

**ADDENDUM I**  
**BIOPLUME III**  
**GRAPHICS CONVERSION**  
**TO SURFER FORMAT**

**Abstract**

This procedure can be used to create a SURFER® compatible grid file from Bioplume III input and output graphics. The input data and results from Bioplume III can be contoured and printed directly from SURFER. Furthermore, SURFER can be used to export graphic data in several formats including an AutoCad® compatible drawing exchange file (DXF) format. To summarize this procedure:

- Using a Bioplume III utility function, model input or output can be extracted and saved as a comma separated value (\*.csv) file.
- The \*.csv file is opened in Excel and pasted into the “Export.xls” worksheet provided in this package.
- To be consistent with SURFER format the row data order is reversed.
- The user fills out four designated cells of this spreadsheet to specify the minimum and maximum range for the x and y-axes that were used in the ground water simulation as required by SURFER.
- The worksheet is then saved as a tab delimited ASCII file with a \*.grd extension.
- This \*.grd file can then be read and contoured directly by SURFER.

A Bioplume III post processor program is currently being developed by USEPA’s Center for Subsurface Modeling Support (CSMoS). Therefore, this method should be considered a temporary procedure to be used as a stopgap until the true post processor is available.

## **Disclaimer**

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## **Nomenclature Used**

The following conventions are used in this document. The symbol → denotes selection of a hierarchal pull-down or menu selection. For example, to describe clicking on the File option then on Open is simply written File → Open. Information needed from the user is placed inside <>. For example, the prompt for you to open your file is written File → Open <Your File Name (e.g. Hillafb1)>.

## **Required Software**

This technique requires the following programs:

- 1) Bioplume III (Distributed by the U.S.E.P.A's Center for Subsurface Modeling Support, Ada, OK);
- 2) Microsoft Excel97® or later; and
- 3) SURFER: Version 6.4 (SURFER for Windows) is recommended. Earlier versions of SURFER will work but the descriptions for use will not be accurate in the text provided below.

## **Technique Description**

The following method can be used to extract Bioplume III two-dimensional graphical information in a SURFER compatible grid file format. Graphical input information can be extracted including, top elevations, bottom elevations, layer thicknesses, observed heads, hydraulic conductivity, and observed concentrations for hydrocarbon and all electron acceptors. After a successful Bioplume III simulation, this method can be used to extract graphical model results. For simplification, the example shown below describes the conversion of hydrocarbon mass transport results; however, the technique can also be used for any of the input/output features described above.

### Step 1: Creation of a \*.csv Format File

Start Bioplume III and open any saved simulation (File → Open <select a file>). Go to any two-dimensional input or output graphical file. For example, to work with a simulated

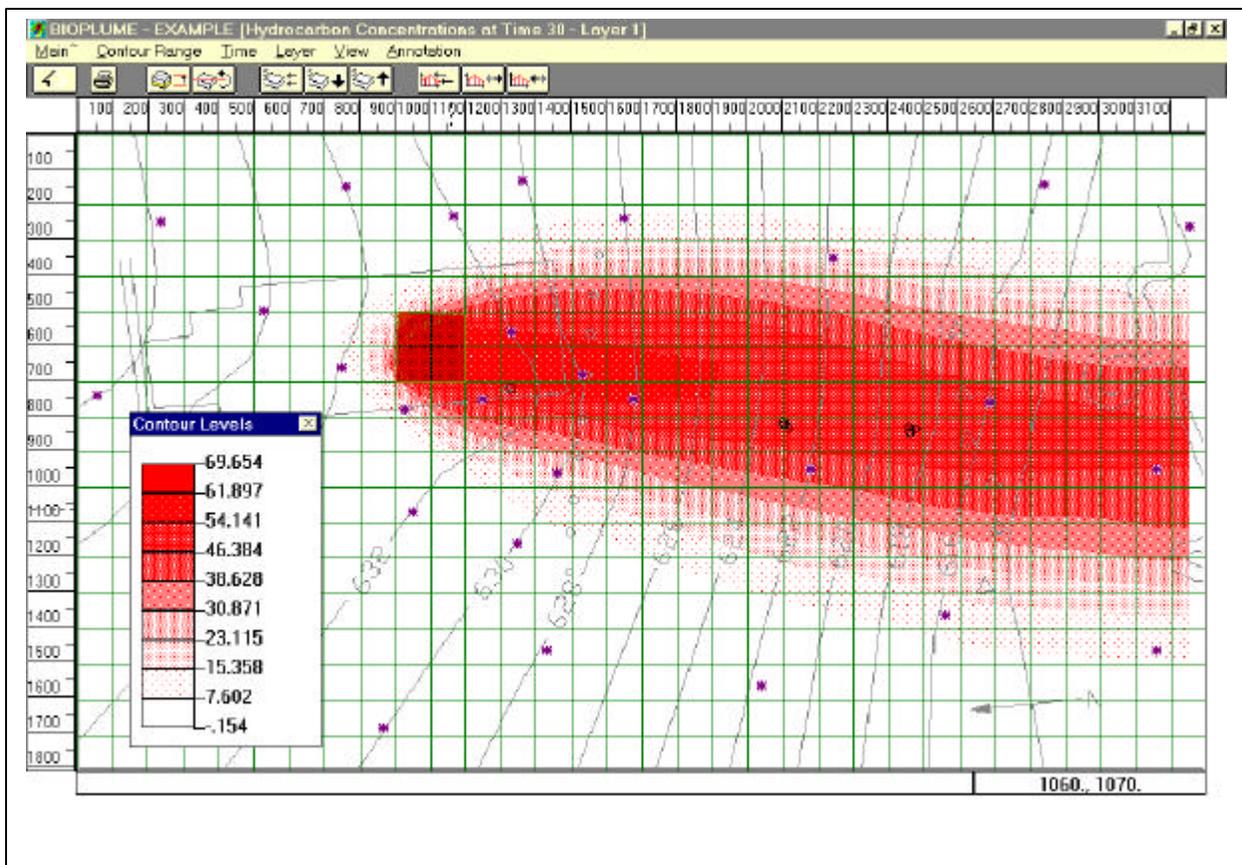


Figure 1. Example of 2D graphical output from Bioplume III showing a modeled hydrocarbon plume.

hydrocarbon plume go to Results → Concentrations → Hydrocarbon → 2D Contours. The graphical hydrocarbon plume might look something like Figure 1.

Next, move the mouse pointer to the upper left-hand corner of the model grid, click and hold the left mouse button. While continuing to depress the mouse button, drag to the lower right-hand corner of the model grid. A spreadsheet-like matrix, similar to that shown on Figure 2, should replace part of the normal graphical display of the model grid. Click on the “Export Data” button then save the file (e.g. Plume.csv). The \*.csv file type is the default format.

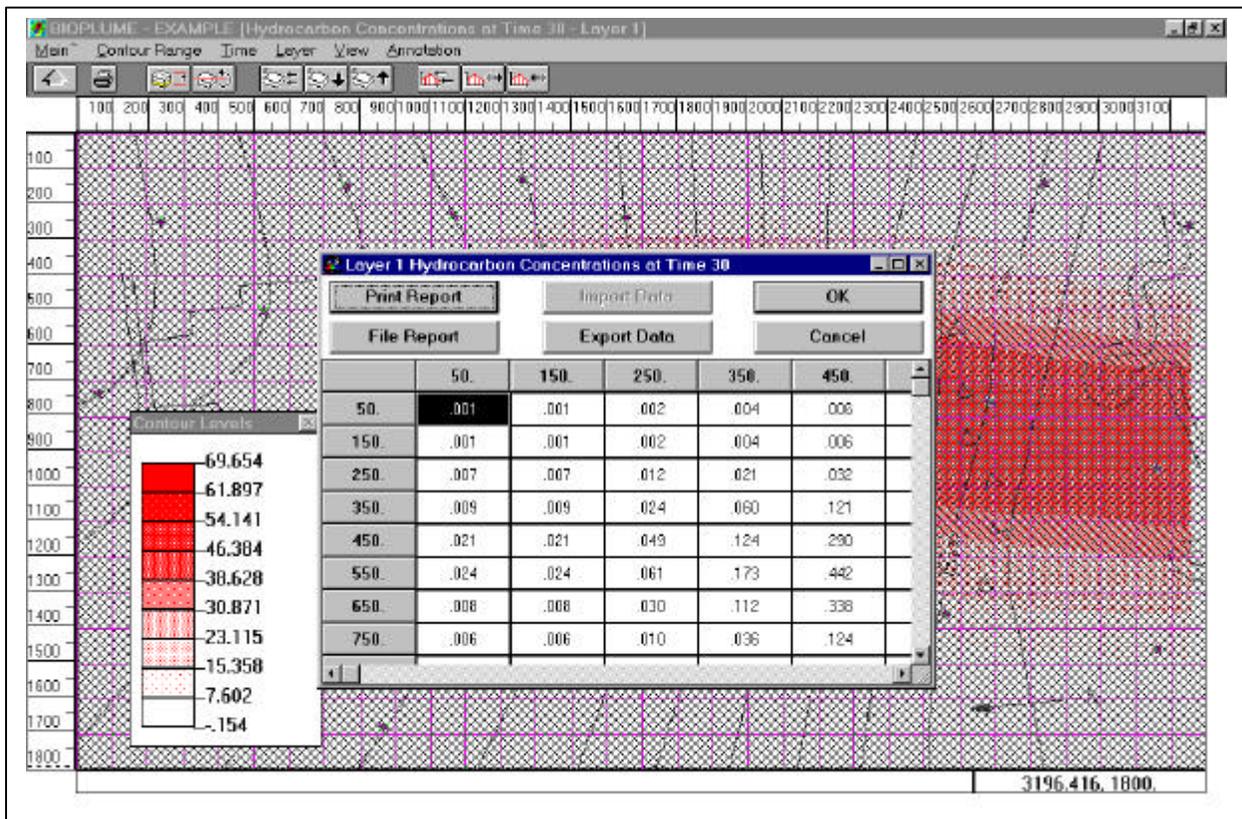


Figure 2. Results matrix generated by using the mouse to block-off the model grid.

## Step 2: Import \*.csv File to Excel

Exit Bioplume III or minimize the screen and start Microsoft Excel97. In Excel go to File → Open. Set the “Files of Type:” window to “All Files (\*.\*)”. Find and select the \*.csv file (e.g. Plume.csv) you just created (Figure 3). Note: the default directory for \*.csv files will be C:\bioplume\export, however, you could have saved this file to any directory.

Figure 3. Unformatted \*.csv file in Excel.

With the mouse, block and copy all of the data in your \*.csv file by clicking on the upper left hand corner of the data and dragging across to the lower left then Edit → Copy. Open the spreadsheet provided by CSMoS called “Export.xls” and do the following:

- A) Click on cell B6 (purple shaded) in Worksheet1 and make it active then paste the copied cells (Edit → Paste). When you do this, certain cells in the heading will automatically change and Column A will become numbered as shown on Figure 4.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		DSAA													
2			32	18											
3															
4															
5		0.122	63.544												
6	1	0.001	0.001	0.002	0.004	0.006	0.008	0.011	0.022	0.058	0.104	0.2	0.795	1.498	2.645
7	2	0.001	0.001	0.002	0.004	0.006	0.008	0.011	0.022	0.058	0.104	0.2	0.795	1.498	2.645
8	3	0.007	0.007	0.013	0.02	0.029	0.045	0.059	0.115	0.194	0.387	1.24	3.478	6.615	9.37
9	4	0.01	0.01	0.028	0.061	0.114	0.202	0.38	0.608	1.005	2.276	8.487	17.279	17.979	19.333
10	5	0.024	0.024	0.049	0.122	0.302	0.653	1.384	3.191	5.77	13.589	33.065	37.792	40.83	43.886
11	6	0.023	0.023	0.053	0.14	0.376	1.021	2.732	7.417	20.315	45.943	60.389	57.796	57.988	57.631
12	7	0.006	0.006	0.023	0.067	0.251	0.743	2.219	6.412	17.221	60.473	62.951	62.541	63.544	62.895
13	8	0.005	0.005	0.009	0.033	0.1	0.289	0.984	3.426	10.83	41.839	49.066	55.234	56.429	57.669
14	9	0.001	0.001	0.001	0.003	0.013	0.022	0.065	0.519	2.195	10.395	22.06	35.838	45.062	47.473
15	10	0.001	0.001	3.99E-04	-0.001	-0.006	-0.018	-0.027	-0.03	0.27	1.78	6.162	14.489	23.192	32.08
16	11	4.19E-05	4.19E-05	1.13E-04	-9.14E-04	-0.006	-0.017	-0.045	-0.085	-0.06	0.365	1.575	5.006	10.363	16.283
17	12	5.17E-05	5.17E-05	1.00E-04	-2.08E-04	-0.002	-0.008	-0.027	-0.068	-0.122	-0.056	0.379	1.848	4.766	8.538
18	13	3.31E-05	3.31E-05	8.33E-05	8.38E-05	-3.97E-04	-0.002	-0.012	-0.036	-0.075	-0.112	-0.065	0.354	1.104	2.859
19	14	3.12E-05	3.12E-05	6.21E-05	1.23E-04	1.04E-04	-6.06E-04	-0.004	-0.016	-0.044	-0.084	-0.111	-0.069	0.115	0.629
20	15	2.14E-05	2.14E-05	3.36E-05	8.21E-05	1.54E-04	1.23E-04	-7.16E-04	-0.004	-0.018	-0.048	-0.082	-0.1	-0.07	0.076
21	16	1.26E-05	1.26E-05	1.94E-05	4.30E-05	1.04E-04	1.70E-04	6.93E-05	-8.95E-04	-0.005	-0.02	-0.045	-0.065	-0.073	-0.054
22	17	1.22E-05	1.22E-05	1.41E-05	1.95E-05	4.99E-05	9.06E-05	1.03E-04	-2.24E-05	-0.001	-0.006	-0.016	-0.022	-0.03	-0.047
23	18	1.22E-05	1.22E-05	1.41E-05	1.95E-05	4.99E-05	9.06E-05	1.03E-04	-2.24E-05	-0.001	-0.006	-0.016	-0.022	-0.03	-0.047

Figure 4. Example of Worksheet 1 in Export.xls file after some \*.csv data are copied to Cell B6.

- B) It's a good idea to save this file as a new unique file name (File → Save As <enter your file name>).
- C) Some of the header cells and part of Column A will automatically change after you paste; however, you will need to enter data into gray shaded cells B3 (minimum x-coordinate of your grid), B4 (minimum y-coordinate of your grid), C3 (maximum x-coordinate of your grid), and C4 (maximum y-coordinate). Note that this data entry need only be done on Worksheet 1 and will be automatically entered on all subsequent worksheets (Worksheet 2 through Worksheet 12).

- D) The order of the grid rows needs to be reversed by sorting to be consistent with SURFER grid file format. Using the mouse, block off the grid portion of Worksheet1 excluding the header (Cells B1 to C5) and go to Data → Sort. Specify “Sort By” to be Column A and specify the sorting order to be *Descending* then click “OK” (Figure 5).

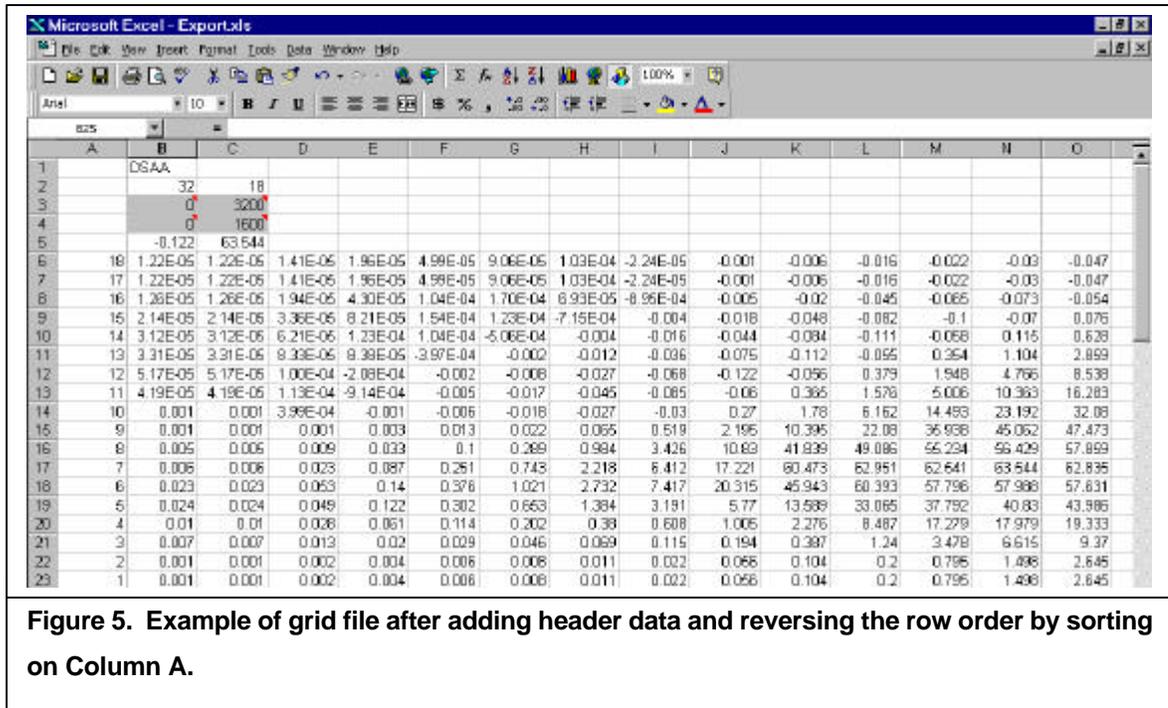


Figure 5. Example of grid file after adding header data and reversing the row order by sorting on Column A.

- E) Delete Column A by clicking on the “A” column header then going to Edit → Delete. The grid data will slide to the left and the final spreadsheet will look like Figure 6.
- F) Save the worksheet in tab delimited format by going to File → Save As. In the “Save as Type” box select “Text (Tab Delimited)(\*.txt)”. In the “File Name” box enter a unique file name using a \*.grd extension (e.g. VOC1.grd). Be sure and specify a \*.grd extension otherwise Excel will automatically place a \*.txt extension which SURFER will not recognize. Note: Excel will give you a warning that “*The selected file*

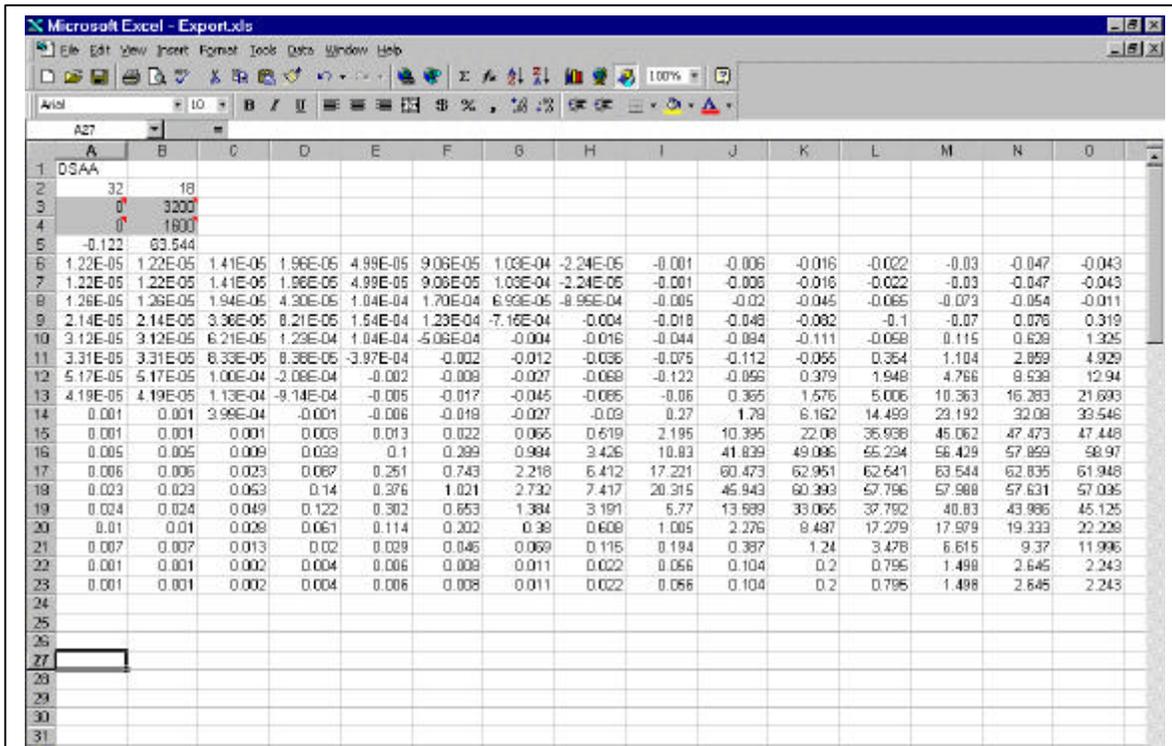


Figure 7. Example of data sheet after Column A is deleted.

*type does not support notebooks that contain multiple sheets". This is normal, just click OK.*

These steps create a SURFER compatible grid file. You can continue to export other graphics files from Bioplume III by copying various \*.csv files into cell B6 on the other unused worksheets. When you have finished exporting graphical files save the Excel spreadsheet in \*.xls format otherwise only one worksheet will be saved and some of your work will be lost.

### Step3: Importing \*.grd Files Into SURFER

Close or minimize Excel and open Golden Software's SURFER (Windows Version 6.4) program. Go to Map → Contour <select the \*.grd file you made>. If the grid file is correct, a pop-up window should appear giving you the option to select the contour intervals and set other attributes. The resulting contoured map can look something like Figure 7. In SURFER, your \*.grd file can be used to make various other graphical representations including a three-dimensional wire-mesh (Figure 8). Also, SURFER results can be exported in a variety of file types including AutoCad compatible drawing exchange file (\*.dxf).

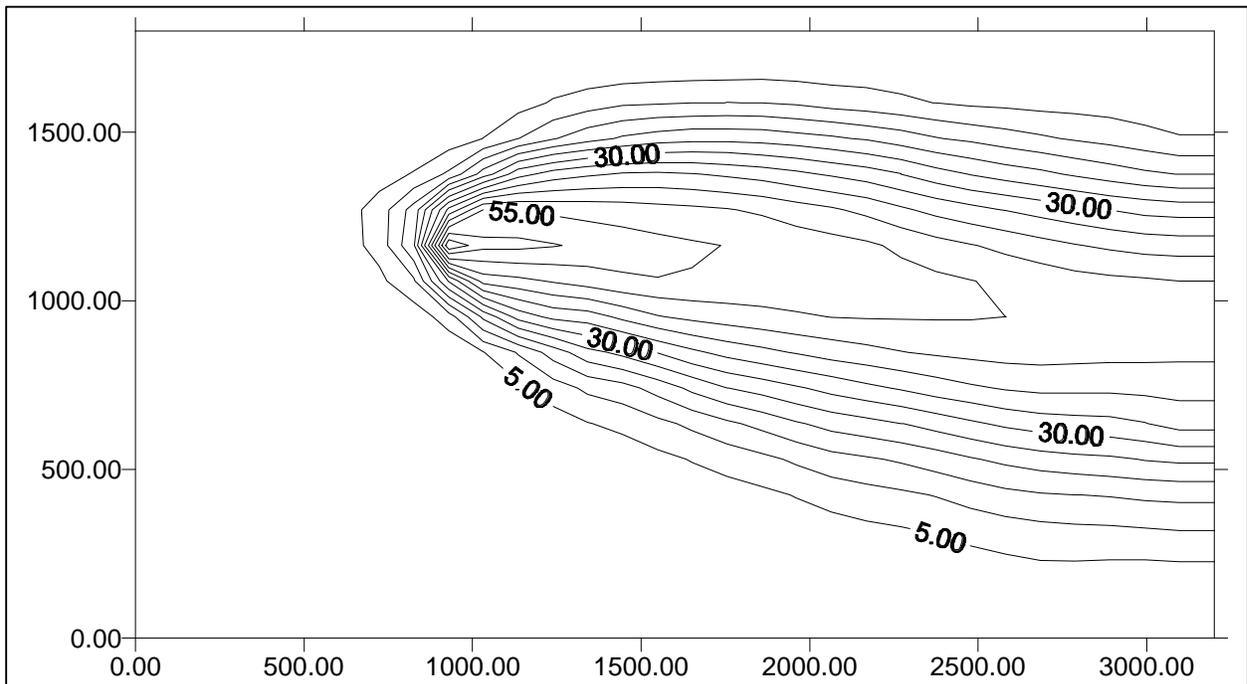


Figure 7. SURFER contoured map from imported \*.grd Bioplume III data.

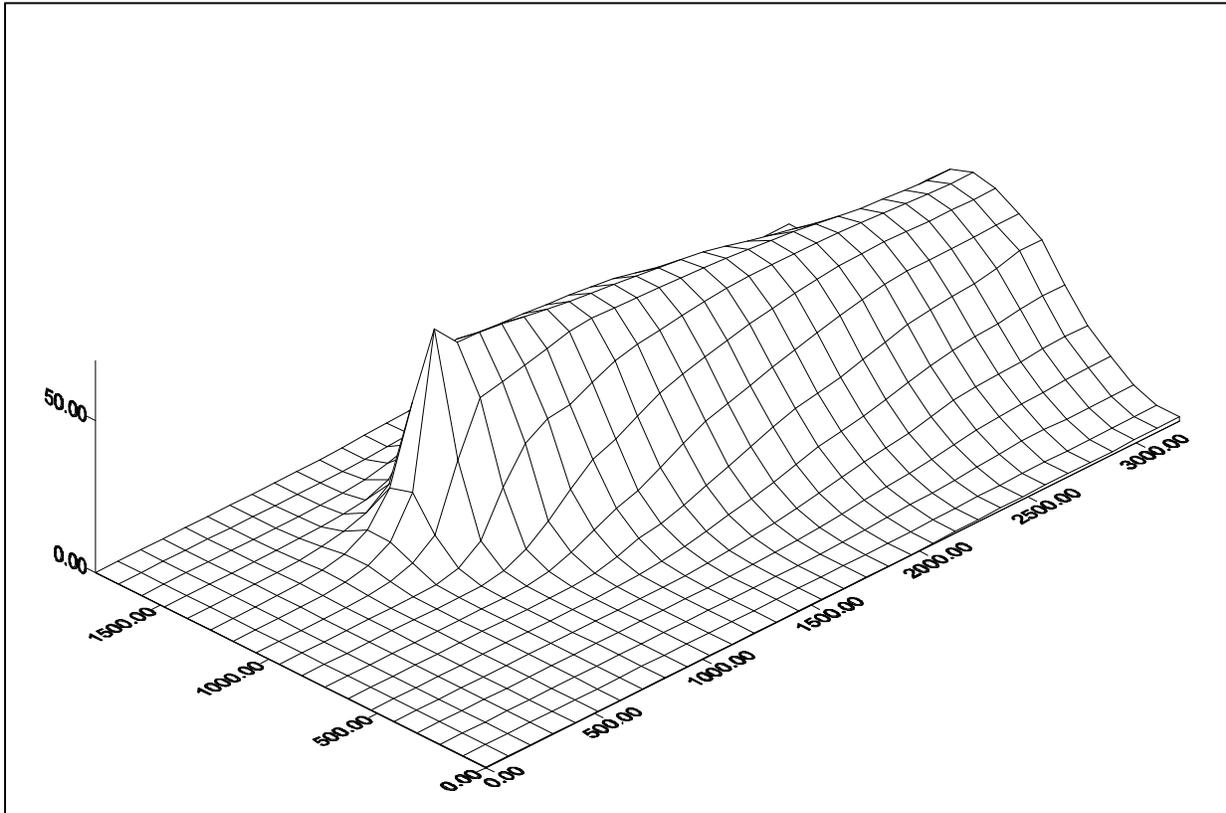


Figure 8. Example wire-mesh figure from \*.grd file.