

Lesson 6: Lithology

Objective: This example is for modeling lithology or fluid indicator with interpreted indicators and markers. XYKB is in a separate file imported Renew Header. Markers are in row based format with Topname column. The indicators here are oil, gas, and water in sand.

Project Panel:

- Start a new project by clicking on the **File** pull down menu and click **New**
- Click the **Next** button on the lower left.

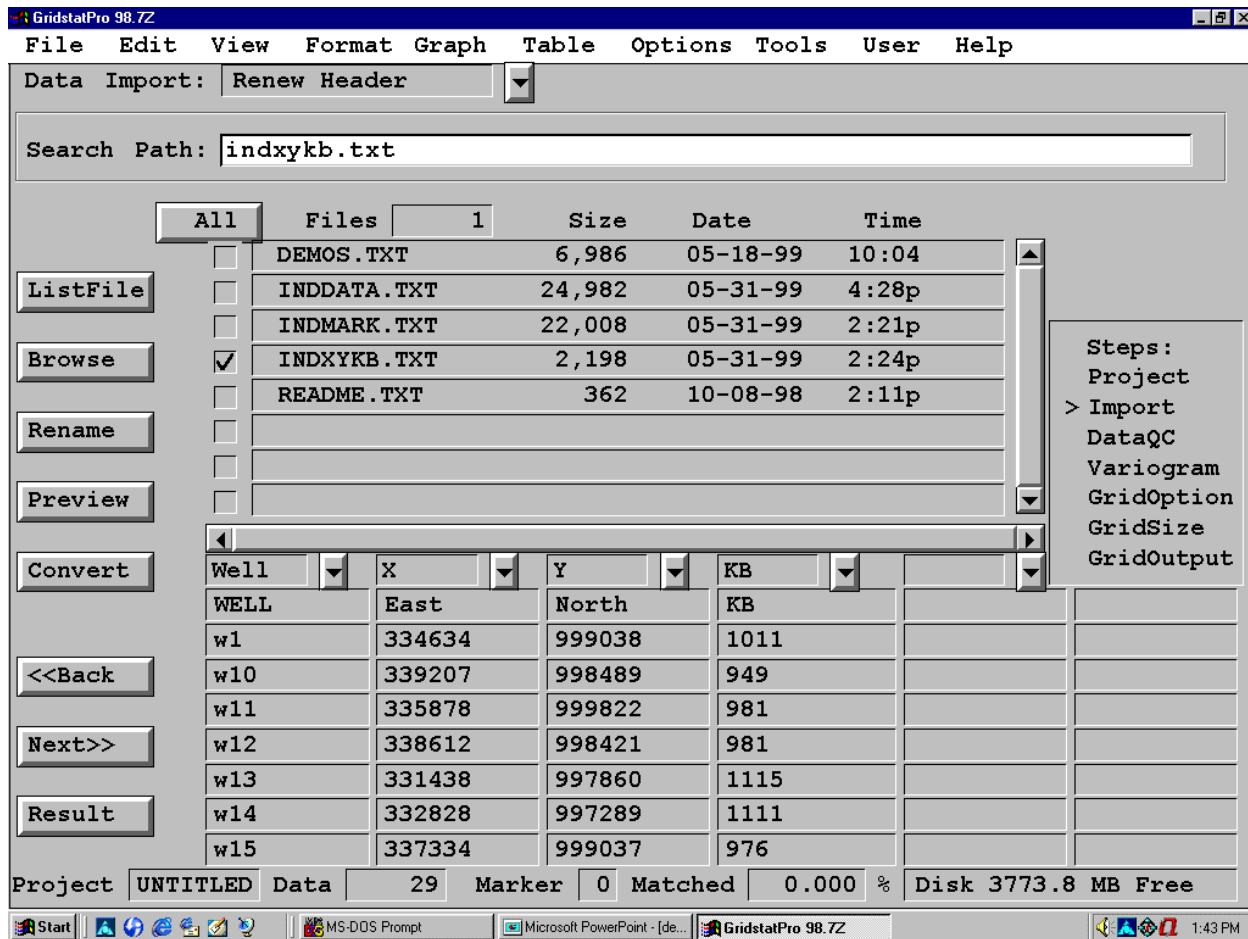
1. Import indicator log as lithology data

Import Panel:

- Click the pull down list at the top (initially **Not Defined**), then select **Lithology**
- On the search path panel, type in **inddata.txt**
- Click on the **ListFile** button, then put a check mark on **INDDATA.TXT**
- Click **Preview** button, then select **As Text**
- On the first column next to **Convert** button, select **Well**
- On the second column, select **Top**
- On the third column, select **Base**
- On the fourth column, select **Type**
- Click the **Convert** button

2. Import XYKB as renew header

- Click the pull down list at the top (initially **Lithology**), then select **Renew Header**
- On the search path panel, type in **indxkb.txt**
- Click on the **ListFile** button, and put a check mark on **INDXYKB.TXT**
- Click **Preview** button, then select **As Text**
- On the column next to **Convert** button, change the fourth column to **KB**



- Click the **Convert** button
- Click the **File** button, then select **Save as**
- Click **OK** button

3. Import markers as row based format

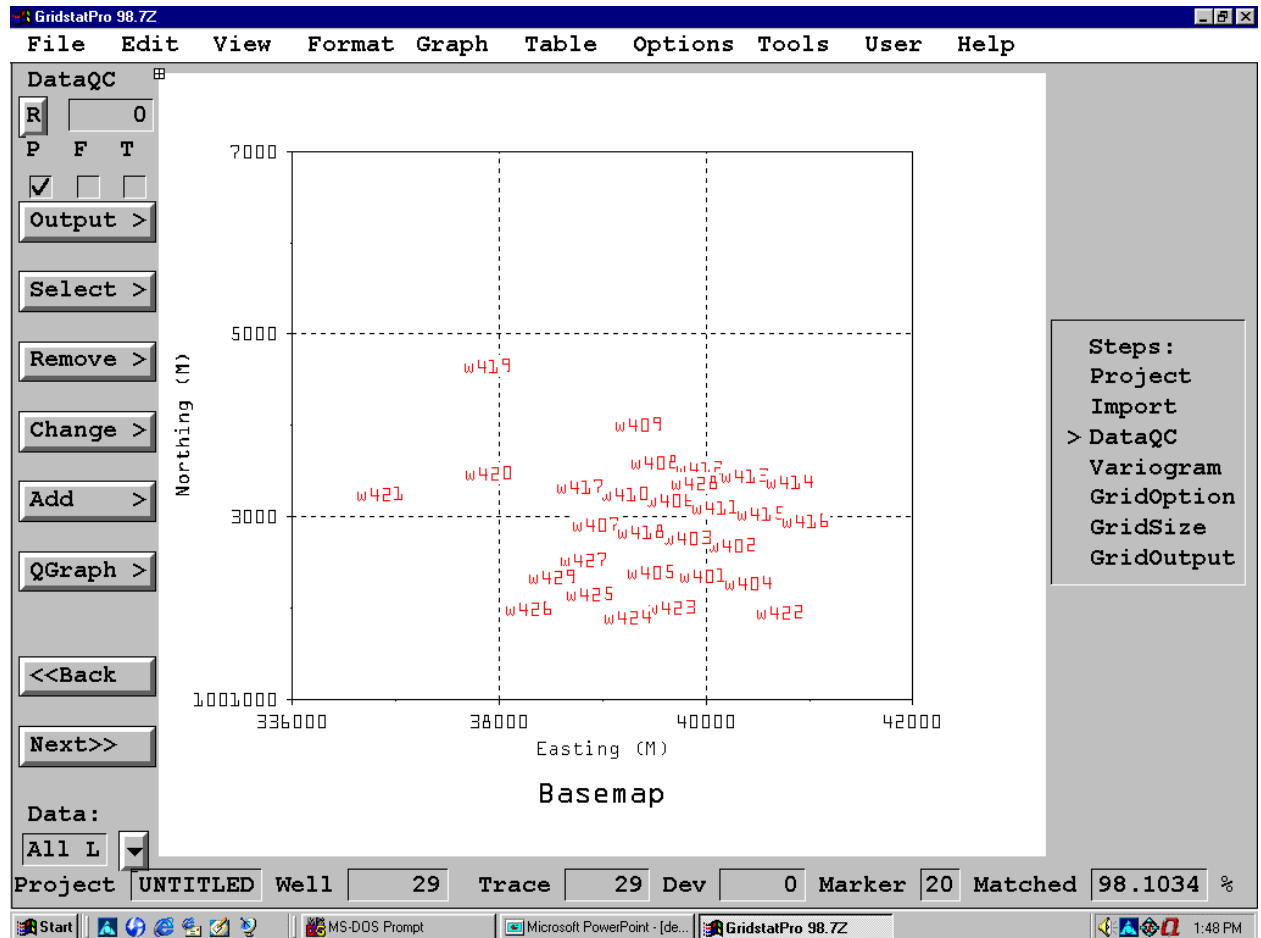
- Click the pull down list at the top (initially **Renew Header**), then select **MarkerHeader**
- On the search path panel, type in **indmark.txt**
- Click the **ListFile** button, then put a check mark on **INDMARK.TXT**
- Click the **Preview** button, then select **As Text**
- On the first column next to **Convert** button, select **Well**
- On the second column, select **Topname**
- On the third column, select **Top**
- Click the **Convert** button
- Click **Yes** to **Convert Markers to Subsea**
- Click **File** button, then select **Save as**
- Put a check mark on **Save Marker in Sequence**
- Click **OK** button
- Click **OK** to **Replace Original Markerfile**
- Click the **Next** button on the lower left

4. Data quality control and remove indicator values > 3 to concentrate on oil, water, and gas

Data QC Panel:

Select the top box on the right

- Click **View** button, then select **1 Graph**



- Click **Format** button, then select **Text&Symbol**
- Click **View** button, then select **4 Graph**

The screenshot shows the GridstatPro 98.7Z software interface. The menu bar includes File, Edit, View, Format, Graph, Table, Options, Tools, User, and Help. The DataQC panel on the left contains several buttons: R (0), P, F, T, Output, Select, Remove, Change, Add, QGraph, <<Back, and Next>>. Below these are Data: All L and a dropdown menu.

The Data Overview section displays the following information:

```

Data Overview:      74504 total p
-----
Wells  Traces DataRead DataNa
  29    29      29
-----
X Min   X Max   Y Min
336852.00 340972.00 1001888.0 100
-----
Data Av.  Data S.D.  Data Min  Da
0.6568238  1.60401    0.000
-----
 Duplicate logs (same well &
    
```

The top-right plot shows a scatter plot of well locations with 'Easting (M)' on the x-axis (ranging from 326000 to 42000) and 'Northing (M)' on the y-axis (ranging from 1001000 to 7000). Numerous wells are plotted as red asterisks, with labels such as w401 through w408.

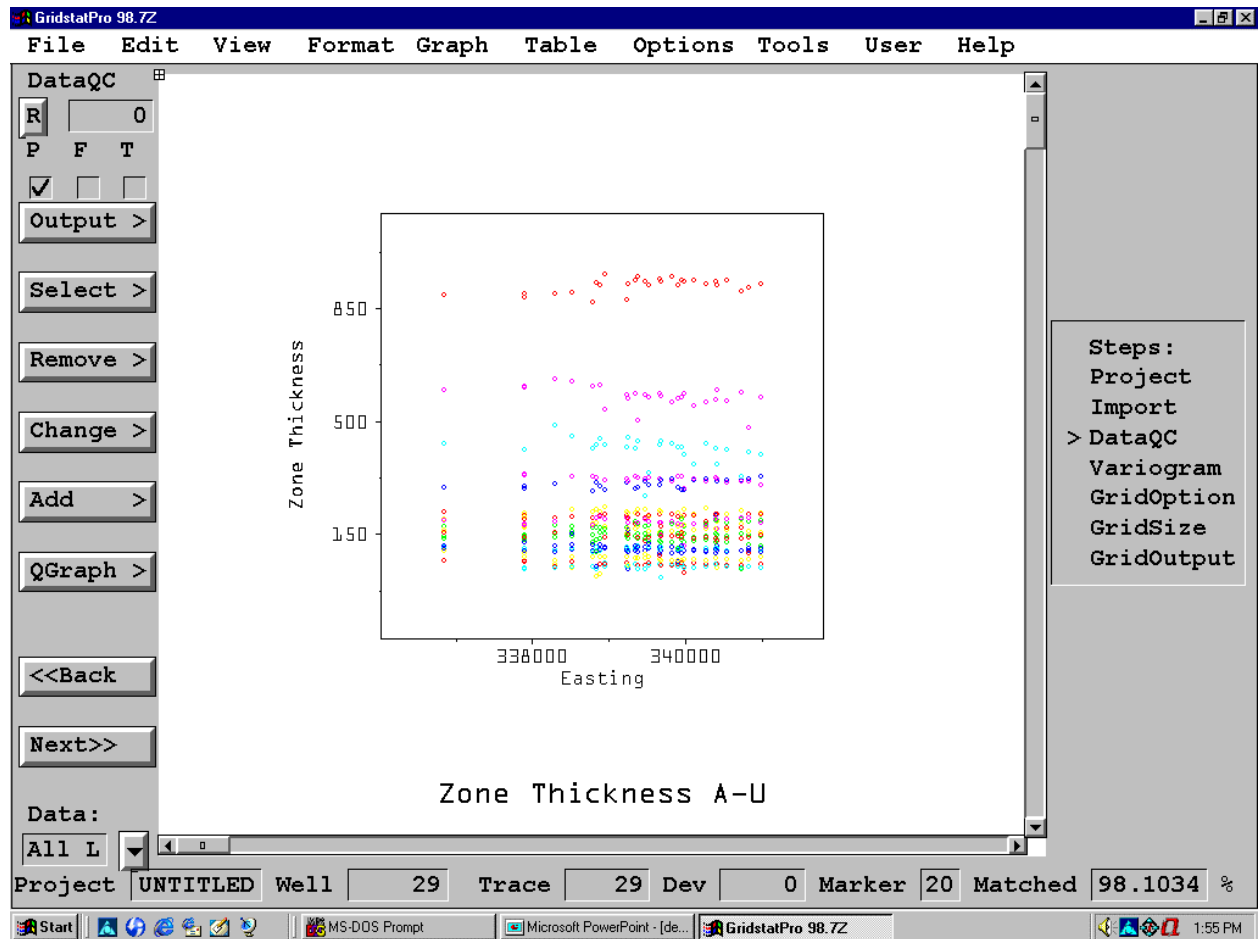
The bottom-left plot shows a lithology graph with 'Easting' on the x-axis (ranging from 330000 to 340000) and 'Easting Northing (M)' on the y-axis (ranging from -3000 to -7000). The plot is titled 'Markers Depth A-U'.

The MarkerHeader table on the right lists the following data:

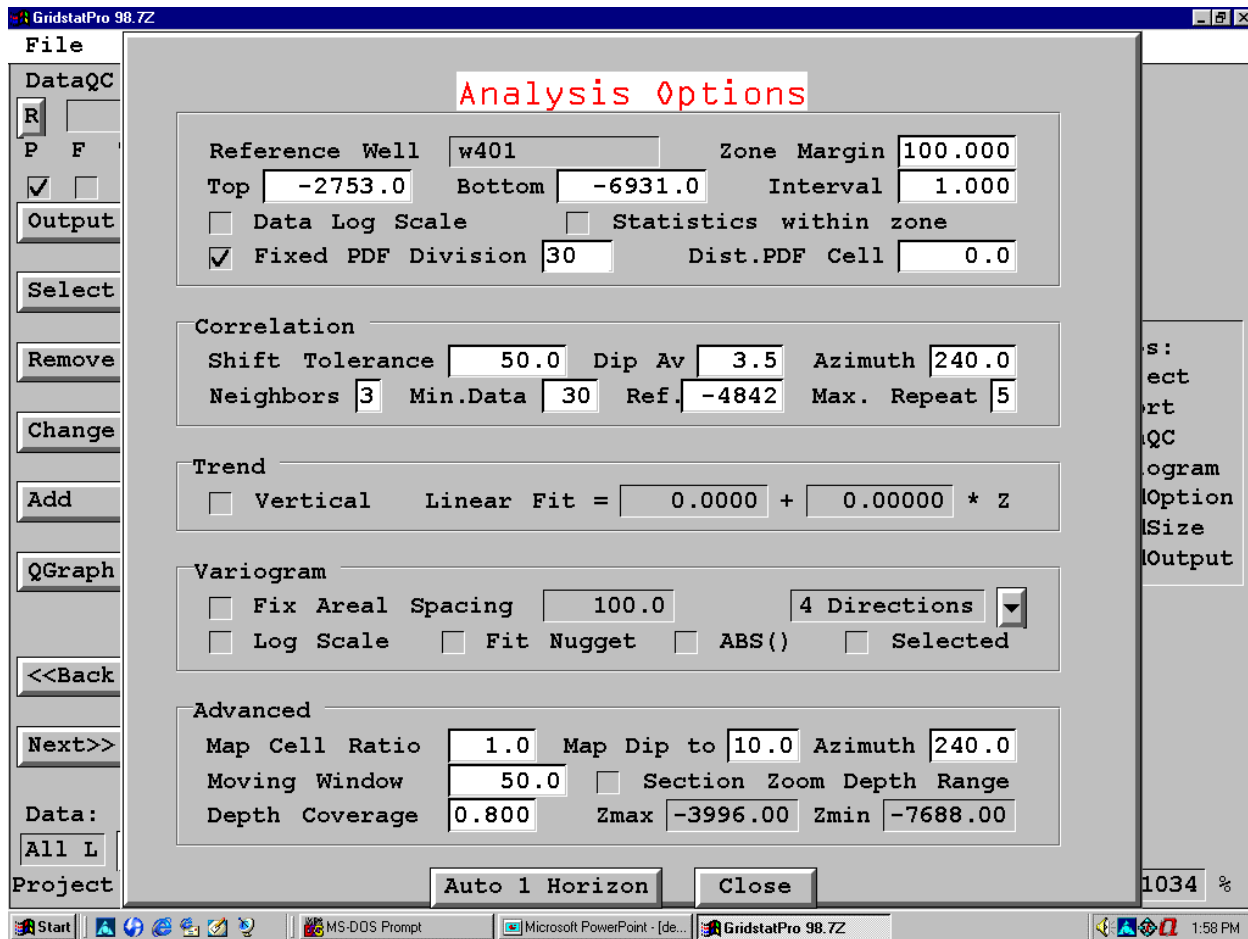
ID	Well
1	w401
2	w402
3	w403
4	w404
5	w405
6	w406
7	w407
8	w408

The bottom status bar shows: Project UNTITLED, Well 29, Trace 29, Dev 0, Marker 20, Matched 98.1034 %.

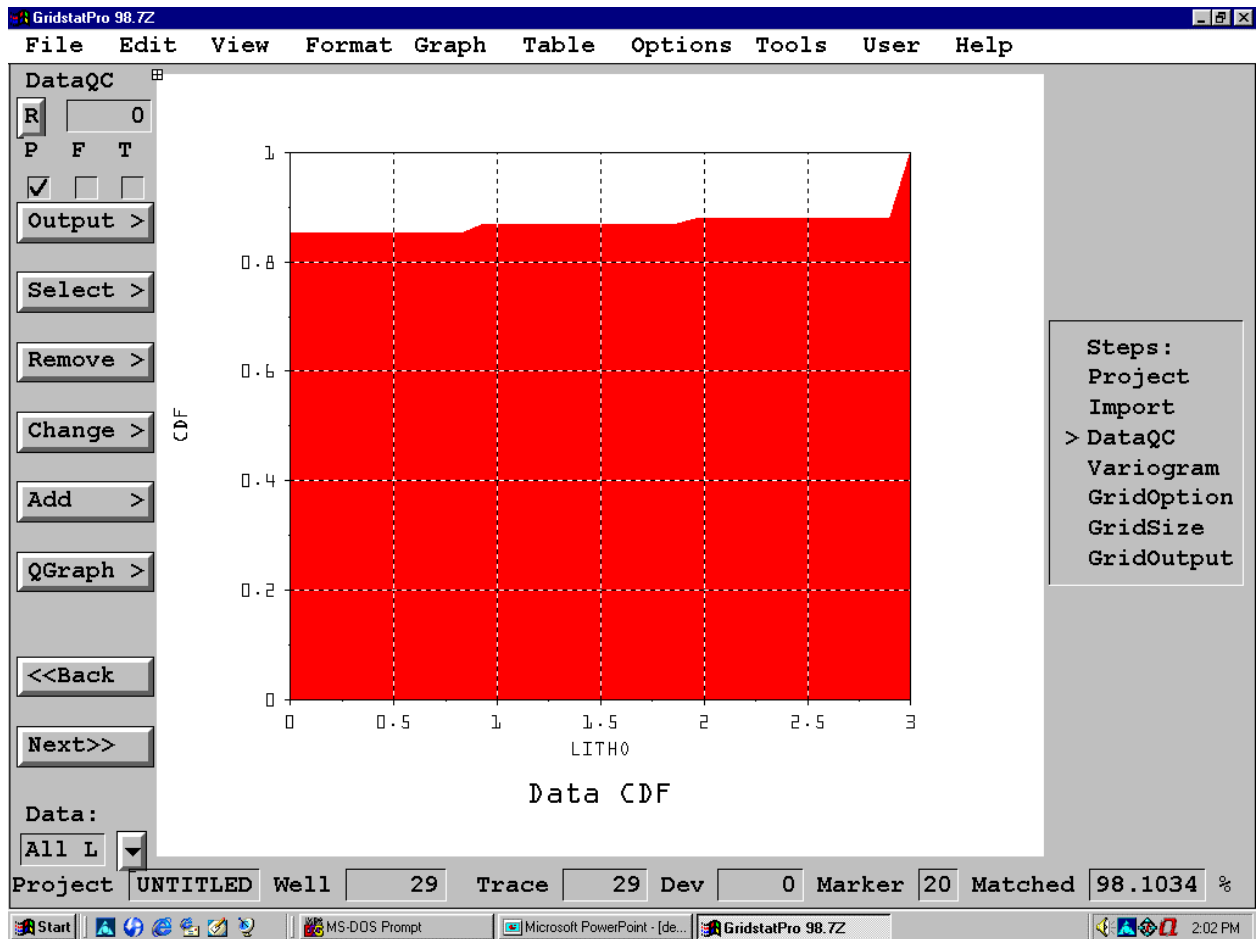
- Select the bottom box on the left
- Click **View** button, then select **1 Graph**
- Click **QGraph** button, then select **Zone Thickness**



- Click **QGraph** button, then select **Dip**
- Click **OK** to **Search Distance Minimum**=1.000, **Maximum** = 1564.049
- Click **Graph** button, then select **Data PDF**
- Click **Remove** button, select **Outside Range**, then change **High Cut** to 3.500
- Click **OK** button
- Click **OK** to **Total Removed Points** : 2156
- Click **Options** button, then select **Analysis**
- Put a check mark in front of **Fixed PDF Division**
- Change to number of **Fixed PDF Division** to 30



- Click **Close** button
- Click **View** button, then select **Reset**
- Click **Graph** button, then select **Data CDF**

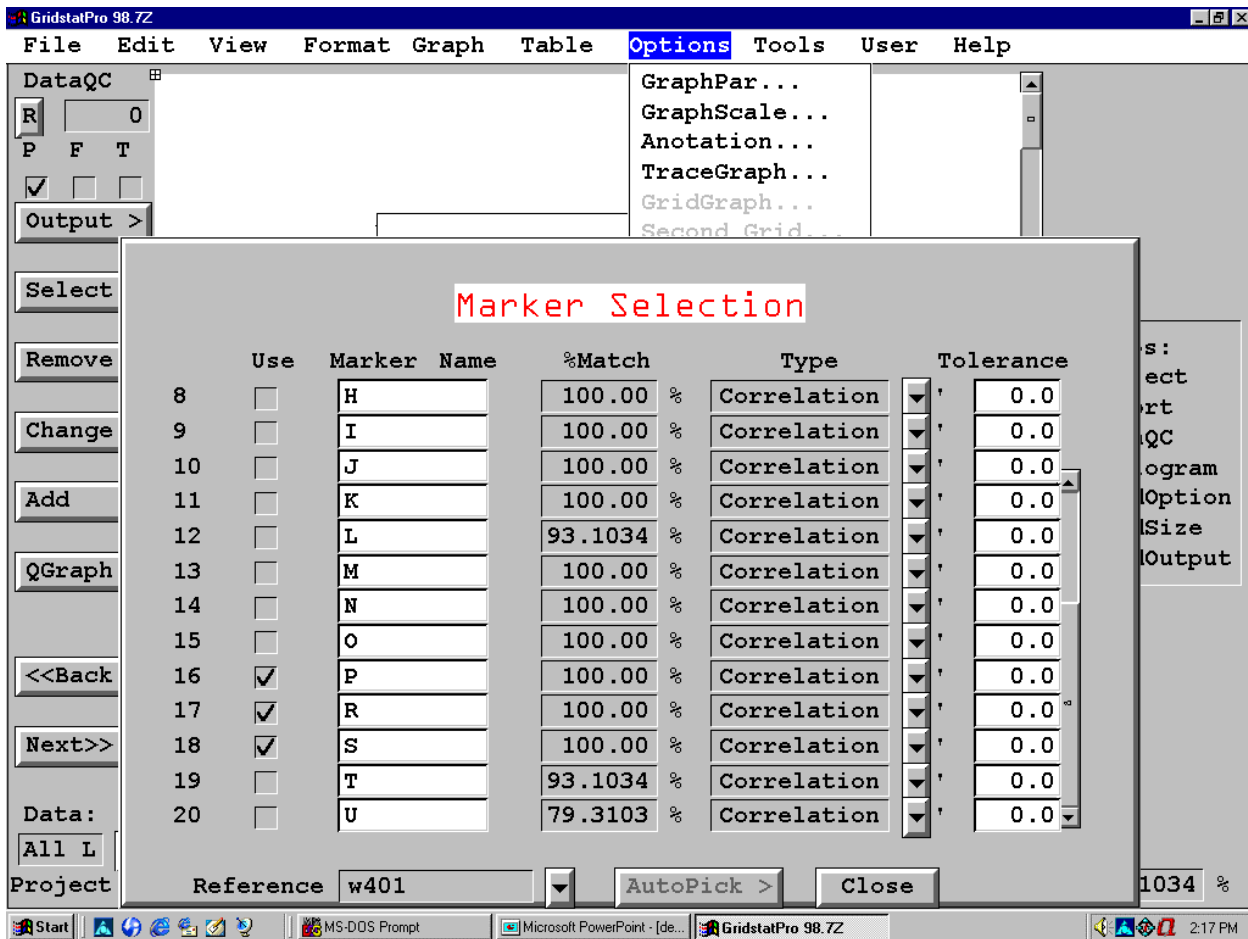


- Click **Graph** button, then select **Markers**

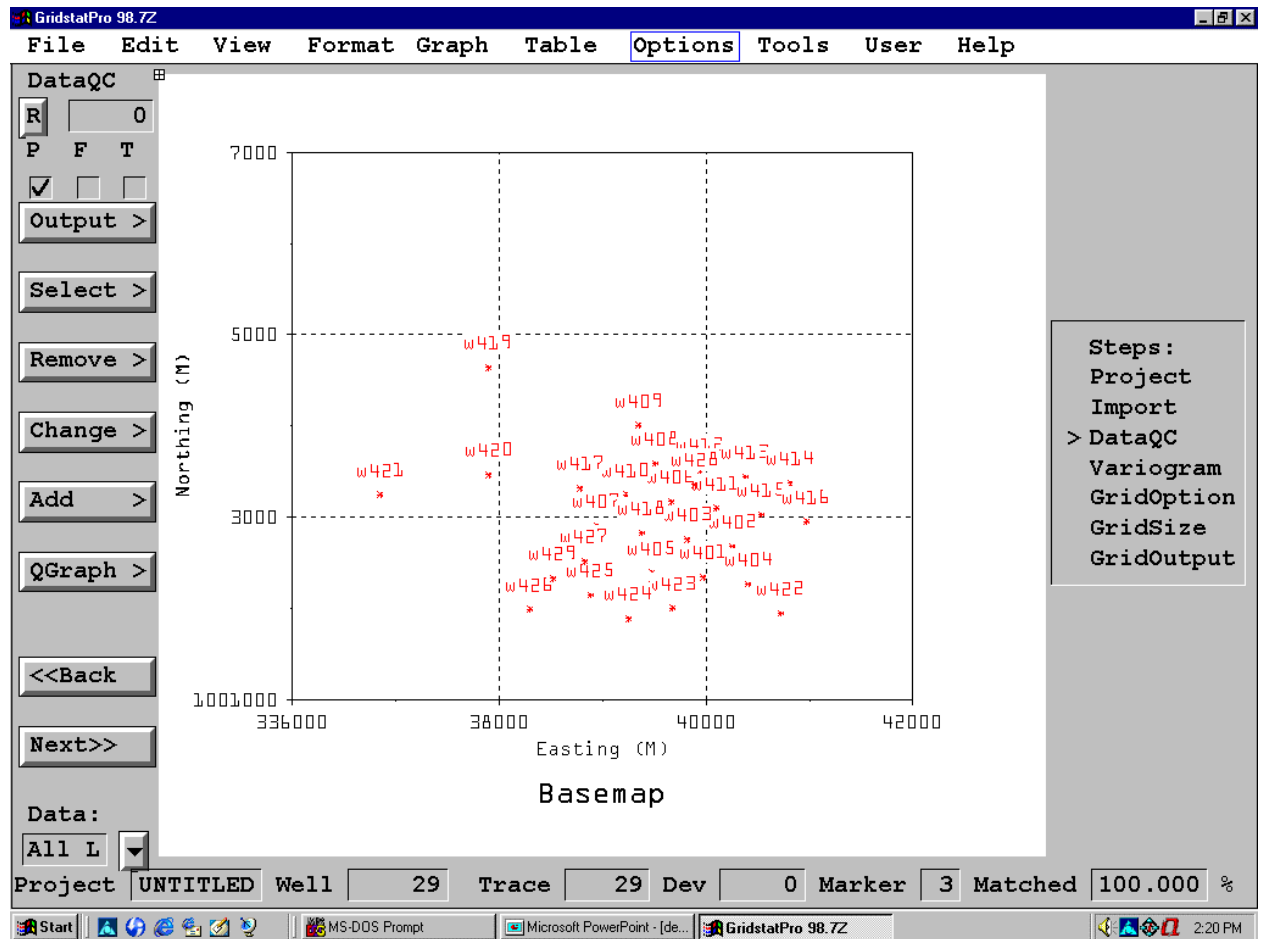
Graph some markers to concentrate on some of the zones

- Click **Options** button, then select **Markers**

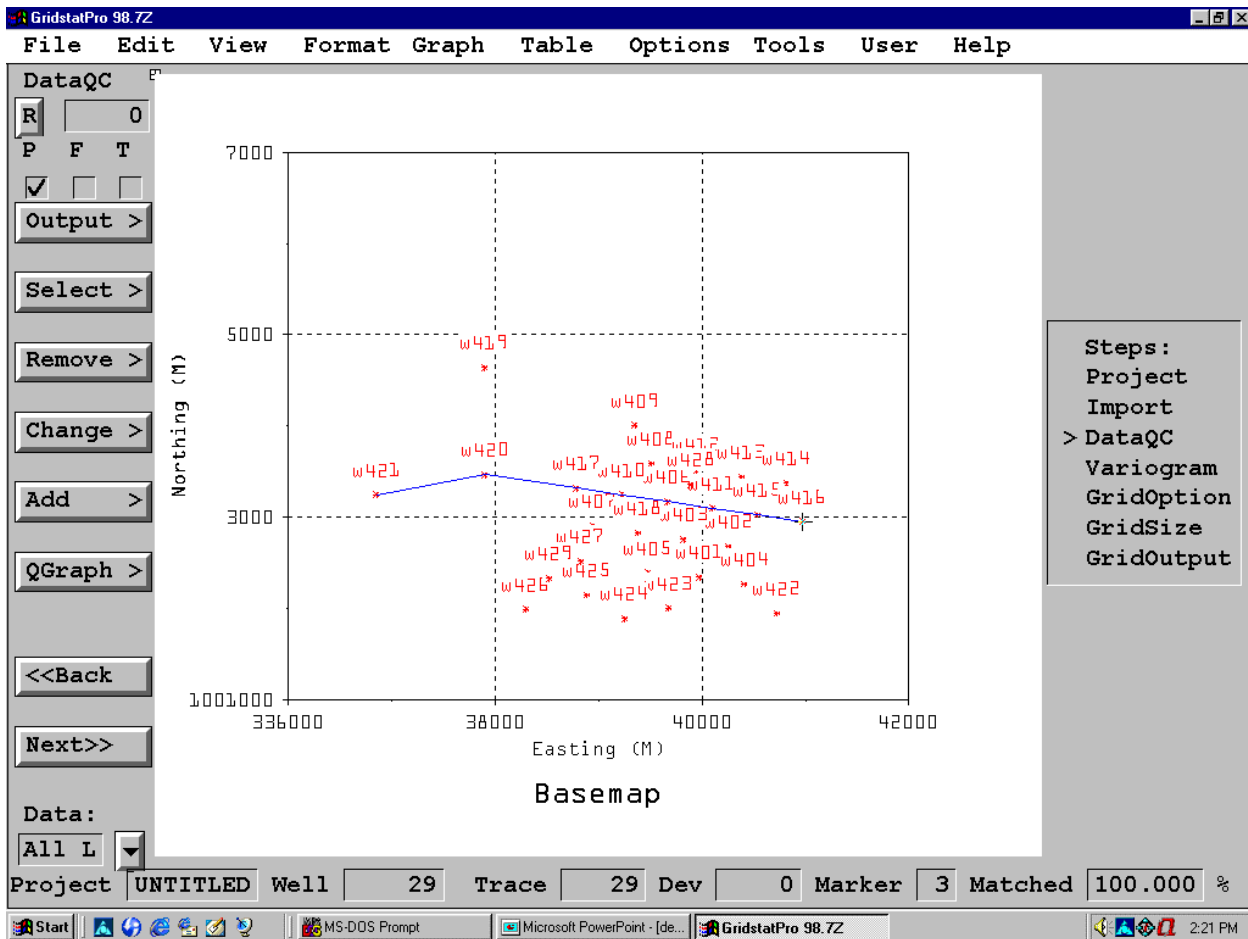
Remove the check mark 1 to 15 and 19-20, only marker P,R, S should have check



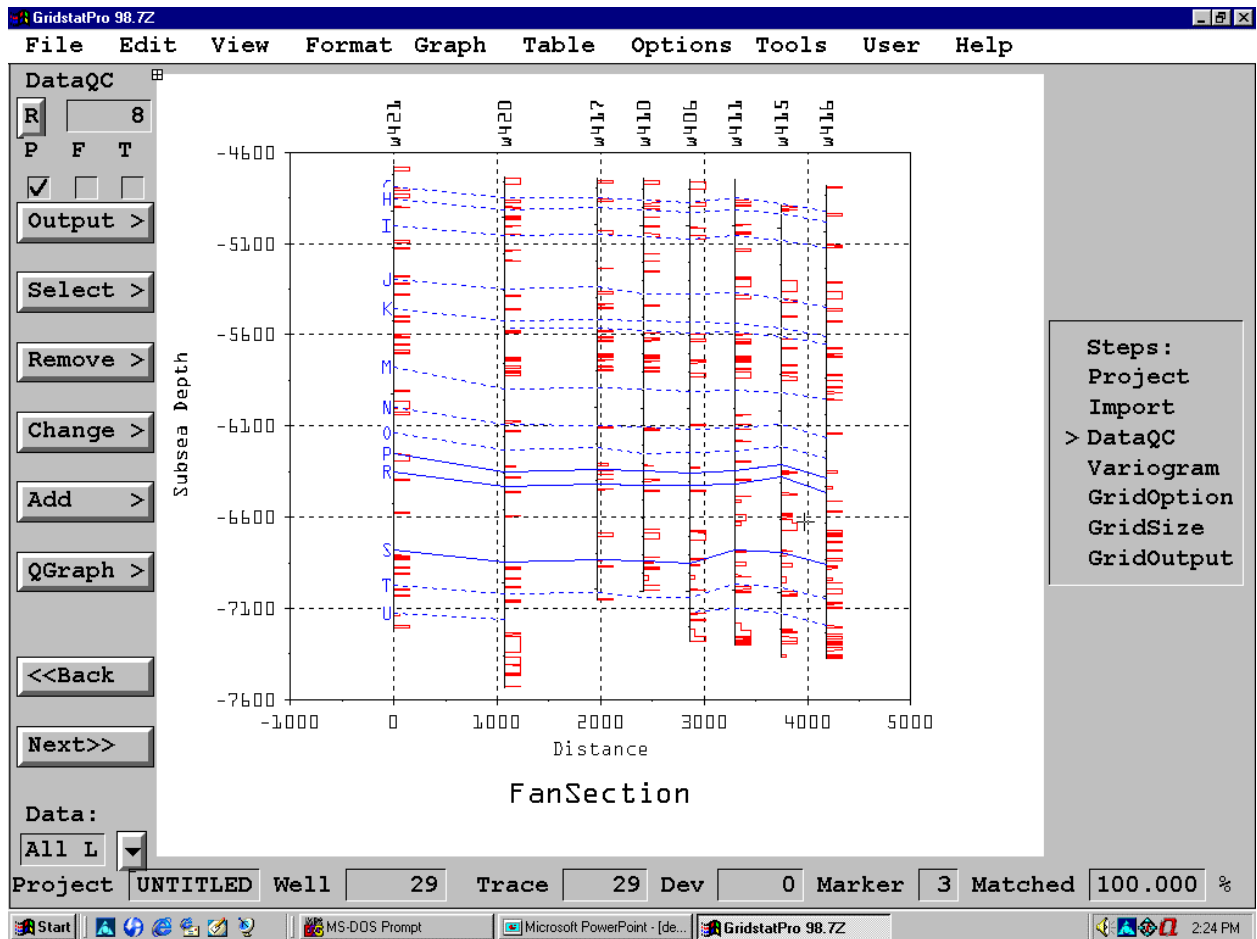
- Click **Close** button
- Click **Graph** button, then select **Basemap**



- Click **Select** button, then select **ResetPick**
- Put a check mark on **P** on the top left (same as **Select>Pick Well**)
- Click on 8 data points of graph to connect line, W421, W420, W40, W418, 403, 402.



- Click **Graph** button, then select **Markers**
- Click **Graph** button, then select **FanSection**

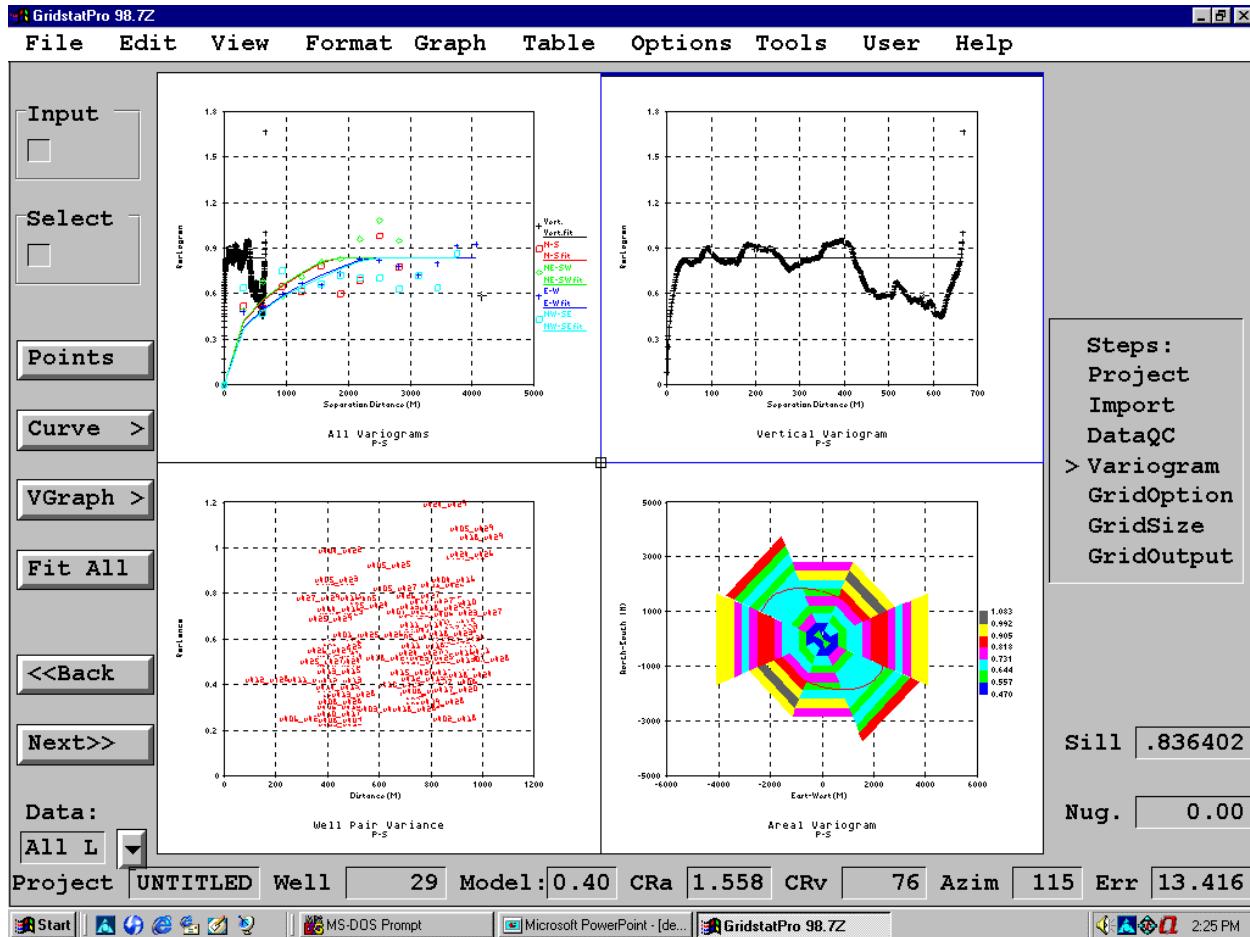


- Click **Next** button at the bottom left

5. Variogram and model fit

Variogram Panel:

- Click **Points** button
- Select **Top** box on the right
- Click **Curve** button, then select **0.4 Fractal**



- Click the **Next** button on the bottom left

GridOption Panel:

- Change **CR-Area** to 1.5
- Click the **Next** button on the bottom left

6. Build 3D indicator model by Kriging

GridSize Panel:

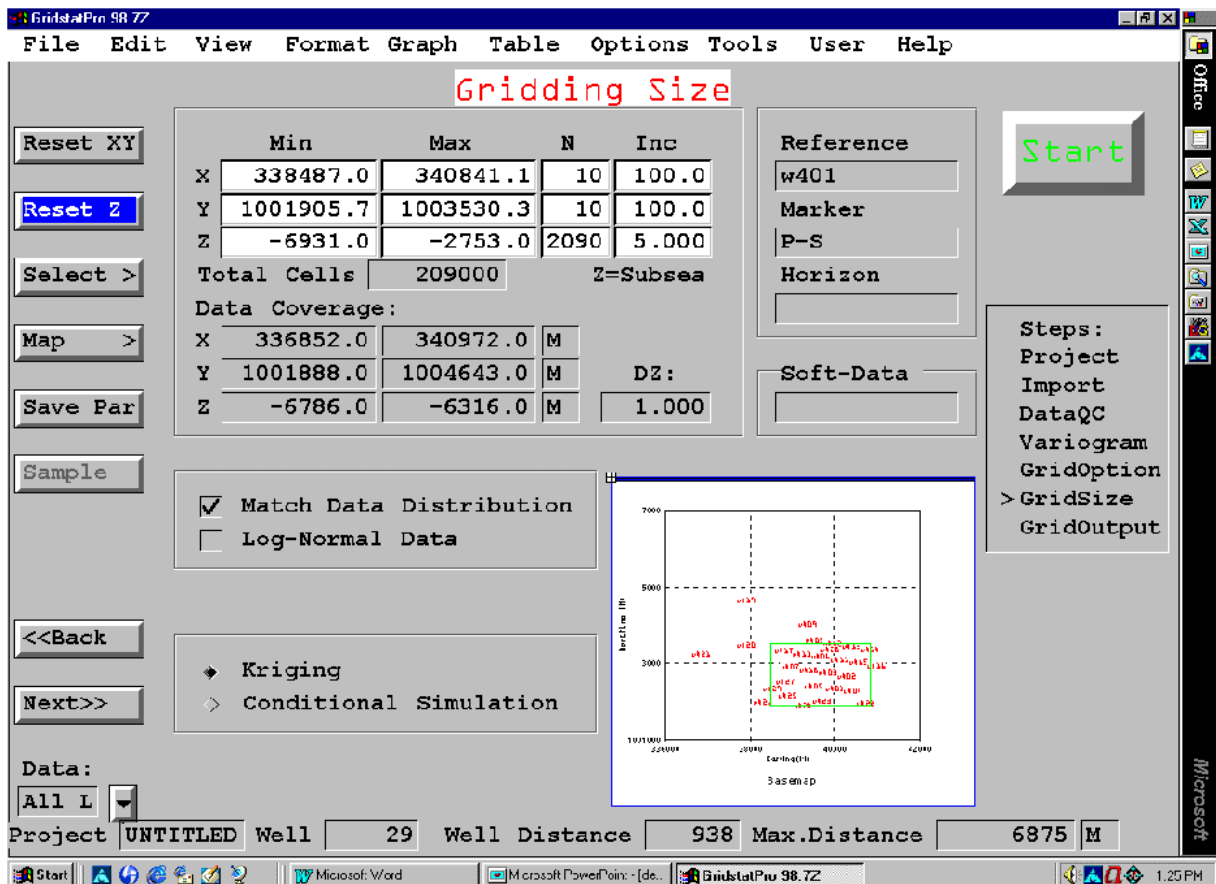
- Click **View** button, then select **1 Graph**

Define grid area and grid size

- Click **Select** button, then select **Pick Box**
- Move cursor to graph to create a box by clicking on left corner and drag down to bottom right corner
- Click **View** button, then select **4 Graph**
- Change row **X**, column **Inc.** to 100.0
- Change row **Y**, column **Inc.** to 100.0

Change DZ from 2 to 5 to reduce running time

Change row Z, column Inc. to 5.000



- Click the **Reset Z** button
- Click **File** button, then select **Save as**
- Click **OK** button

Make indicator grid

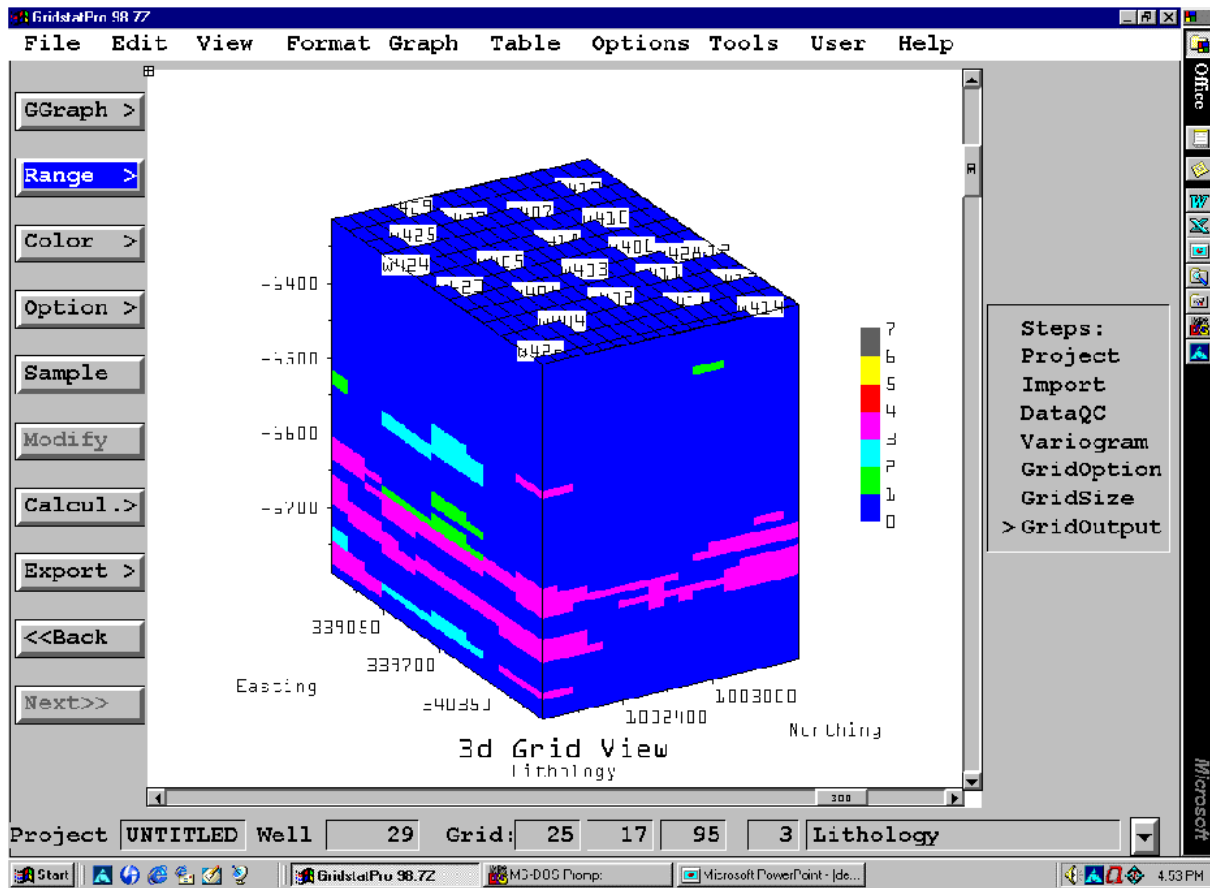
- Click **Options** button, then select **Grid Select**
- On the **Trend/Indicator** select box, select **Indicator**
- Click the **Close** button

Define attribute as lithology

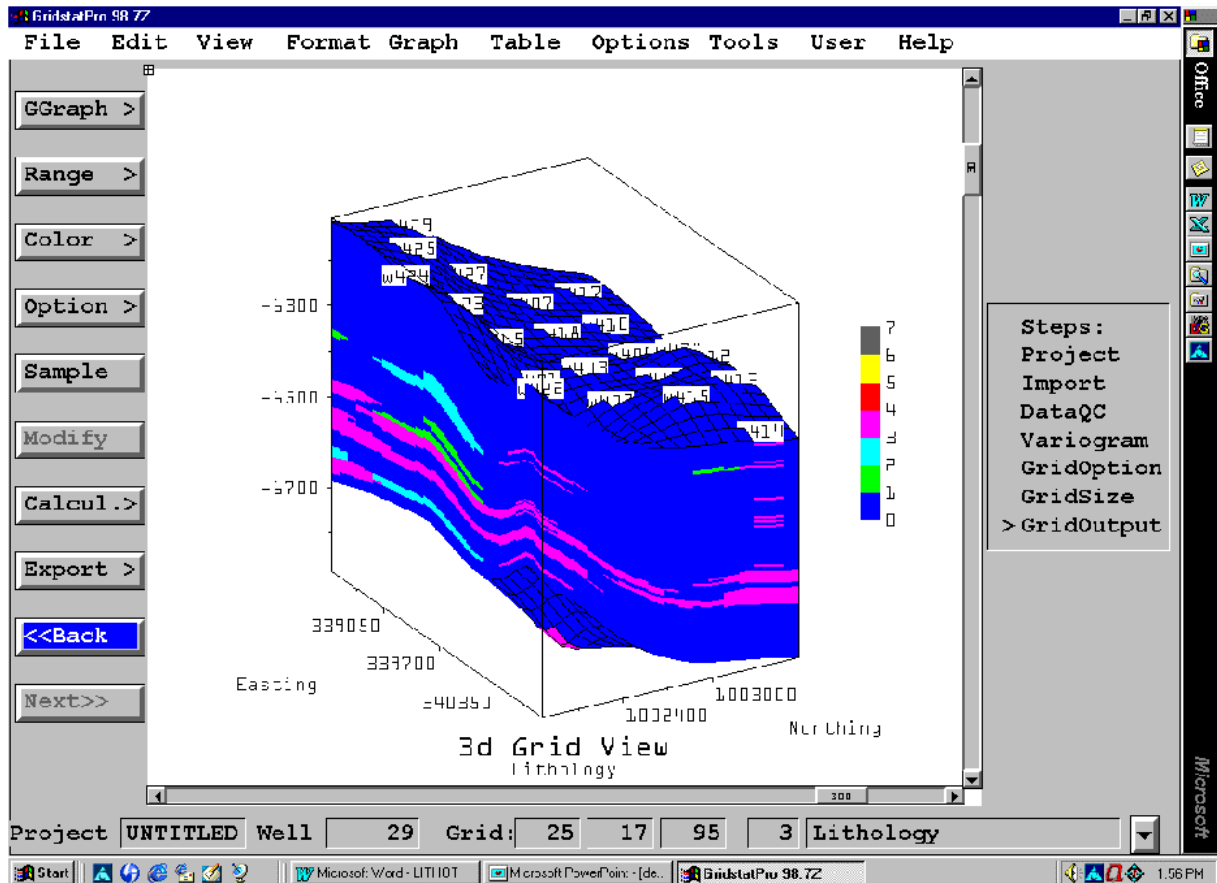
- Click **Options** button, then select **Data&Units**
- On **Type** select box, select **Lithology**
- Click the **Close** button
- Click **Start** button
- Click **Next** button on bottom left

GridOutput Panel:

- Click the **View** button, then select **1 Graph**
- Click **GGraph** button, then select **3D View**



- Click **Range** button, then select **Finest**
- Click **Option** button, then select **Structure**



- Click the **Back** button

7. Build 2 conditional simulation realizations for comparison

GridSize Panel:

- Click on **Conditional Simulation**
- Click **Options** button, then select **Gridding Data**

Use existing horizon grid

- On **DataFile** select box, select **DepthGrid**
- On **As Horizon** select box, select **Own DepthGrid**
- Click **Close** button

Run two realizations

- Click **Options** button, then select **Grid Select**
- Change number of Grids to **2**
- Click **Close** button
- Click **Start** button
- Click **OK** to **Replace Existing Grid**

- Click **Next** button at the bottom left

8. Graph results

GridOutput Panel:

- Click the **GGraph** button, then select **3D View**
- Select the second box on the right
- On the bottom right of grid, select **Realization 1**
- Click **GGraph** button, then select **3D View**
- Select to top left box
- On the bottom right of grid, select **Realization 2**
- Click **GGraph** button, then select **3D View**

