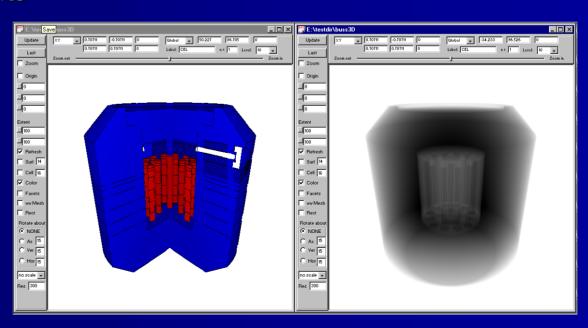
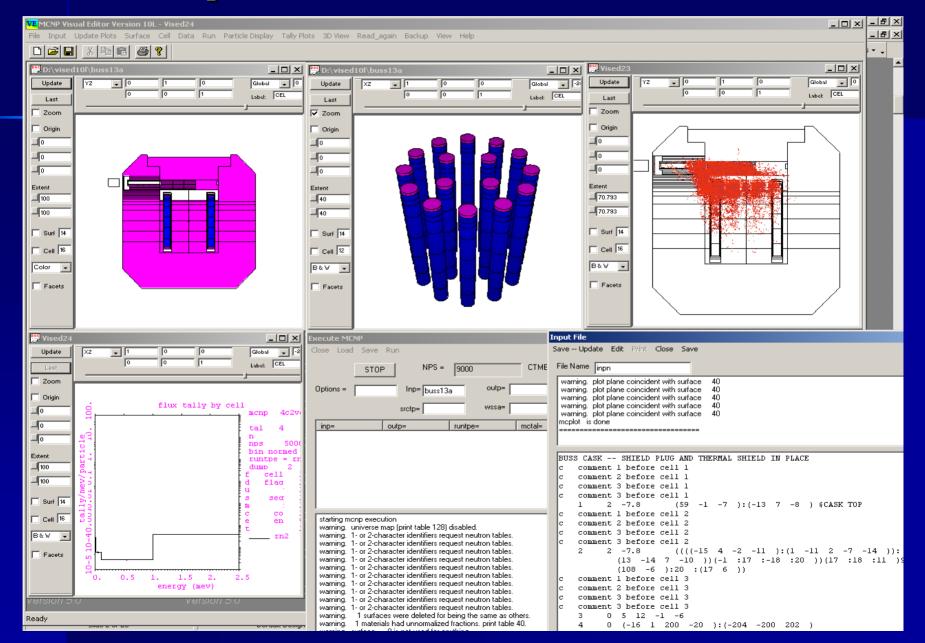
# 3-D PLOTTING CAPABILITIES IN THE VISUAL EDITOR FOR RELEASE 5 OF MCNP

A. L. Schwarz and R. A. Schwarz Visual Editor Consultants

L. L. Carter Carter M. C. Analysis



#### **Complete Interface for MCNP**



# The Visual Editor Input File Creation Capabilities

- Display Geometries with 2D Views.
- Create Geometries
  - Universes
  - Fills
  - Lattices
- Some support for data cards.
  - Materials
  - Transformations
  - Importances

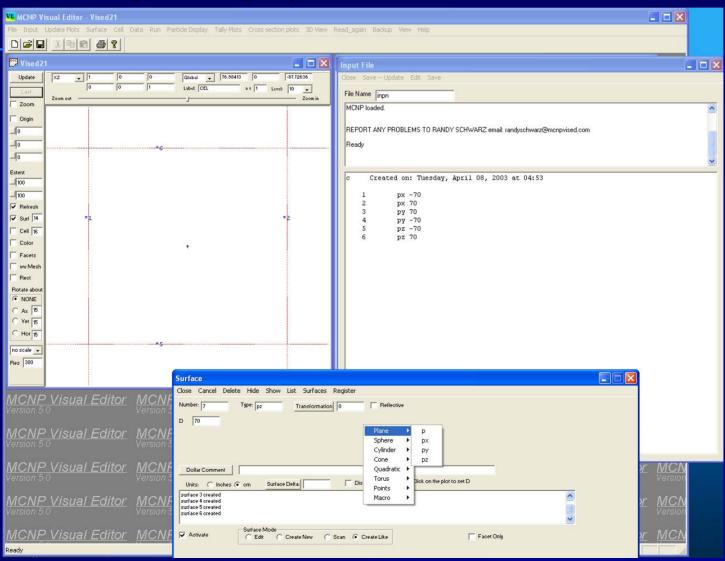
# The Visual Editor Output Visualization Features

- Plot Particle Tracks
  - SDEF Source generation points
  - Collision Points
  - KCODE generation points
- 3D Plots.
- Tally Plots.

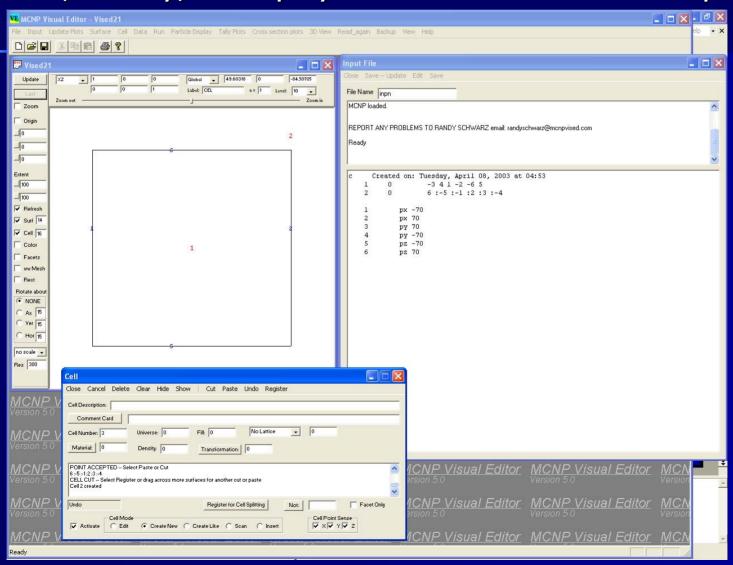
#### **How the Visual Editor works**

- Visual C++ code is linked to the MCNP Fortran code.
- The Visual Editor Fortran modifications are now a part of the LANL Version 5 Fortran code.
- The C++ and Fortran share data and memory.

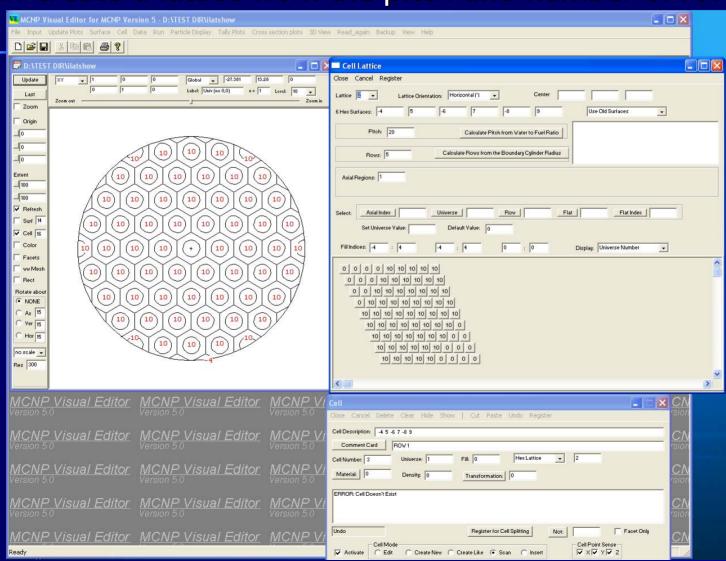
Create, modify, or display surface information from the plot



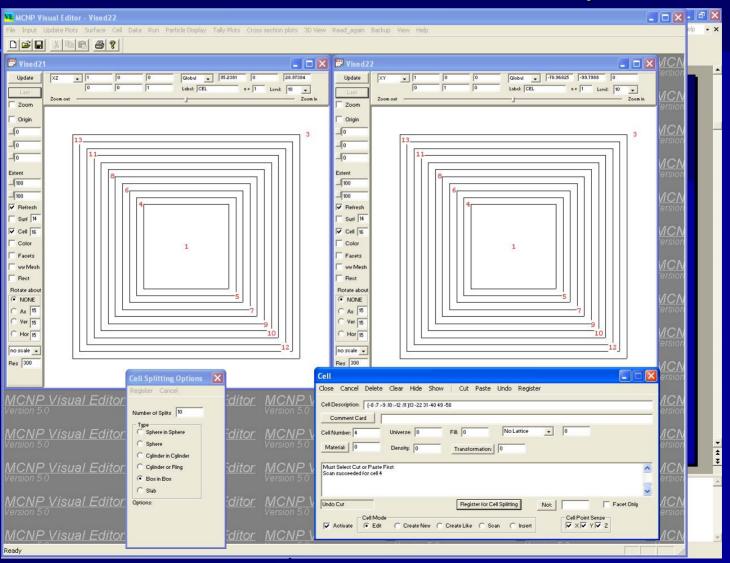
Create, modify, or display cell information from the plot



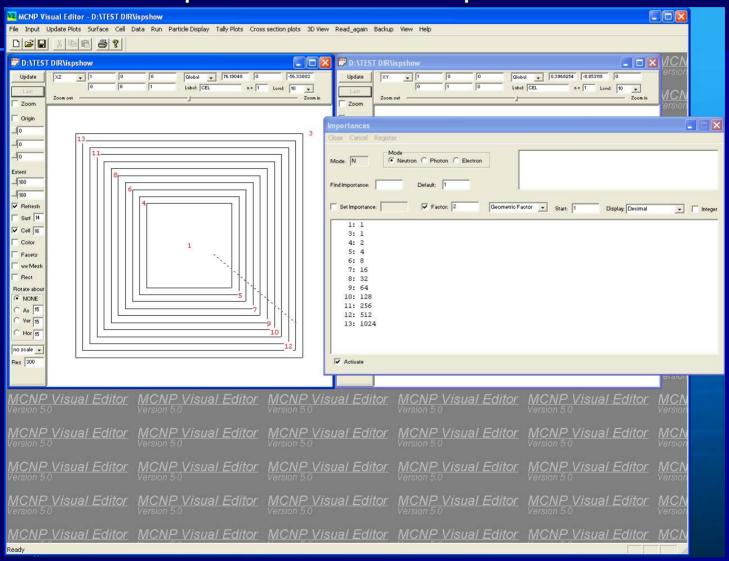
Can create a lattice from the pitch and number of rows.



Split a cell into a number of smaller sections for particle biasing.

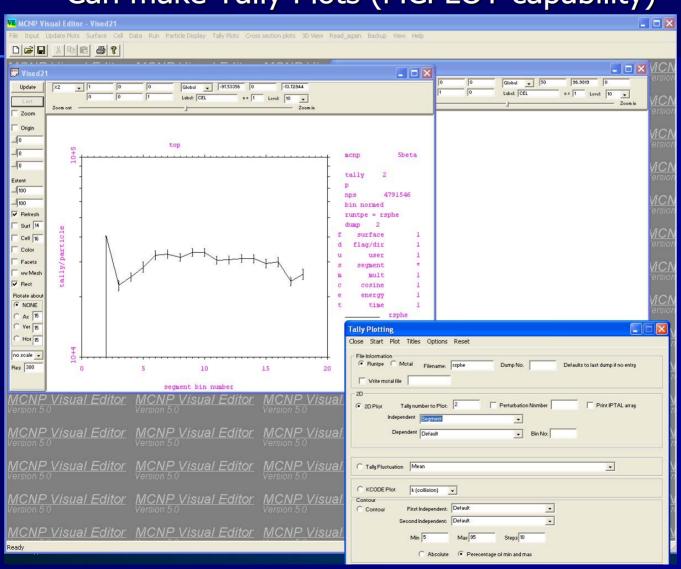


Set importances from the plot screen.



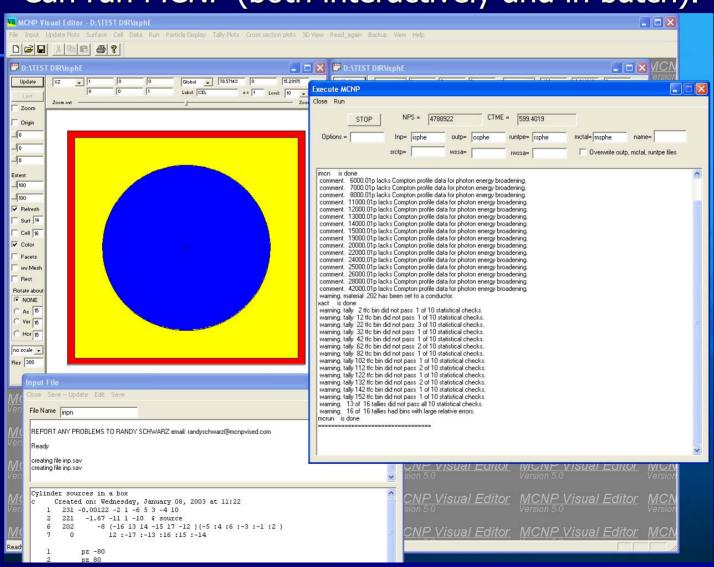
#### **New Features in Version 5 Release**

Can make Tally Plots (MCPLOT capability)



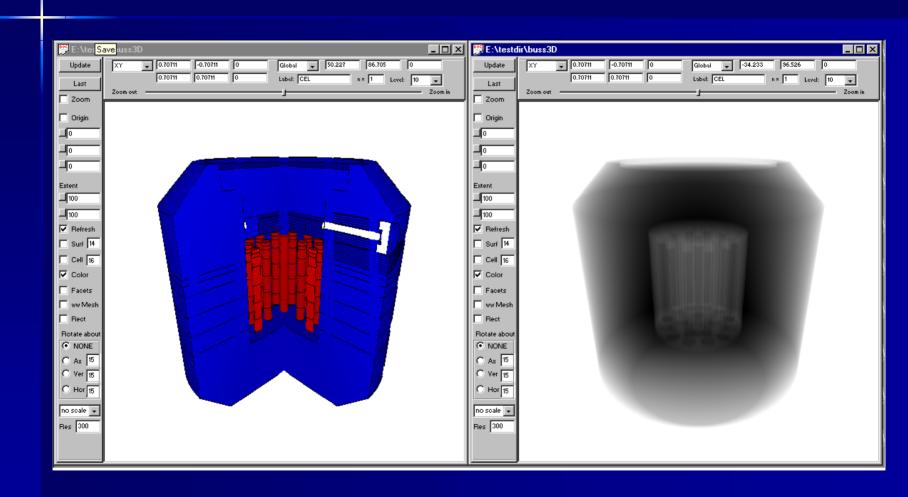
#### **New Features in Version 5 Release**

Can run MCNP (both interactively and in batch).



#### **New Features in Version 5 Release**

Can create 3-D plots – Visualization and Radiographic



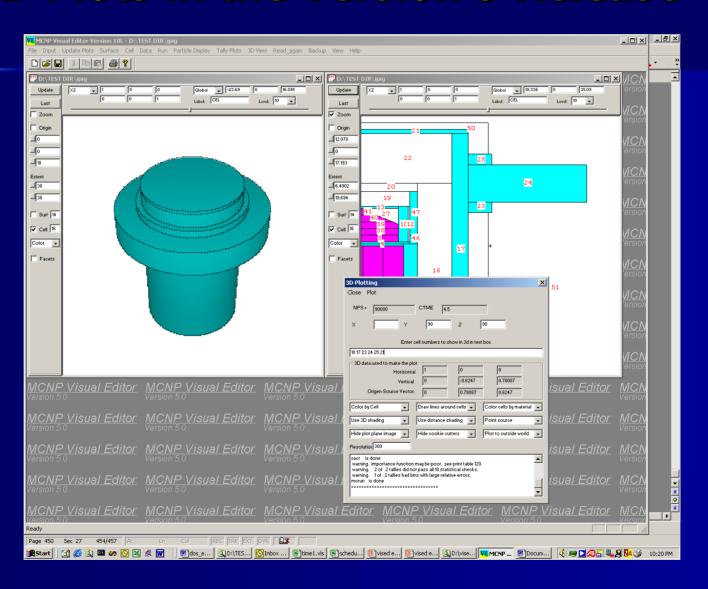
# 3D Plot Background

- MCNP was made for ray tracing.
- Lee created a patch to generate a source.
- Took Lee about 2 weeks to implement.

#### **How 3D Plots Work**

- Sends particle tracks through the geometry.
- Hits the specified cell
- Hits the outside world
- Hits the plot plane (if requested)

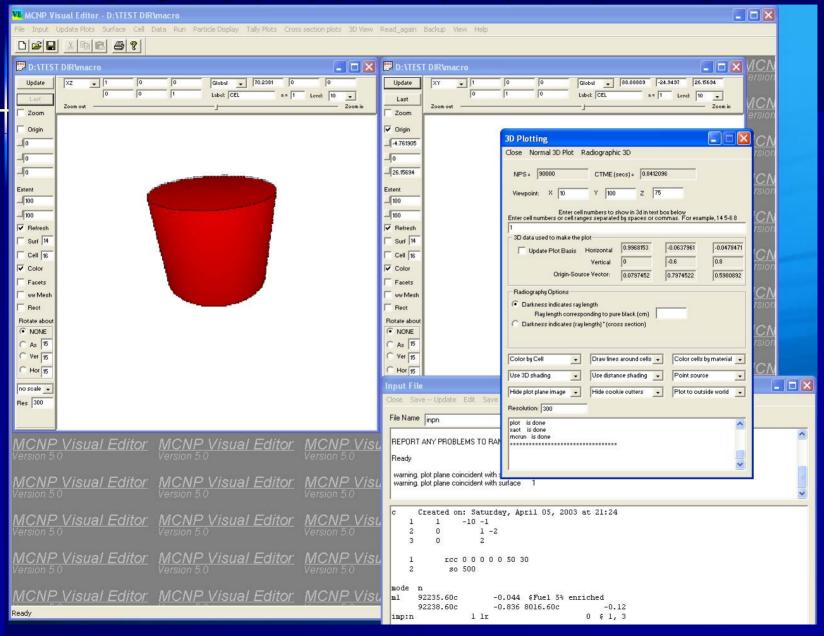
#### 3-D Plots in the Version 5 Release



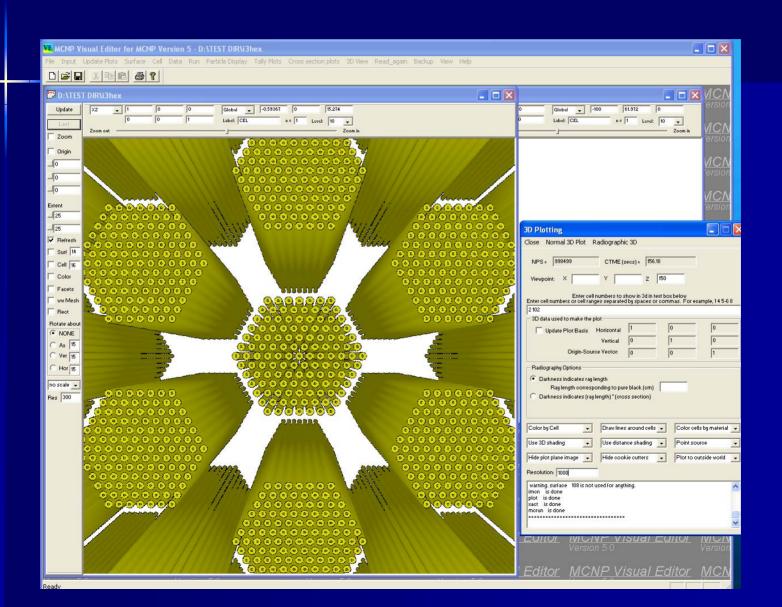
#### Restrictions on 3D Plotting

- Must have a complete input file.
- Viewpoint can not be in a zero importance cell.
- Extents and Origin taken from the 2D Plot
- Color set by the color of the cell (material) or surface.

#### Macrobodies available in 3D.



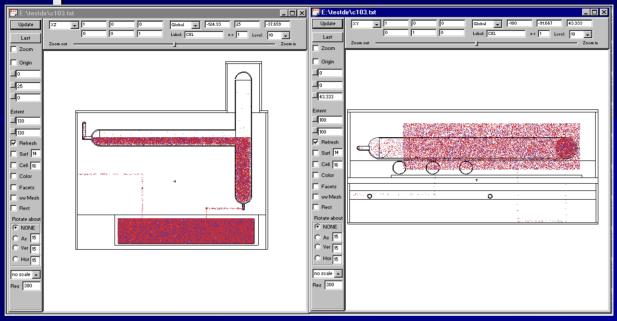
#### **3D Plots of Lattice Geometries**

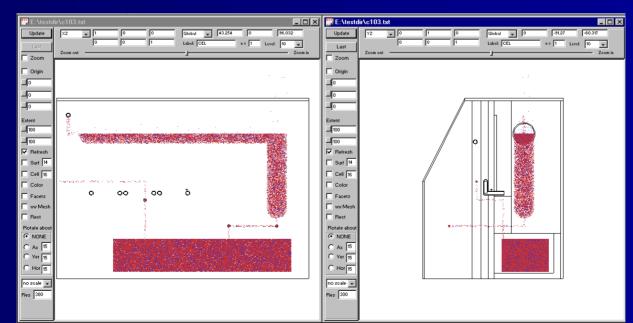


# **3D Plot Panel**

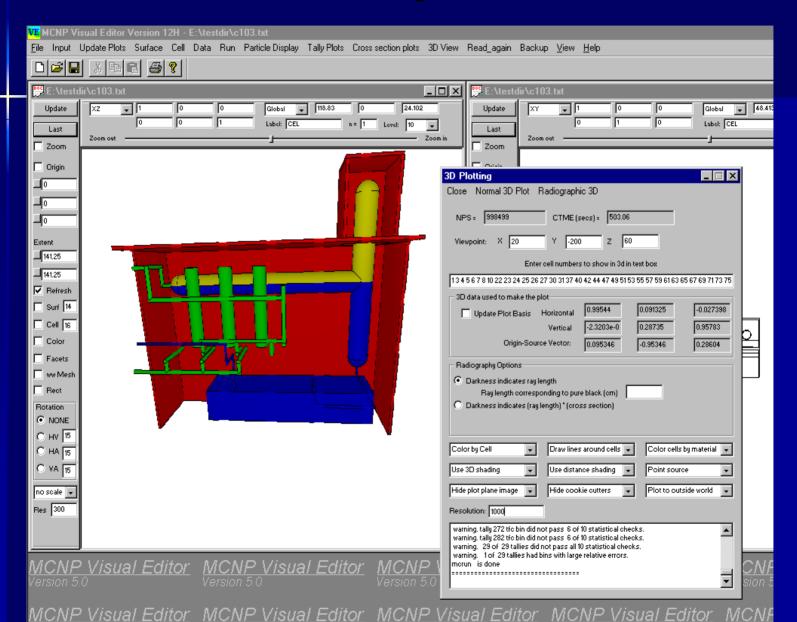
3D Plotting
Close Normal 3D Plot Radiographic 3D
NPS = CTME (secs) = Viewpoint: X 20 Y -200 Z 60
Enter cell numbers to show in 3d in text box below Enter cell numbers or cell ranges separated by spaces or commas. For example, 1 4 5-6 8  47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 101 103 105 107
3D data used to make the plot
Update Plot Basis Horizontal
Vertical
Origin-Source Vector:
Radiography Options
Darkness indicates ray length     Ray length corresponding to pure black (cm)     Darkness indicates (ray length) * (cross section)
Color by Cell
Use 3D shading   Use distance shading   Point source
Hide plot plane image ▼ Hide cookie cutters ▼ Plot to outside world ▼
Resolution: 300

### **Complex Source in a Glovebox**

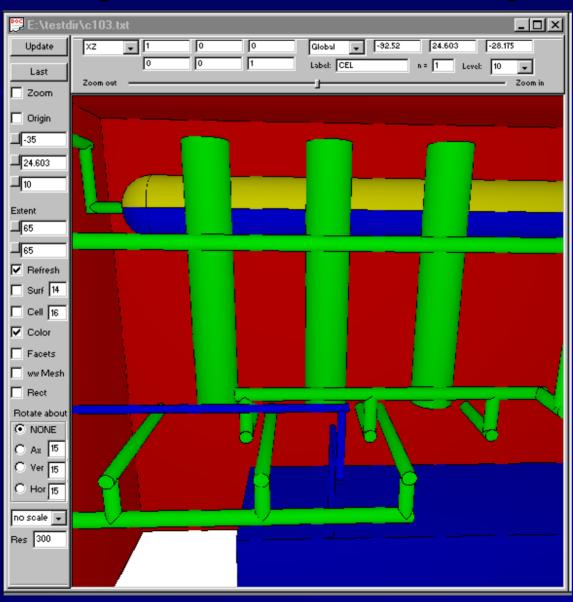




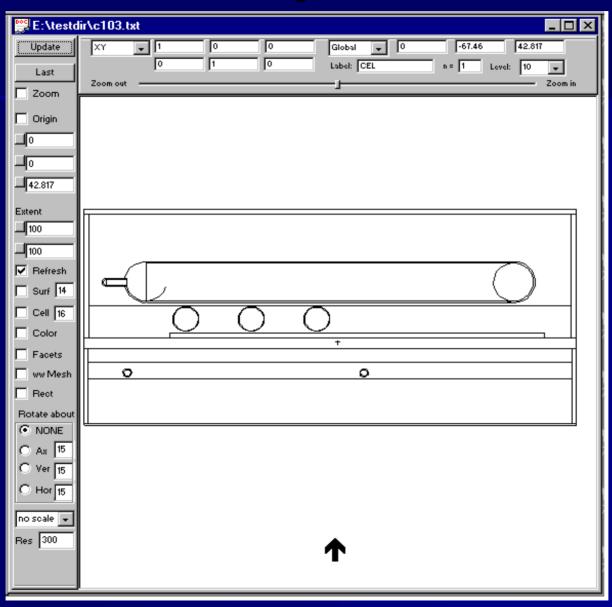
#### **3D View of Complex Source**



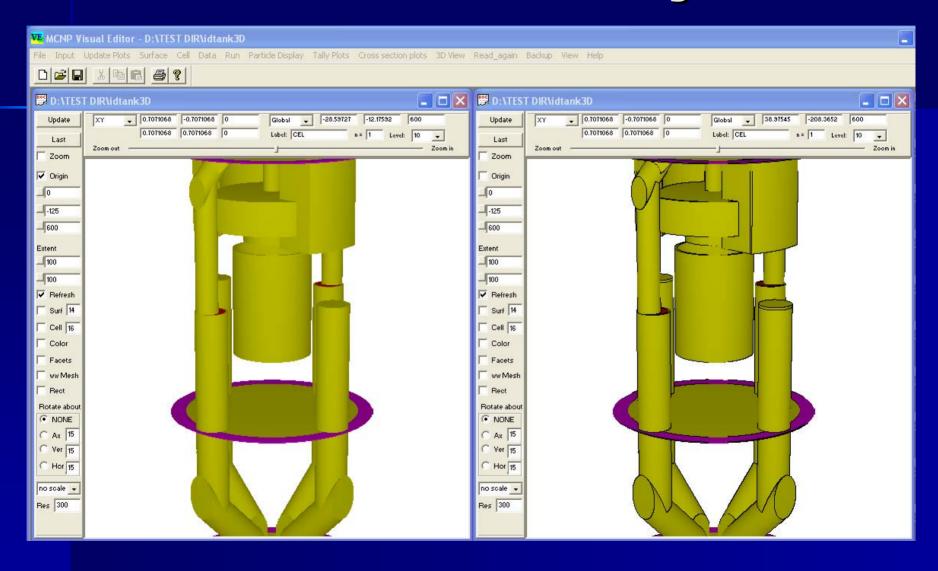
#### **Close up of Glove Box Piping**



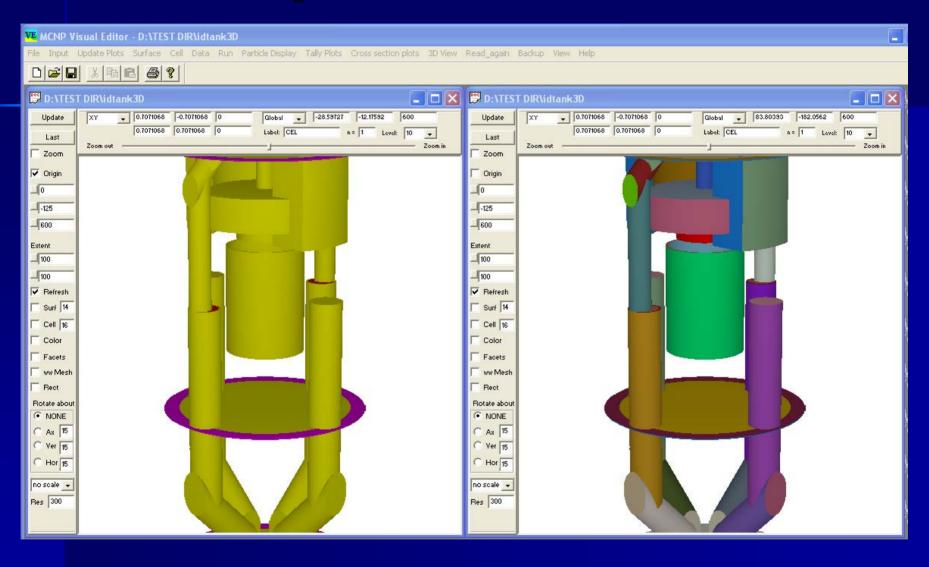
# **Set the Viewpoint in 2D**



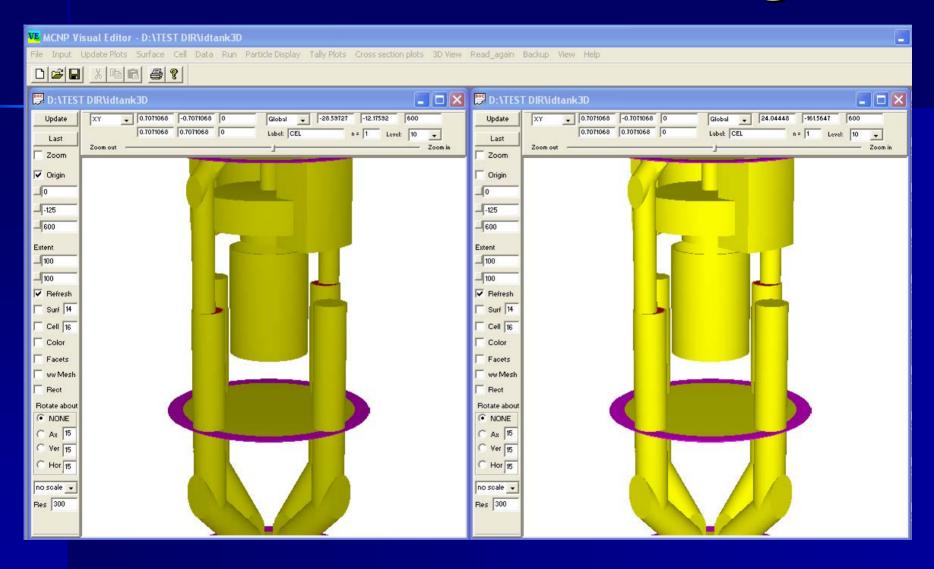
## **Draw lines around objects**



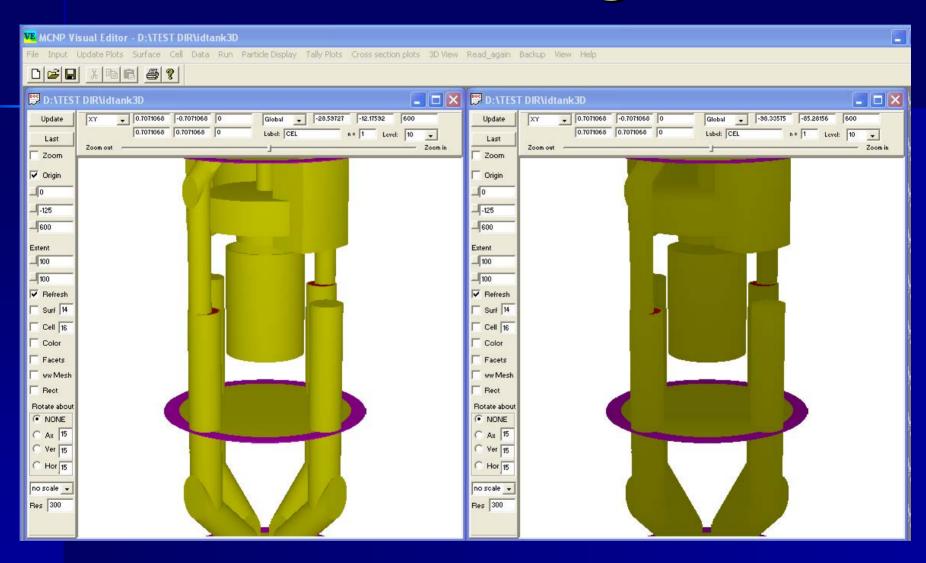
## Color by surface



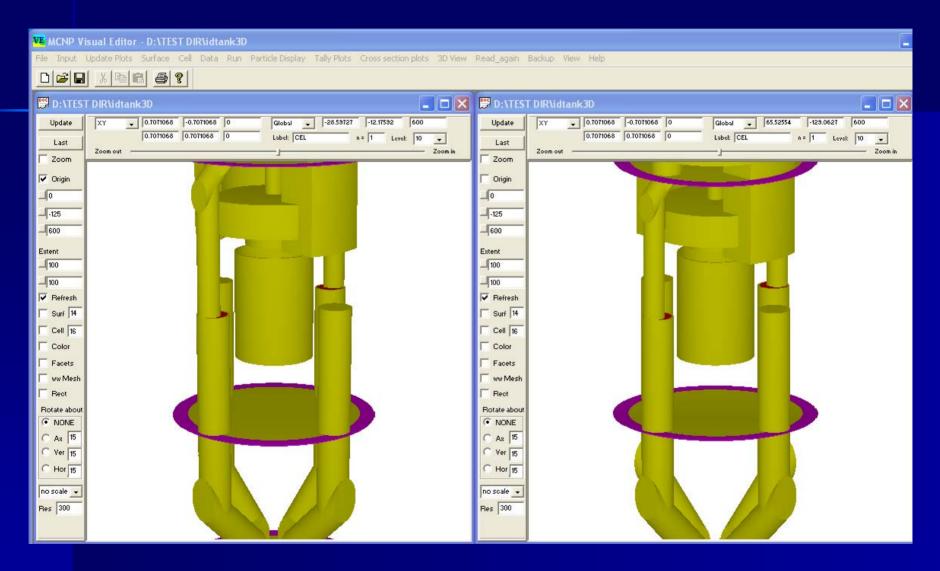
## **Turn off Distance Shading**



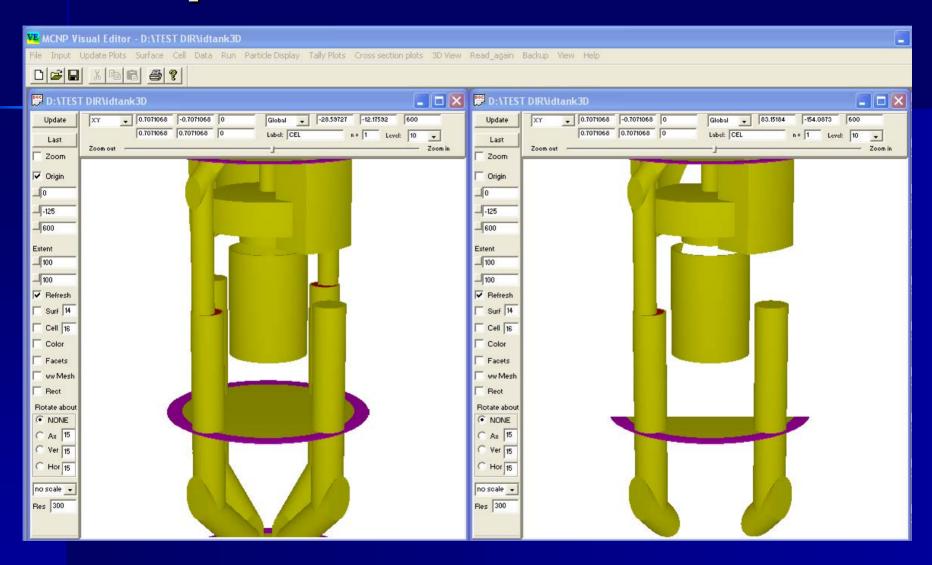
## **Turn off 3D Shading**



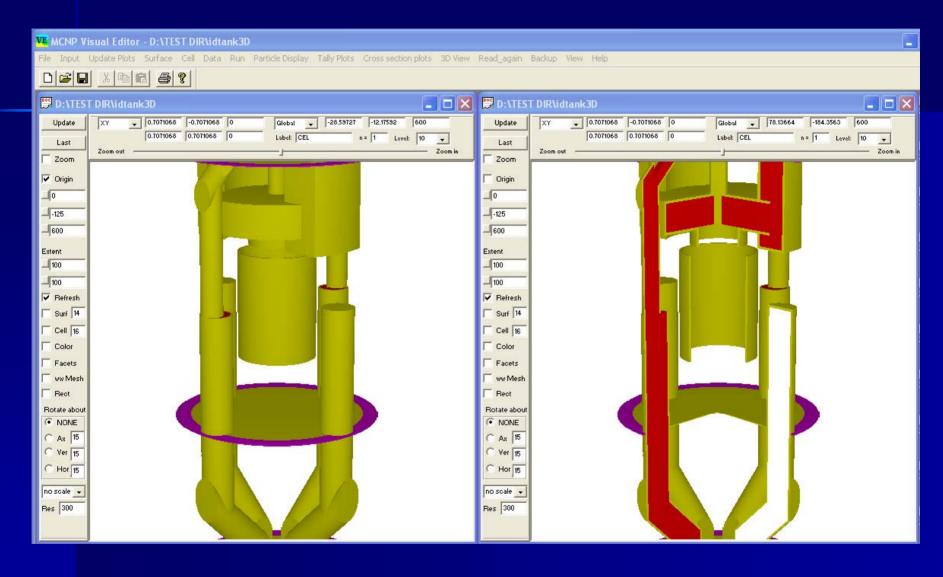
#### **Use a Plane Source**



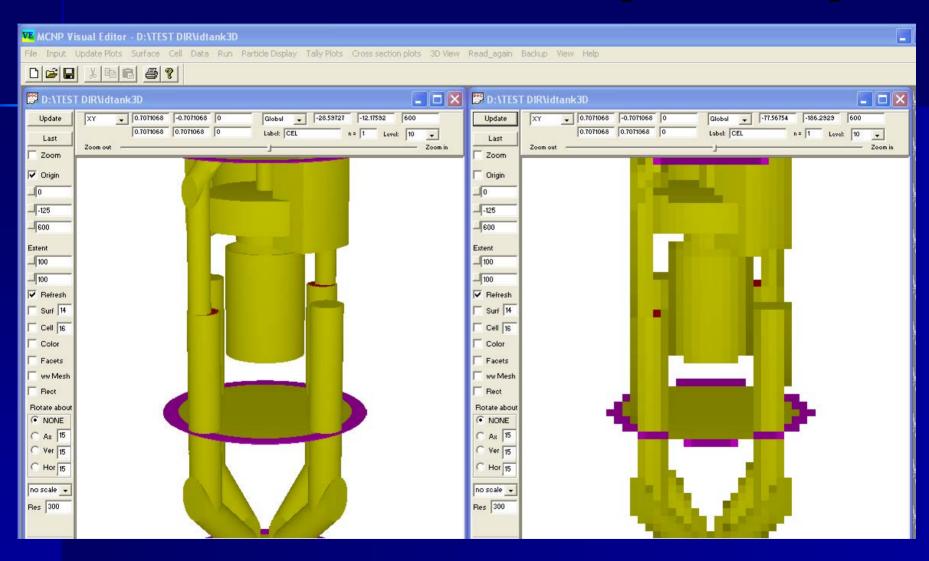
# **Stop at the Plot Plane**



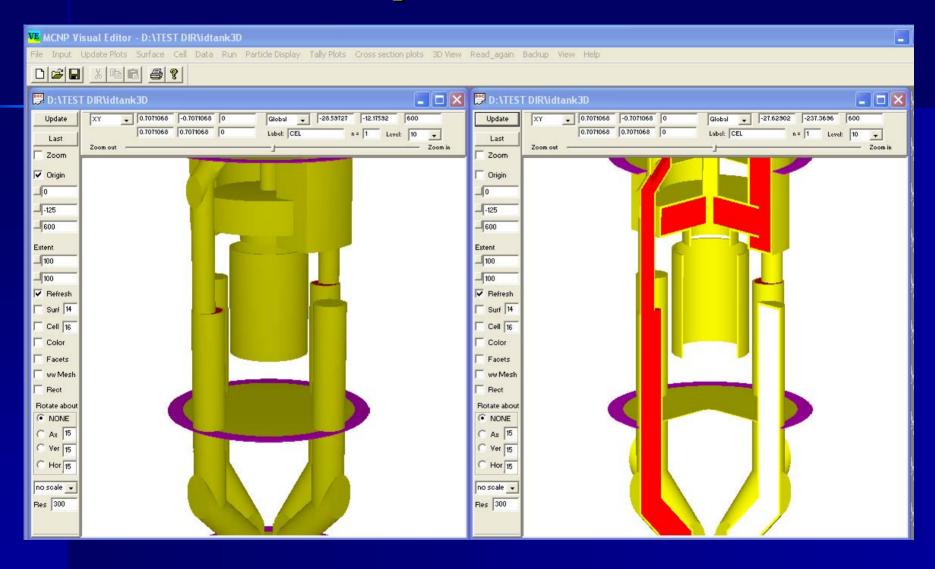
#### **Show Cookie Cutter**



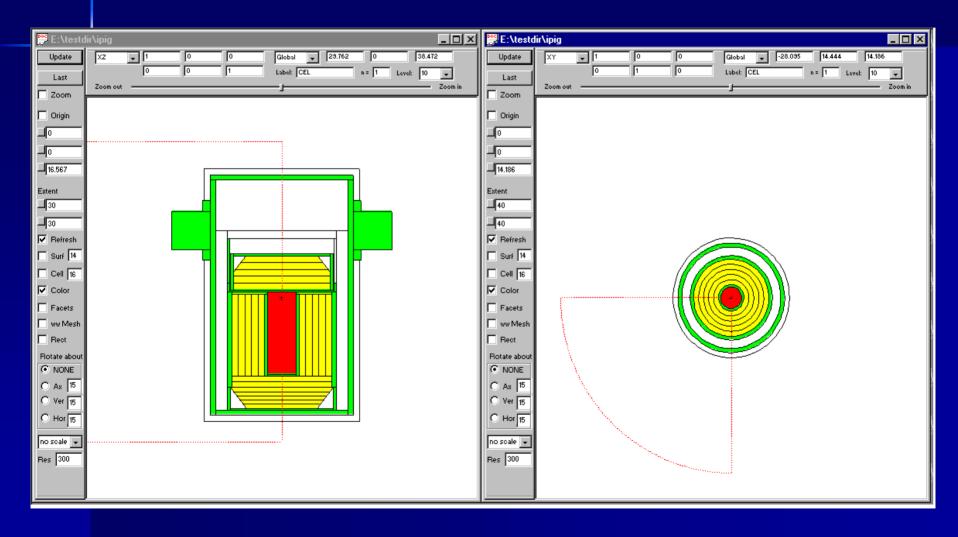
# Reduce Resolution (500-50)



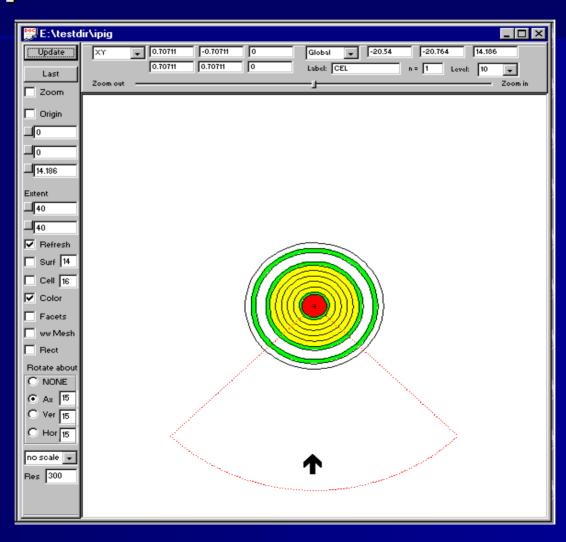
## **Combine Options**



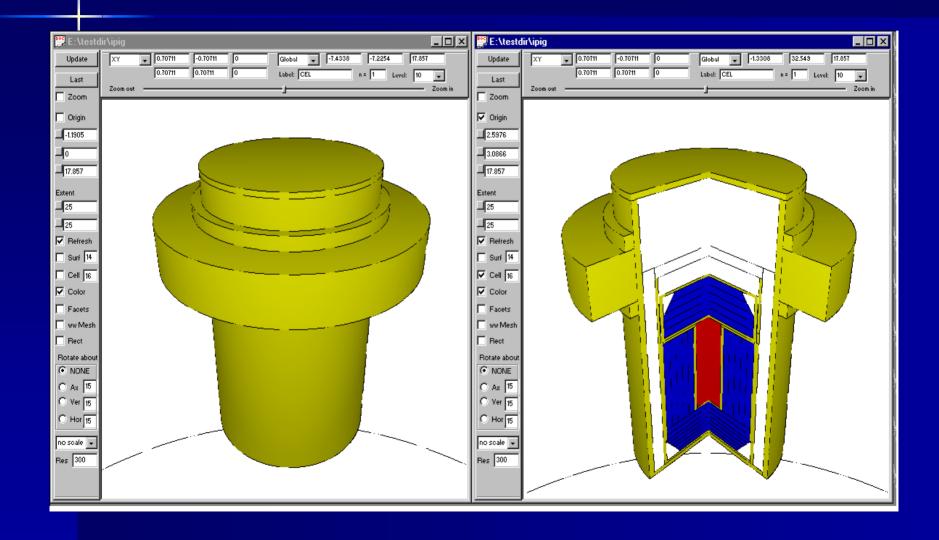
# **Using Cookie Cutters to Remove Geometry**



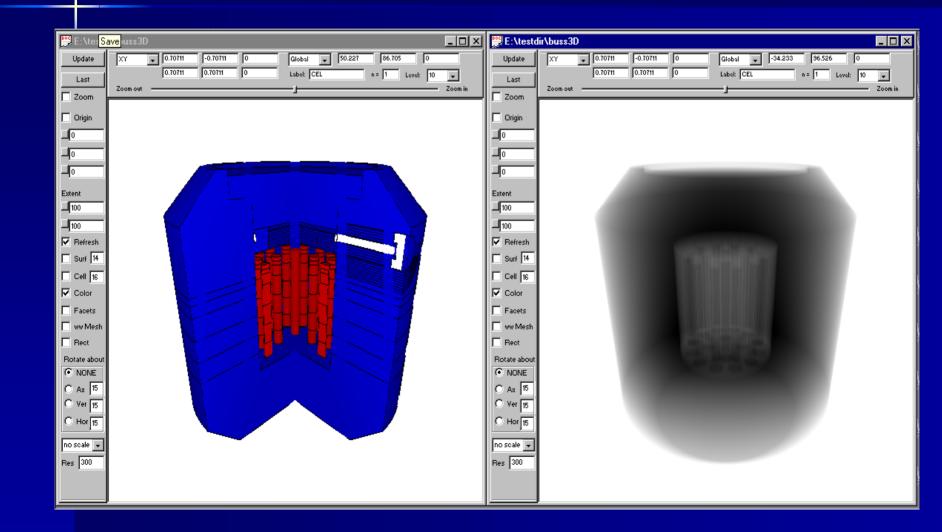
# Set the Basis in 2D and Get the Viewpoint



#### **Enable the Cookie Cutter**



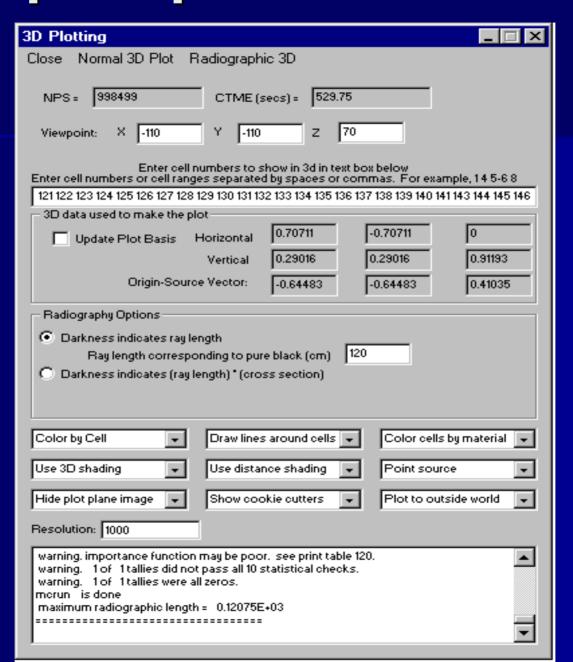
# Radiographic Plot of a Cask



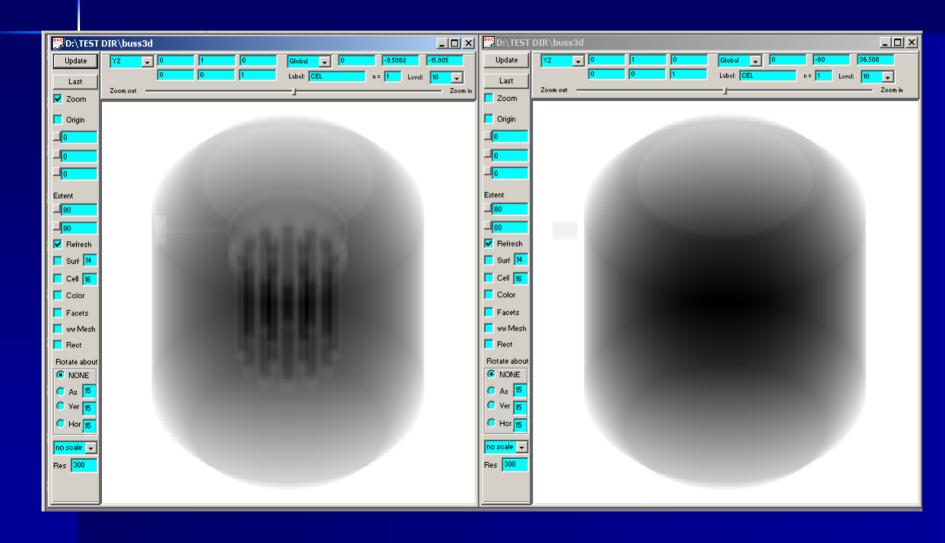
# Radiographic Plots

- Need to specify maximum ray length
  - Code will calculate this if not known.
- Can optionally set an incident energy for the source. With this option, darkness represents incident energy times the cross section. (Density Plot)
- Show Darkness as a function of ray length inside a body.

#### Radiographic options in 3D Plot Panel



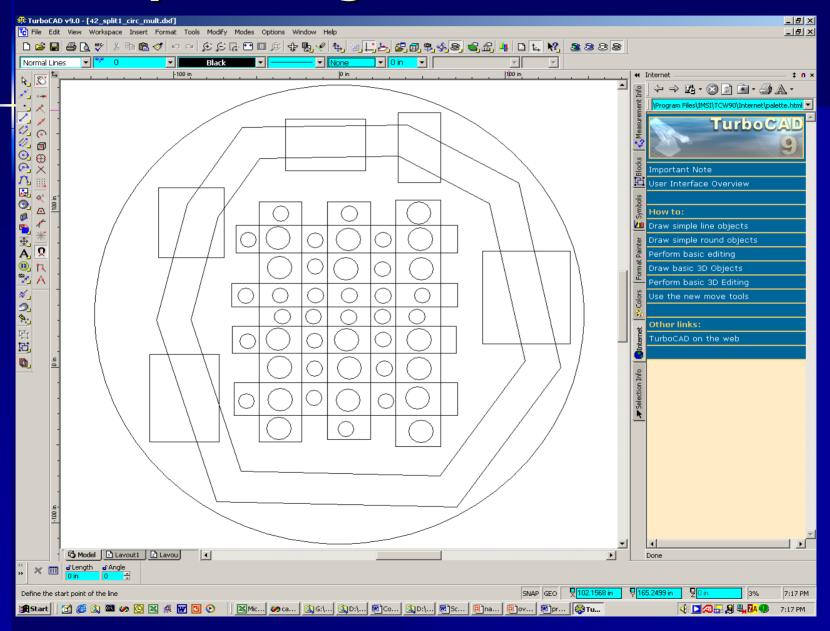
# Radiographic Plot with 5 Mev Incident Source



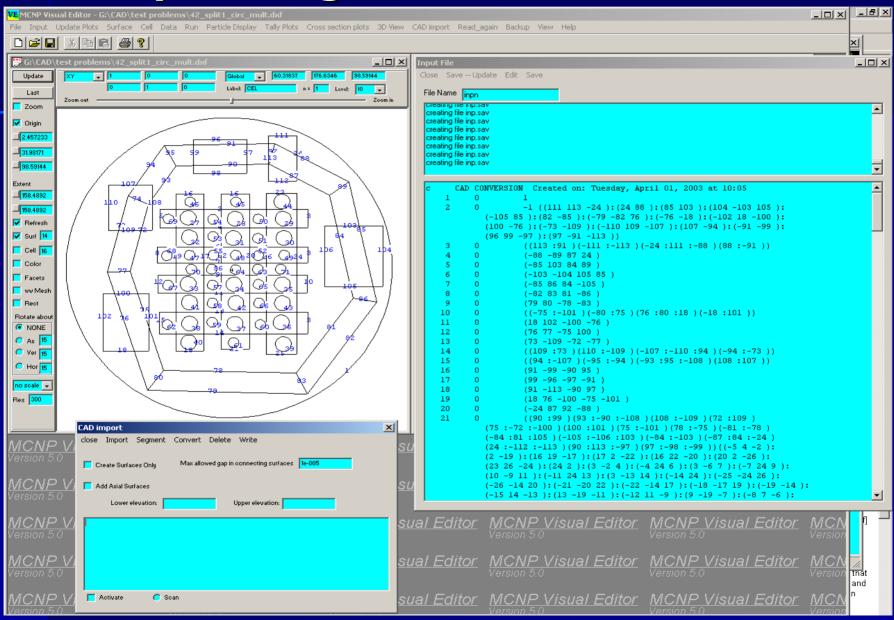
#### **Future Visual Editor Developments**

- Upgrade Version 5 to Linux
  - Linux currently only available for 4C2
- Include Source Creation
- Include Tally Creation
- Include Support for other Data Cards.
- CAD import.

#### **Currently Working on CAD Conversion**



#### **Currently Working on CAD Conversion**



#### **How to Get the Visual Editor**

- Executable is being released with Version 5 of MCNP.
  - Only has a Windows executable.
  - MCNP release more recent than the Vised executable.
- Linux can be obtained from the Vised 4C2 package.
  - Linux executable.
  - Linux source codes.

#### **Additional Information**

Development Web Site.

#### www.mcnpvised.com

- Future Classes
  - June 2-6
  - September 8-12

