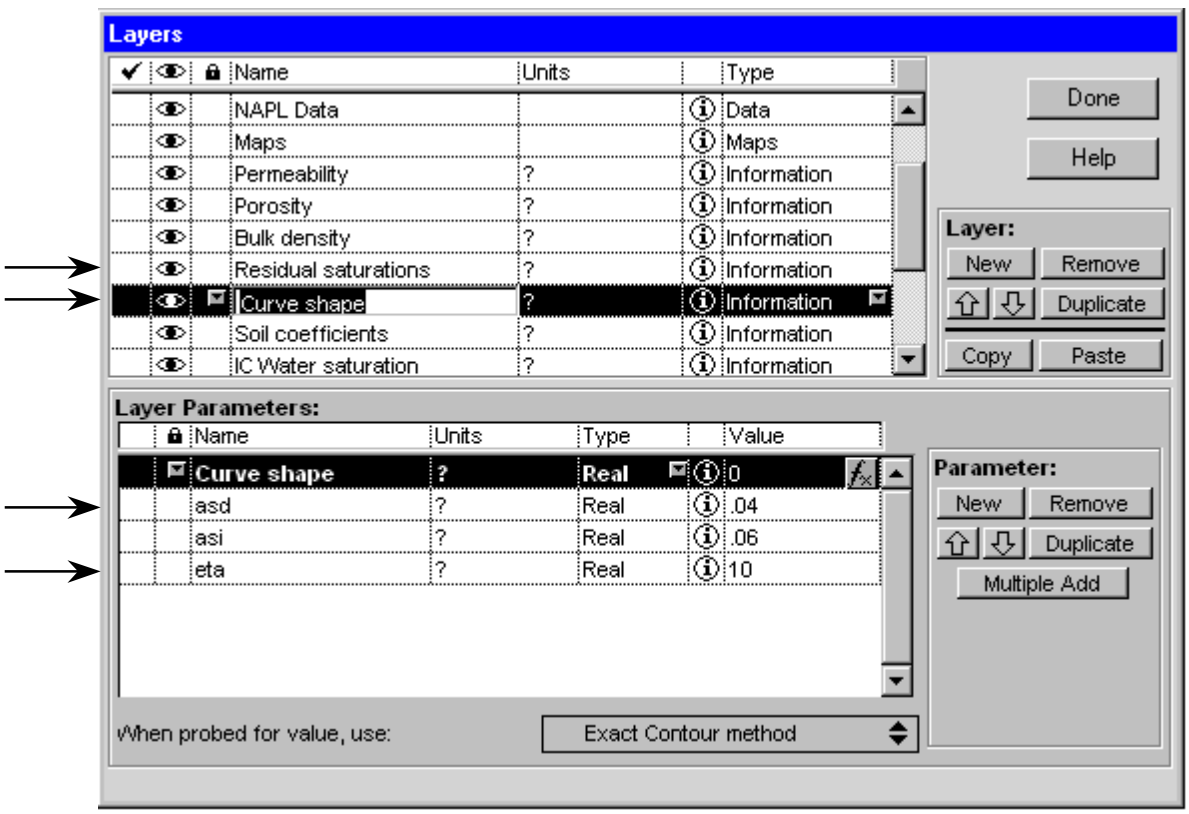
4.) **drain.mmb**: simulate Part 3 for the 2-D experimental cell.

Task 1 - assess the values of S_{Wr}, a_d, n

$$h_c = \frac{\left[S_e^{-1/m} - 1\right]^{1/n}}{a_d} \qquad S_e = \frac{S_W - S_{Wr}}{1 - S_{Wr}}$$

Use the ArgusONE file **task1.mmb**. Make the changes in the Layers window.

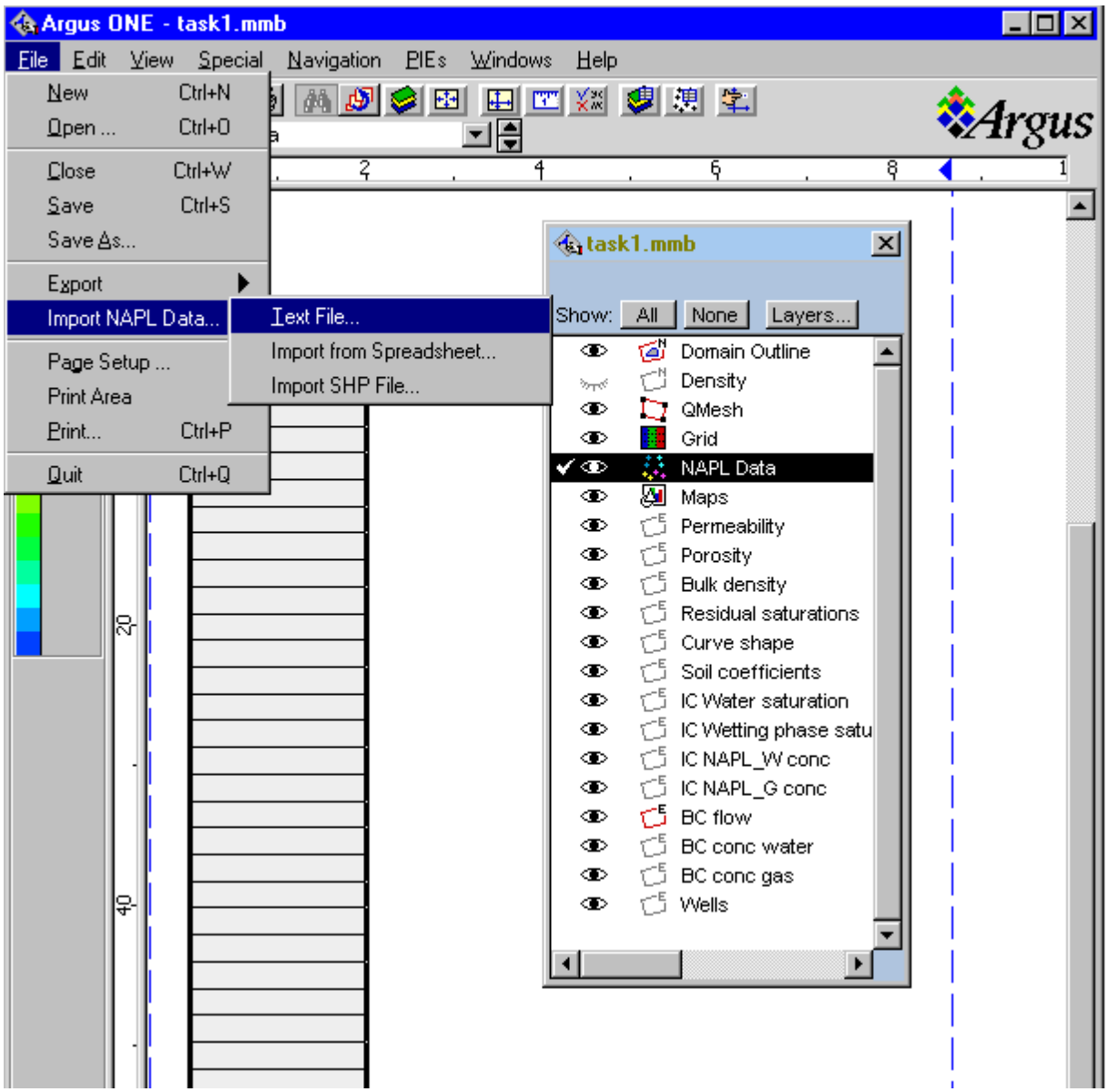
Try a couple of combinations of the three 'fitting' parameters to see if you can match the experimental data provided.



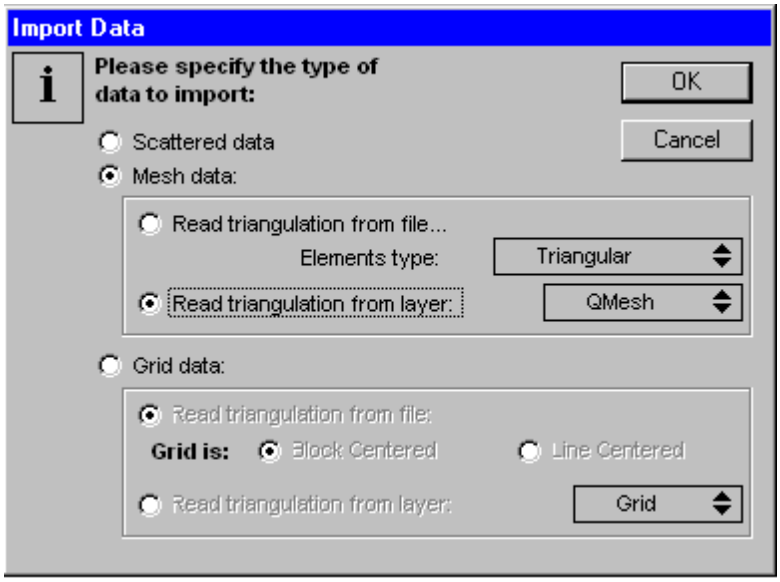
For each change run the model and look at solution using the cross-section tool

1.) go to the NAPL Data layer

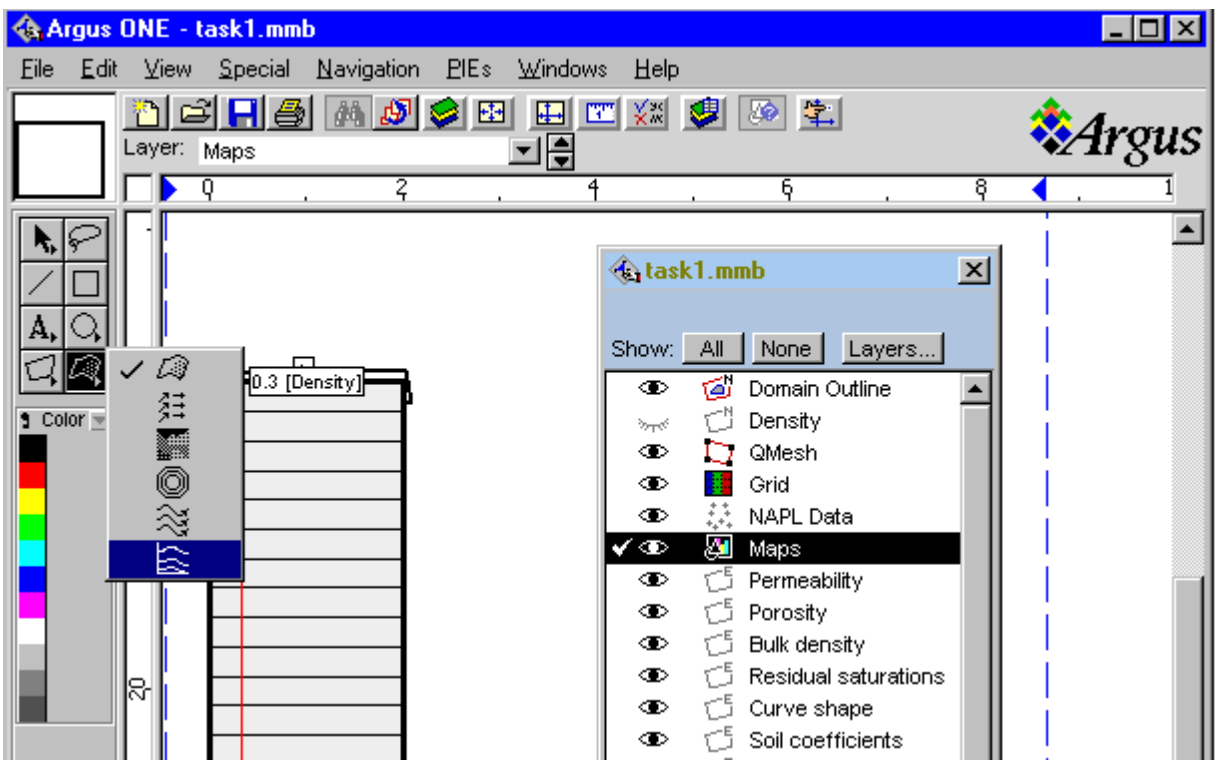
2.) Import the text file



Up comes this window. Mimic this look (mesh data without triangularization)

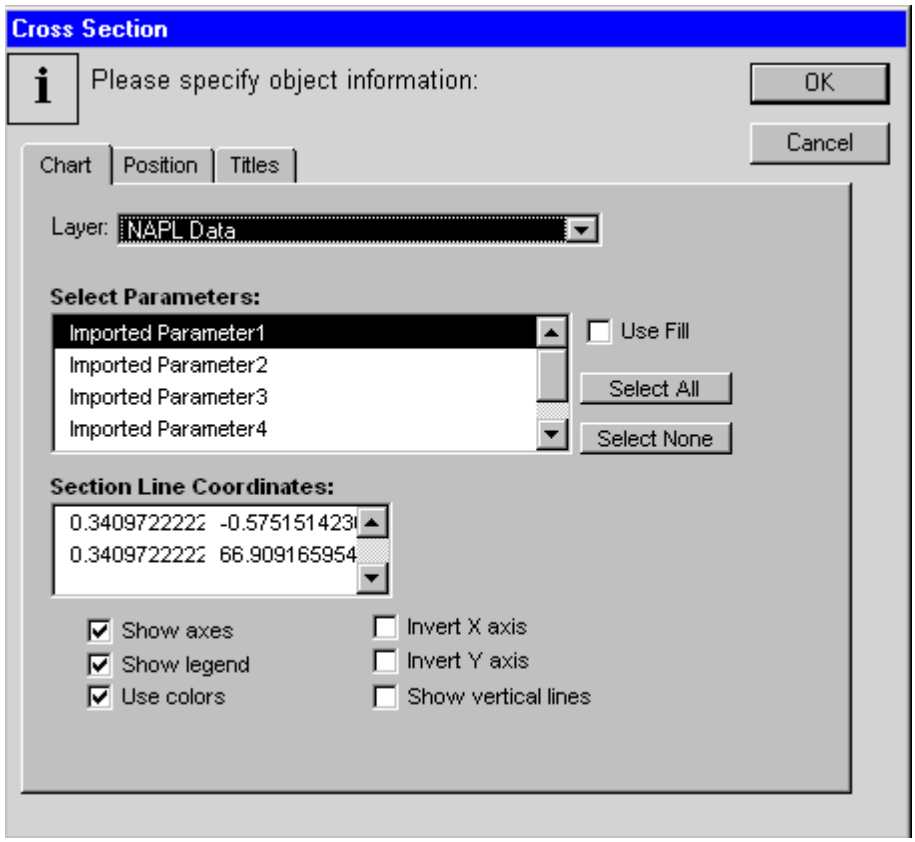


3. select the file: **file1.out**
4. Go to the 'Maps' layer.
5. 'select the red line that superposes the grid (this defines the cross-section
6. Choose the post-processing tool (cross-section)



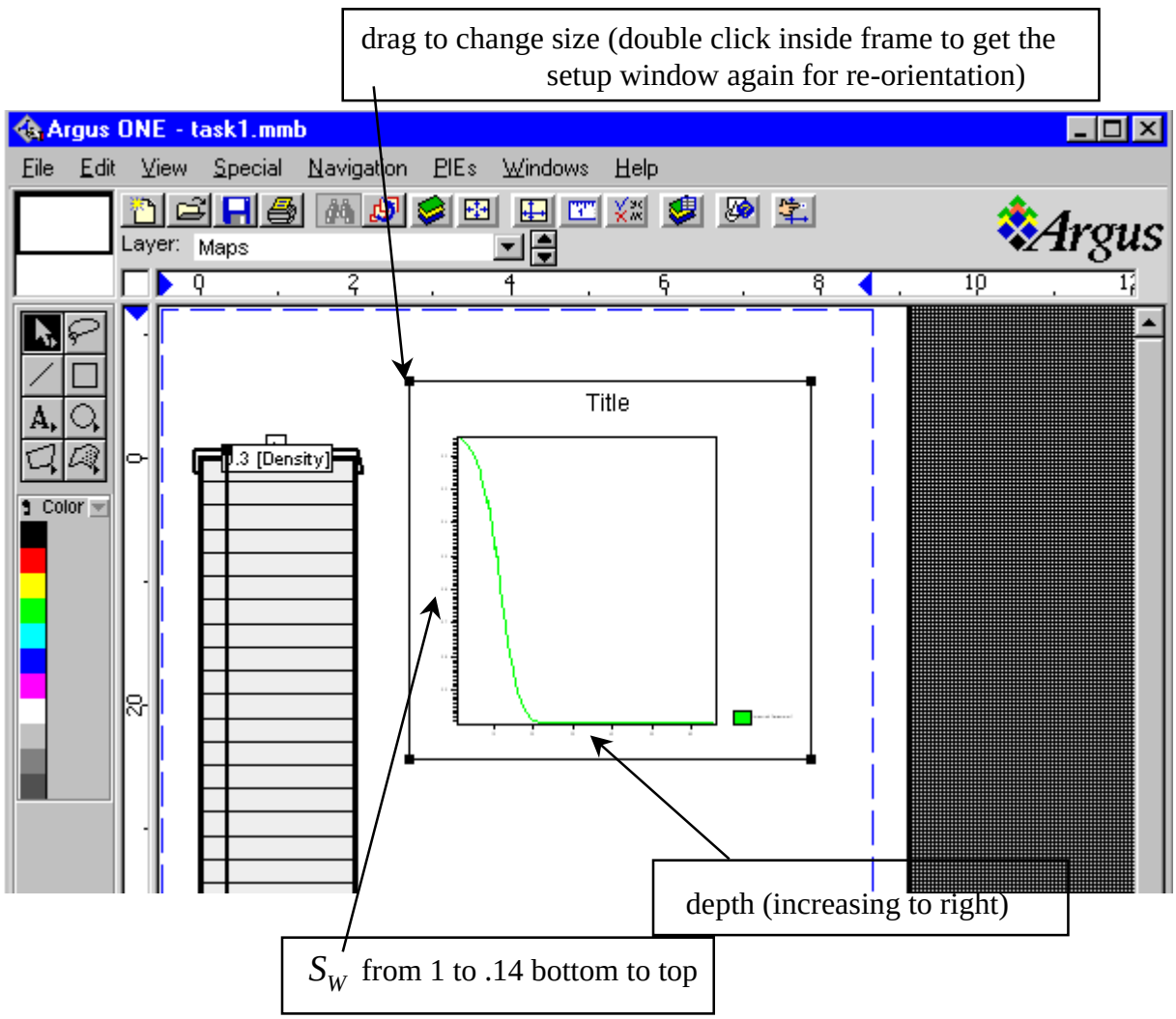
7. In a area to the right of the grid, click and drag a rectangle.

Up comes this window.

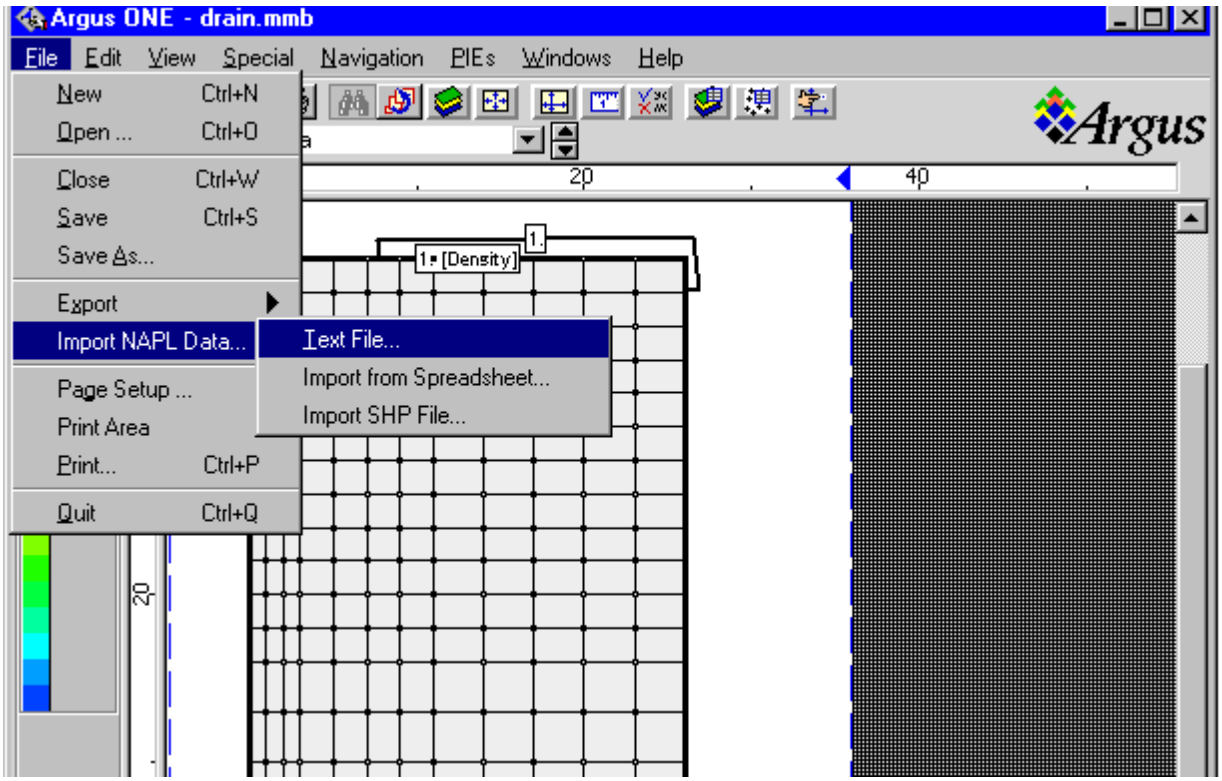


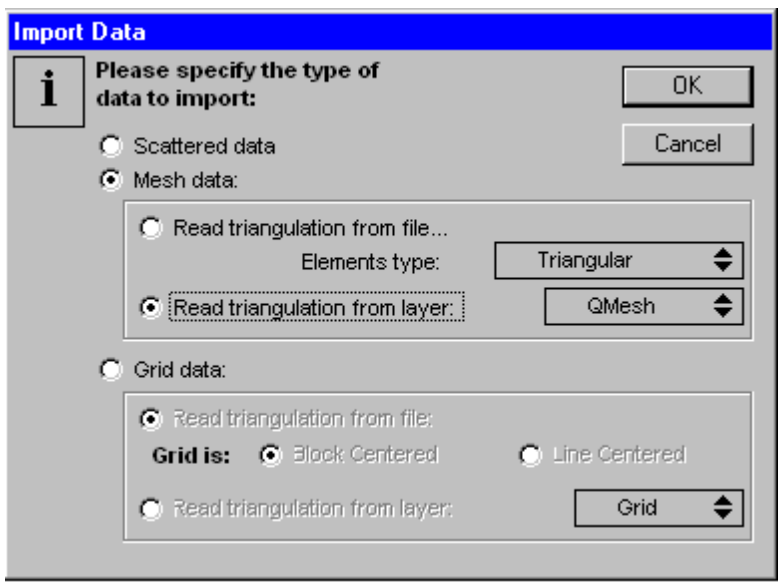
8. Select the NAPL Data Layer and ‘Imported Parameter 1’ (this is the S_W solution). Click OK

This is what you should get. You can change the orientation and size of the plot.



Get in the ‘NAPL Data’ Layer, then ...

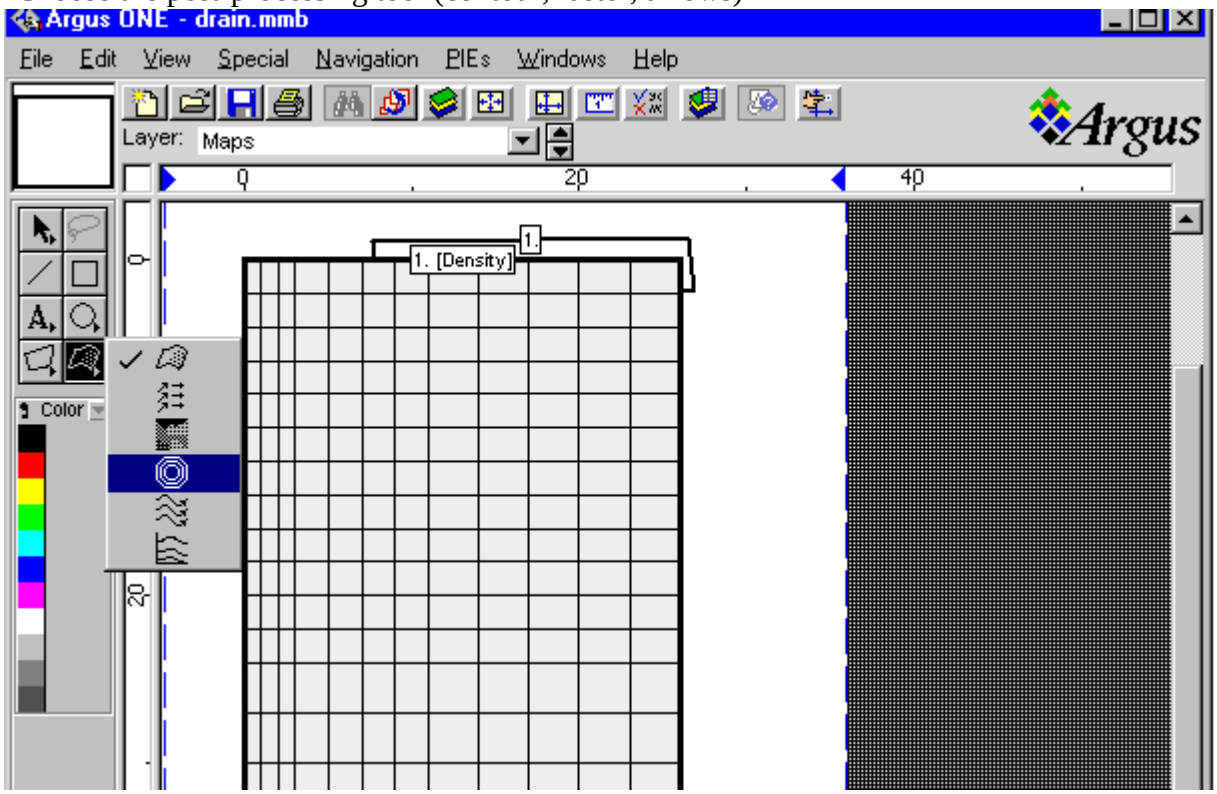




Hit ‘OK’ and then choose a file to import (**file#.out** or **vel#.out**)

Go to the ‘Maps’ layer

Choose the post-processing tool (contour, raster, arrows)



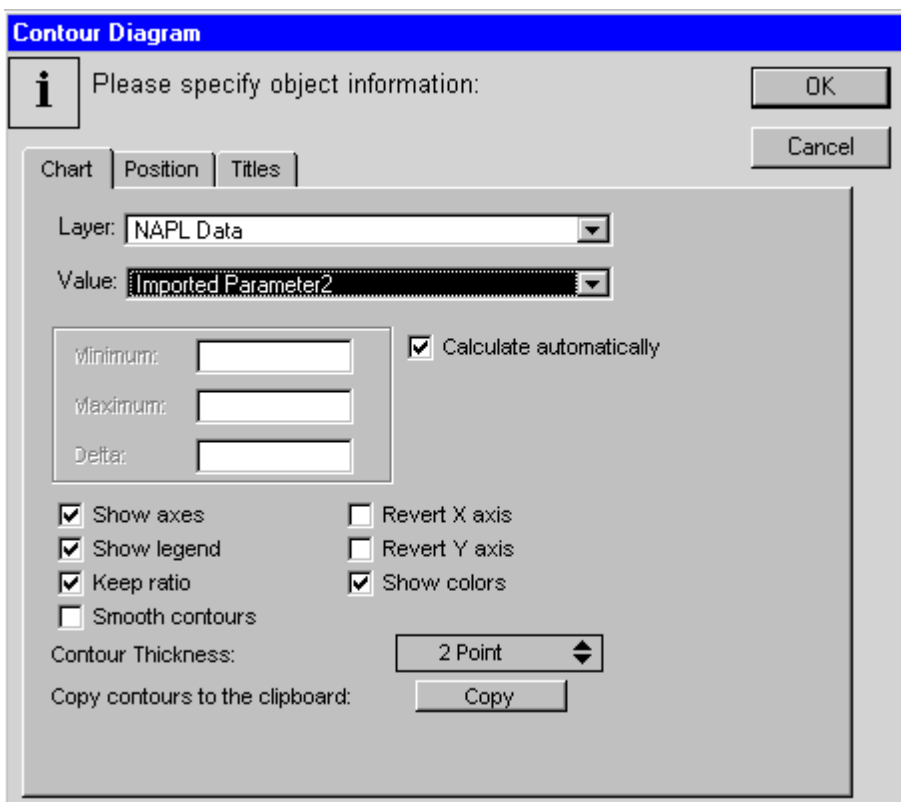
After choosing the tool, click and flag out a small rectangle on the grid - A window comes up.

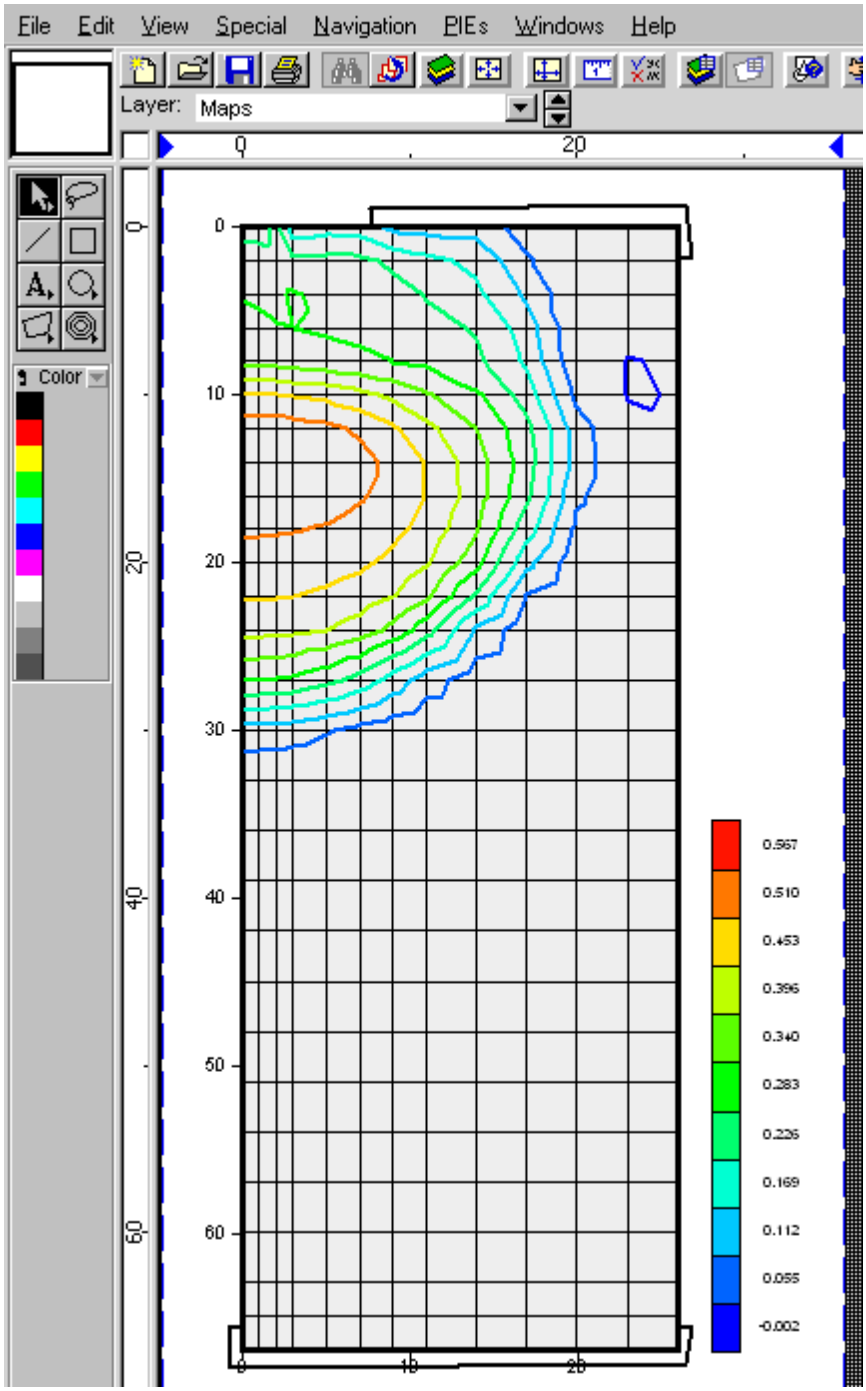
Choose the NAPL Layer

Choose the Value (one of the the data types in the file (e.g. 7 in **file#.out)**

go to ‘Position’ and click on the button ‘overlay source data’

Then click OK

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