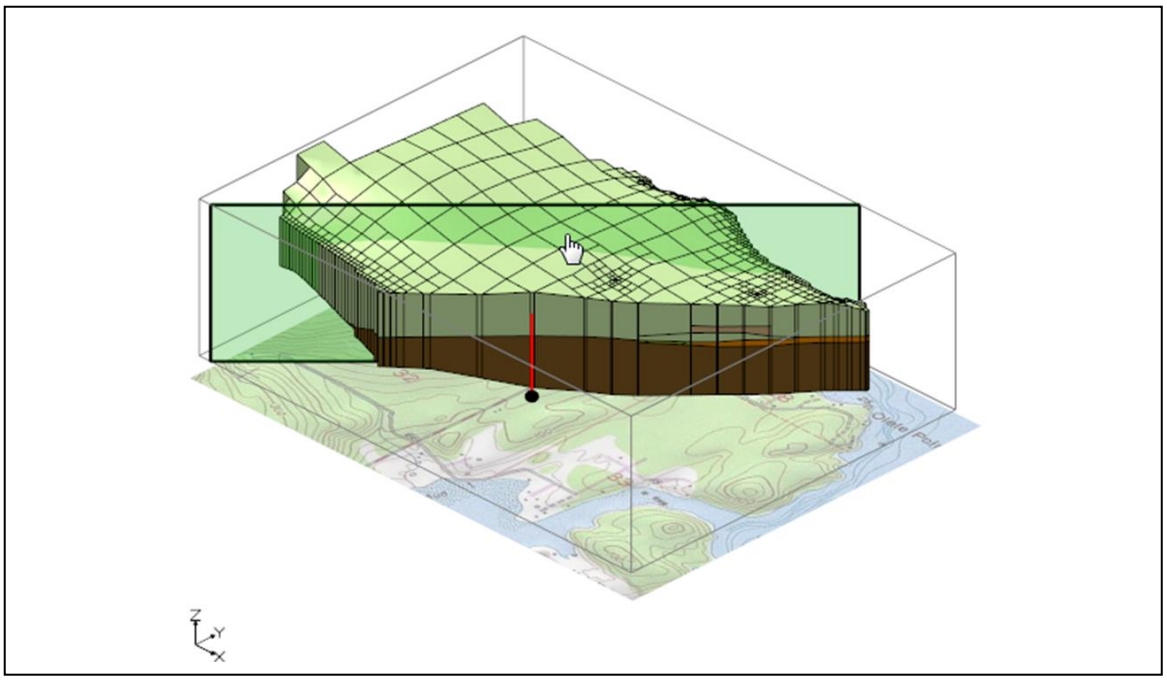
GMS v. 10.4

GMS 10.4 Tutorial

UGrid Clipping

Using the clipping display option to visualize UGrid data.



Objectives

This tutorial describes the UGrid clipping tool. The UGrid clipping tool can be used to cut away a portion of a UGrid to visualize the data inside.

Prerequisite Tutorials

- Getting Started

Required Components

- Grid module

Time

- 10–15 minutes

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1 Introduction

The UGrid clipping display option can be used to cut away a portion of a UGrid and visualize the data inside the grid. It can be used to cut part of the UGrid using a clipping plane or by using scalar dataset values.

2 Using a Clipping Plane

For this section of the tutorial, a UGrid with complex stratigraphy will be opened. A clipping plane will then be used to cut away a portion of a UGrid to visualize the inner stratigraphy.

To get started, do the following:

1. Launch GMS.
2. If GMS is already running, select *File* | **New** to ensure that the program settings are restored to the default state.

2.1 Opening the UGrid Stratigraphy Project

Next, to open the GMS project containing the UGrid:

1. Click **Open** to bring up the *Open* dialog.
2. Select "All Files (*.*)" from the *Files of type* drop-down.
3. Browse to the *UGridClip\UGridClip* directory and select "olele.gpr".
4. Click **Open** to import the project and close the *Open* dialog.

The UGrid should appear in the Graphics Window as shown in Figure 1.

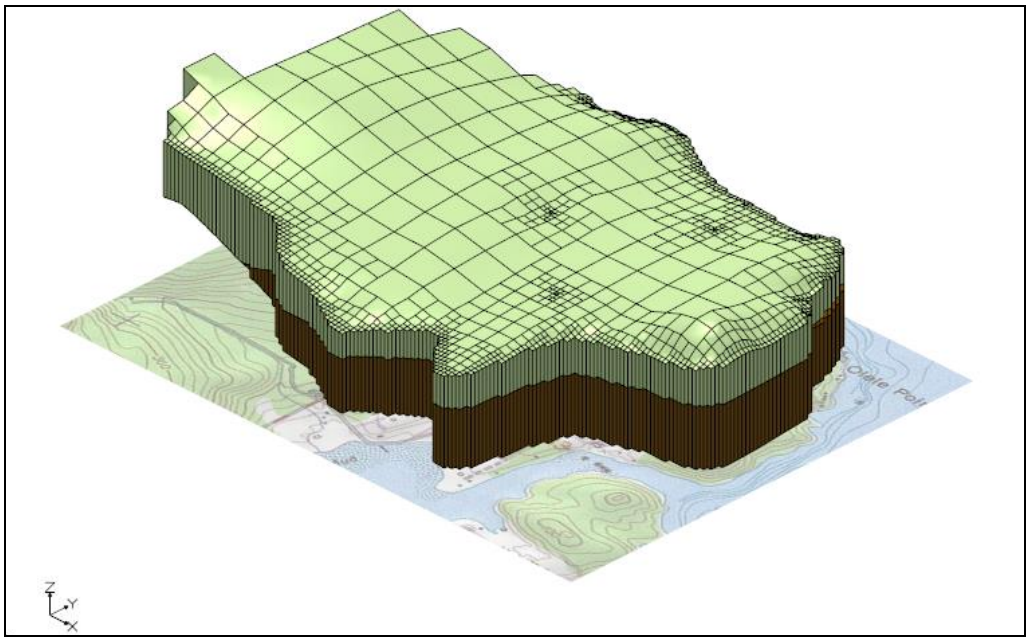

Figure 1 UGrid with outer stratigraphy

2.2 Manually Setting a Clipping Plane

The location of the clipping plane can be specified manually by entering a point on the plane, and the plane's normal vector. This tutorial will display the stratigraphy looking from the southeast with a plane running through cell ID 613. The first step is to determine the location and normal vector for the clipping plane.

1. Select the *Edit* | **Select by ID** menu item to open the *Select* dialog.
2. Set the *ID* to "613".
3. Click **OK** to exit the *Select* dialog.

From the status bar at the top of the GMS window notice the centroid of the cell is at approximately (1715229, 17428353, 8.7).

By default, the normal vector points away from the portion of the UGrid to be clipped. Therefore, to clip away the southwest portion of the UGrid the normal vector should be set to (-1, 1, 0).

4. Select the *Edit* | **Unselect All** menu item to clear the selected cell.

Now to turn on the clipping display option:

5. Click **Display Options** to bring up the *Display Options* dialog.
6. Select *UGrid Data* from the list on the left.
7. Turn on the *Clip* option, and click on the **Options...** button to open the *UGrid Clip Settings* dialog.

8. The *Clip Type* should be set to "Plane".
9. Change the *Clip To* setting to "Partial Cells".
10. Enter the following values in the rest of the *UGrid Clip Settings* dialog:

Item	*Value*
Plane Point X	1715229
Plane Point Y	17428353
Plane Point Z	8.7
Plane Normal X	-1.0
Plane Normal Y	1.0
Plane Normal Z	0.0

11. Click **OK** to close the *UGrid Clip Settings* dialog.
12. Click **OK** to close the *Display Options* dialog.

The clipped UGrid should appear in the Graphics Window as shown in Figure 2.

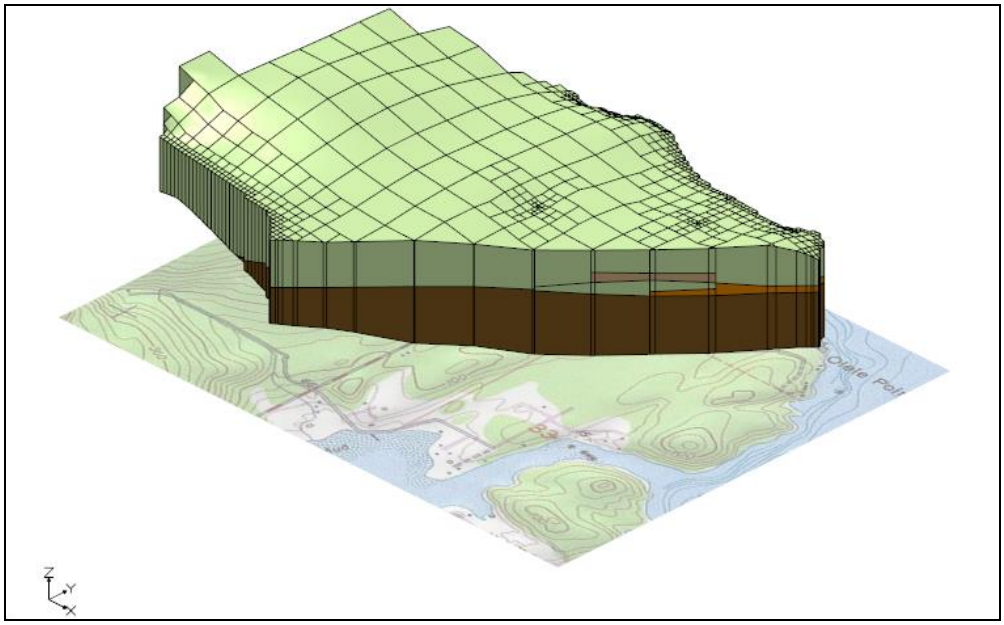

Figure 2 UGrid with clipped stratigraphy

2.3 Using the Clipping Plane Widget

The clipping plane widget provides a much easier way to position the clipping plane.

1. Select the **Edit Clip Plane** tool.

The clipping plane widget should appear in the Graphics Window as shown in Figure 3. The widget shows the plane as a translucent rectangle; the point defining the plane is shown in the rectangle; and the normal is shown as an arrowed line segment passing through the plane. A grayed out bounding box is displayed around the UGrid.

The plane, point, and normal can each be edited by clicking on them and dragging them within the bounding box in the Graphics Window. Dragging the clipping plane moves the plane point back and forth along the plane normal. Dragging the plane point moves it about the surface of the plane. And dragging tail or head of the normal vector changes the normal orientation about the plane point.

2. Change the clipping plane location by clicking in the plane and dragging it toward the back corner of the gray bounding box.

Experiment with moving the plane about the UGrid by also adjusting the plane point and normal.

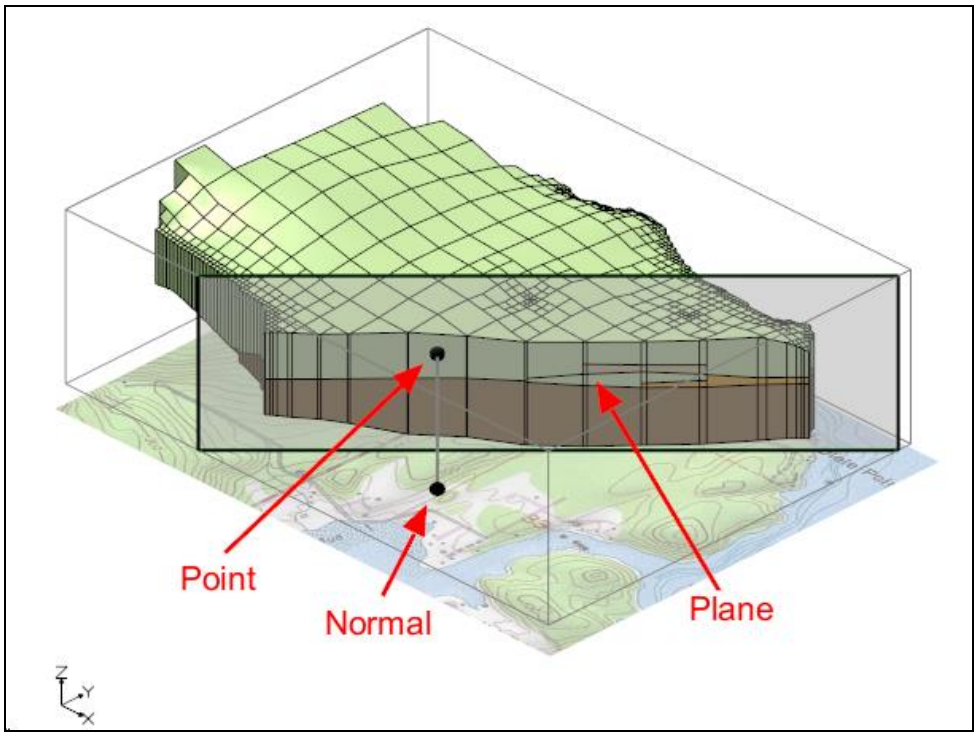

Figure 3 UGrid with clipping plane widget

3 Clipping to Scalar Values

In this section of the tutorial, a GMS project with a UGrid containing a dataset with cell-by-cell contaminate concentration values in parts-per-million (ppm) will be loaded in. The UGrid clip display option will be used to display the contaminate plume.

3.1 Opening the UGrid Project

First, to open the GMS project containing the UGrid data:

1. Select *File* | **New** to close the "olele.gpr" project, and if desired save the project to different location.

2. Click **Open** to bring up the *Open* dialog.
3. Select "All Files (*.*)" from the *Files of type* drop-down.
4. Browse to the *UGridClip\UGridClip* directory and select "contaminate_plume.gpr".
5. Click **Open** to import the project and close the *Open* dialog.

The UGrid with the concentration data should appear in the Graphics Window as shown in Figure 4, with contours of the plume visible on the front left face of the grid.

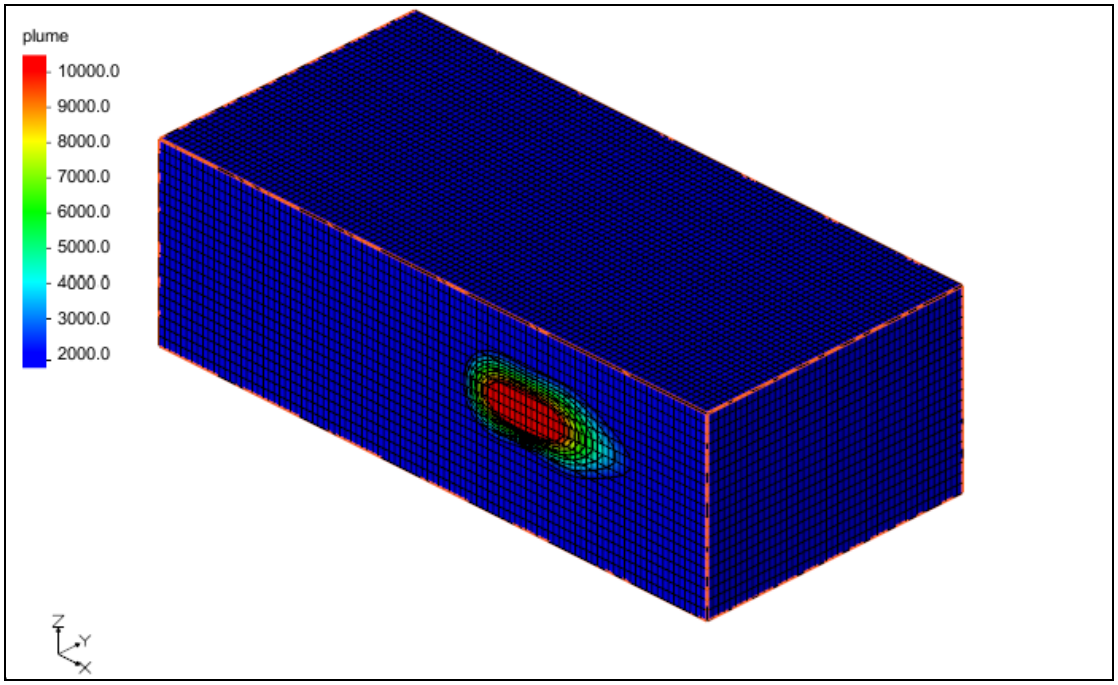

Figure 4 UGrid with contaminate concentration contours

3.2 Clipping to UGrid cells above a scalar value

Now to use scalar clipping to display the portion of the UGrid with a contaminant value greater than 2000 ppm:

1. Click **Display Options** to bring up the *Display Options* dialog.
2. Select *UGrid Data* in the list on the left.
3. Turn on the *Clip* option, and select the **Options** button to open the *UGrid Clip Settings* dialog.
4. Change the *Clip Type* to "Scalar".
5. The *Clip To* option should be set to "Whole Cells".

6. Enter “2000.0” for the *Scalar Value*.
7. Click **OK** to close the *UGrid Clip Settings* dialog.
8. Click **OK** to close the *Display Options* dialog.

The Graphics Window should display the plume as shown in Figure 5.

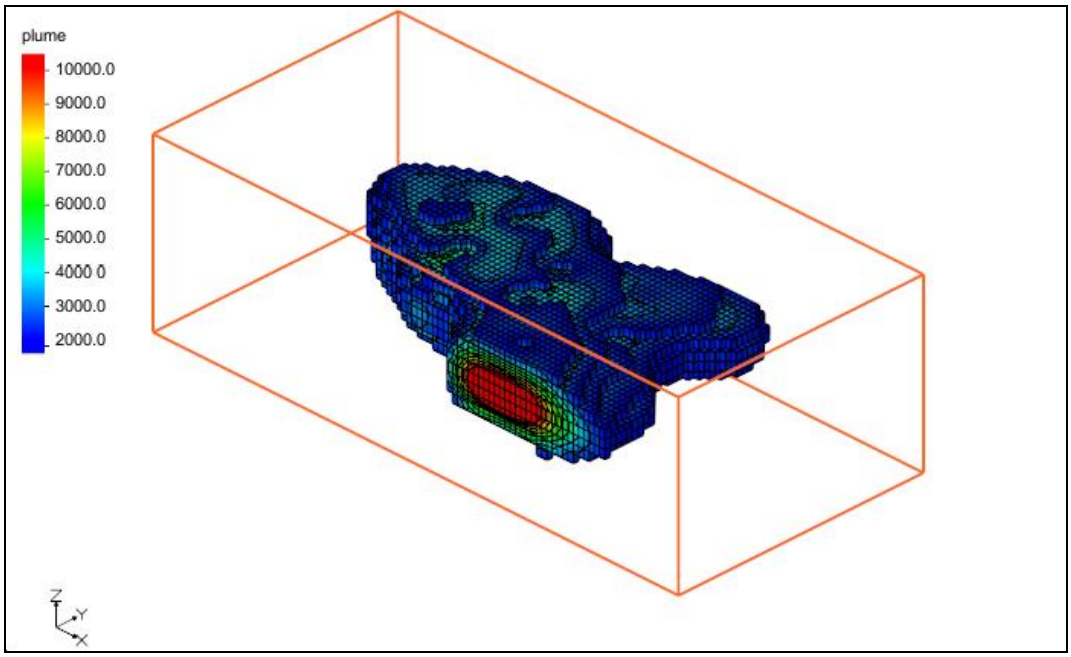

Figure 5 UGrid contaminate plume with scalar and whole cells

3.3 Clipping to smoothed UGrid within a scalar range

The next step is to use the “Scalar Range” clip option to display an outer portion of the plume as well as using the “Partial Cells” option to get a smoother view of the plume.

To use the “Partial Cells” option with scalar values it is necessary to use a dataset where the dataset values are on the nodes (or points) of the UGrid rather than the cell. To do so, it is necessary to convert the cell dataset into a node dataset.

1. Right-click on the “contaminant” dataset and select the **Convert to Point Dataset** menu item to bring up the *New Dataset Name* dialog.
2. Click **OK** to use the default dataset name and close the *New Dataset Name* dialog.

Now with the new dataset (“contaminant point data”) selected as the active dataset, change the clip display options:

3. Click **Display Options** to bring up the *Display Options* dialog.

4. Click on the **Options** button next to the *Clip* option to open the *UGrid Clip Settings* dialog.
5. Change the *Clip Type* to "Scalar Range".
6. Change the *Clip To* option to "Partial Cells".
7. Enter "2000.0" for the *Minimum Scalar Value*.
8. Enter "9000.0" for the *Maximum Scalar Value*.
9. Click **OK** to close the *UGrid Clip Settings* dialog.

An alert should pop up warning that a point dataset must be used when clipping to scalar values and partial cells.

10. Click **OK** to close the alert.
11. Click **OK** to close the *Display Options* dialog.

The Graphics Window should display the plume as shown in Figure 6.

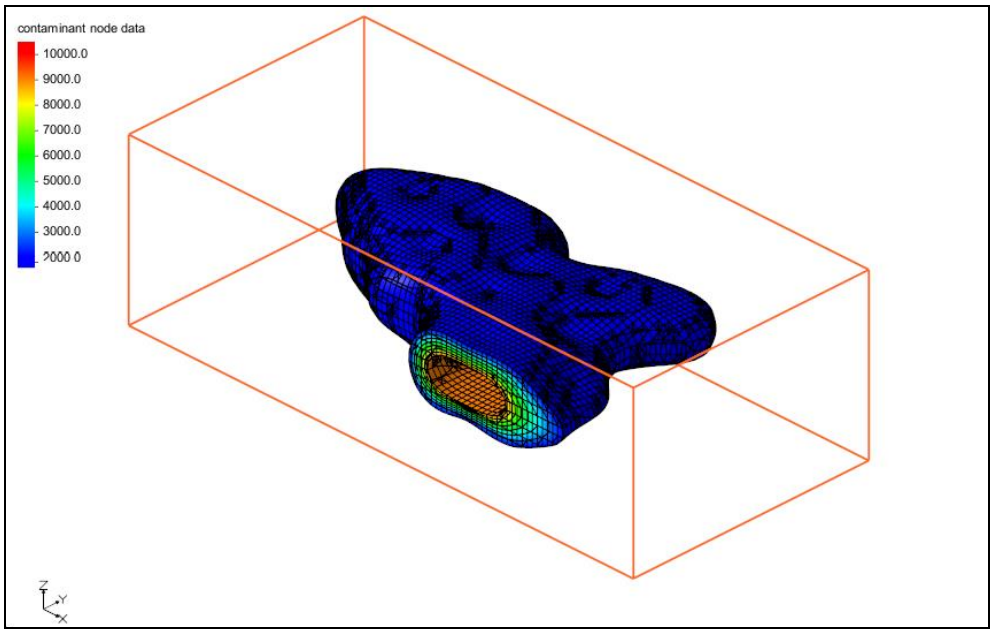

Figure 6 UGrid contaminate plume with scalar range and partial cells

3.4 Removing additional cells with cell visibility

Cell visibility can be used along with the clipping display option to remove more of the UGrid and see inside the plume. To do so, it is possible to hide the cells near the front-left face of the UGrid.

1. Switch to **Plan View** .

2. Using the **Select Cells** tool, drag a rectangle in the Graphics Window to select the cells of the bottom half of the plume.
3. Click on the **Hide Cells** command to hide the selected cells.
4. Switch to **Oblique View**.

The Graphics Window should appear similar to Figure 7. The hidden cells can be redisplayed using the **Show Cells** command.

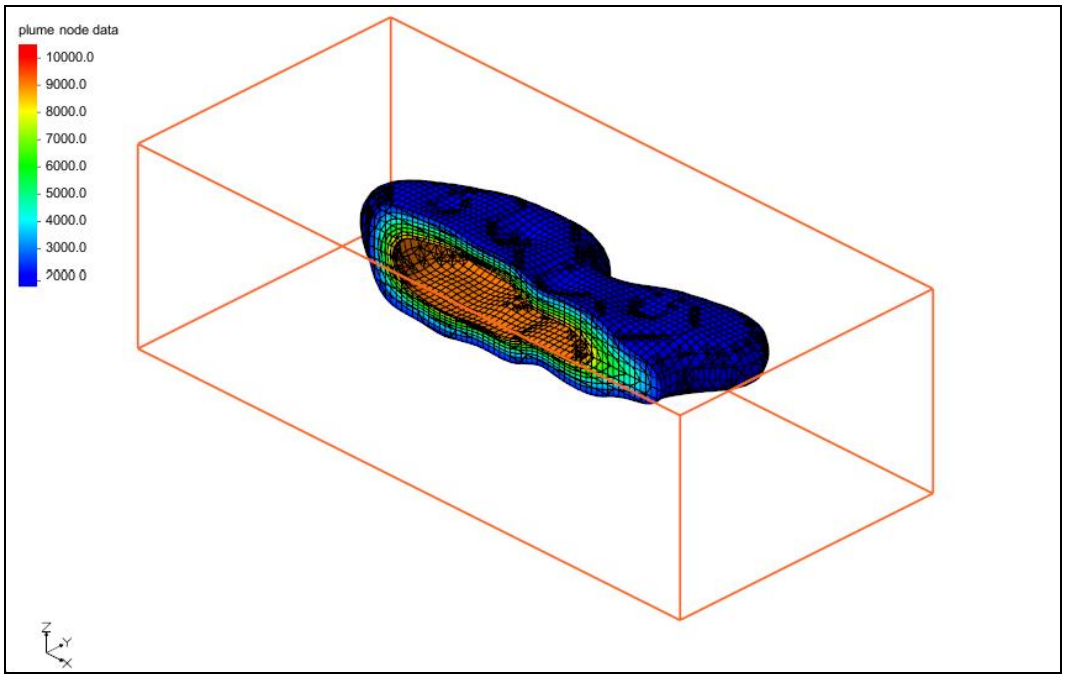

Figure 7 UGrid contaminate plume with hidden cells

4 Conclusion

This concludes the "UGrid Clipping" tutorial. Topics covered in the tutorial include clipping UGrids with a clipping plane, clipping above or below a scalar value, clipping to a scalar range, and using cell visibility to clip additional cells.