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Sophisticated MCNP Calculation of the Flux Map of FRJ-2 using a fully nodalized Model

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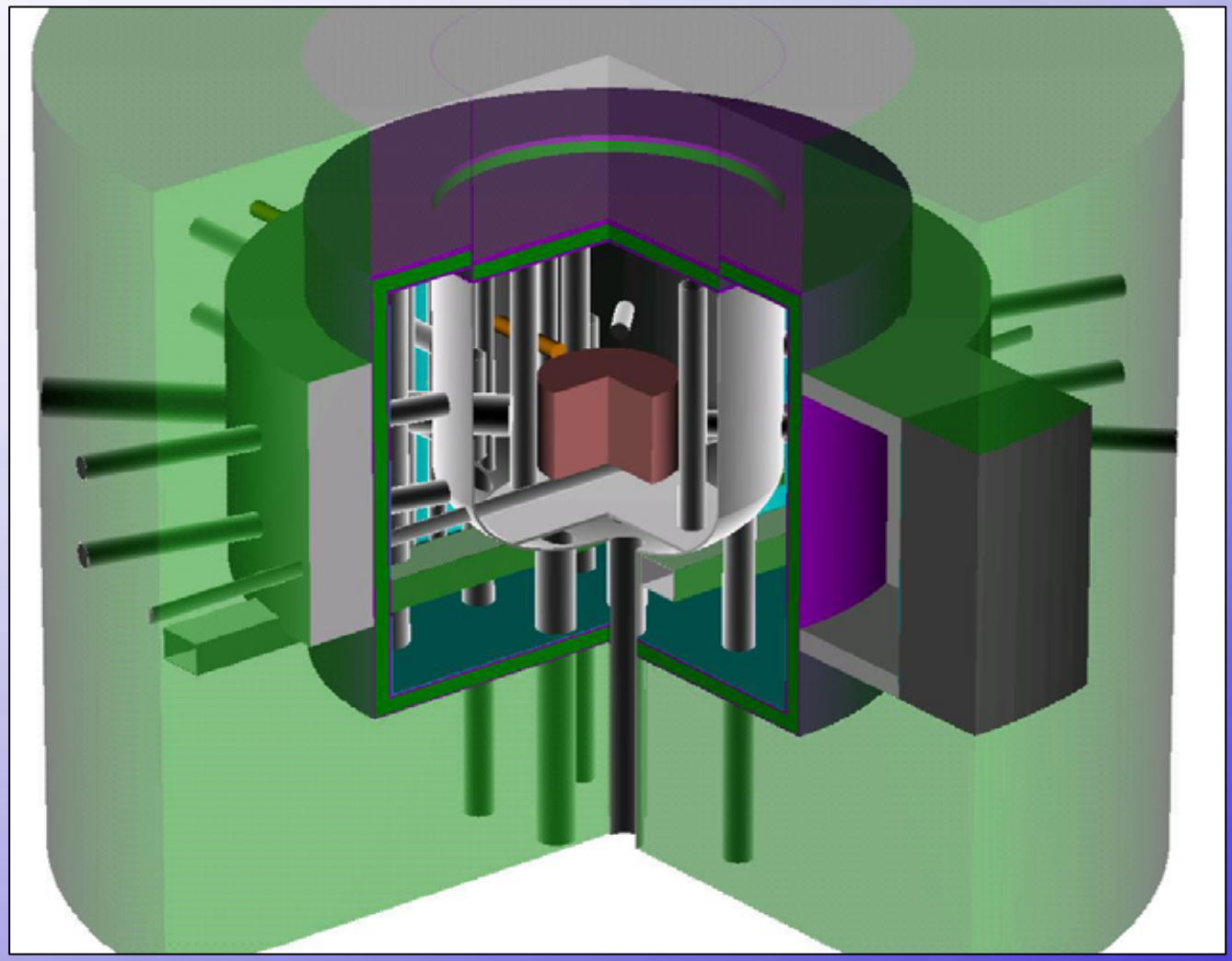
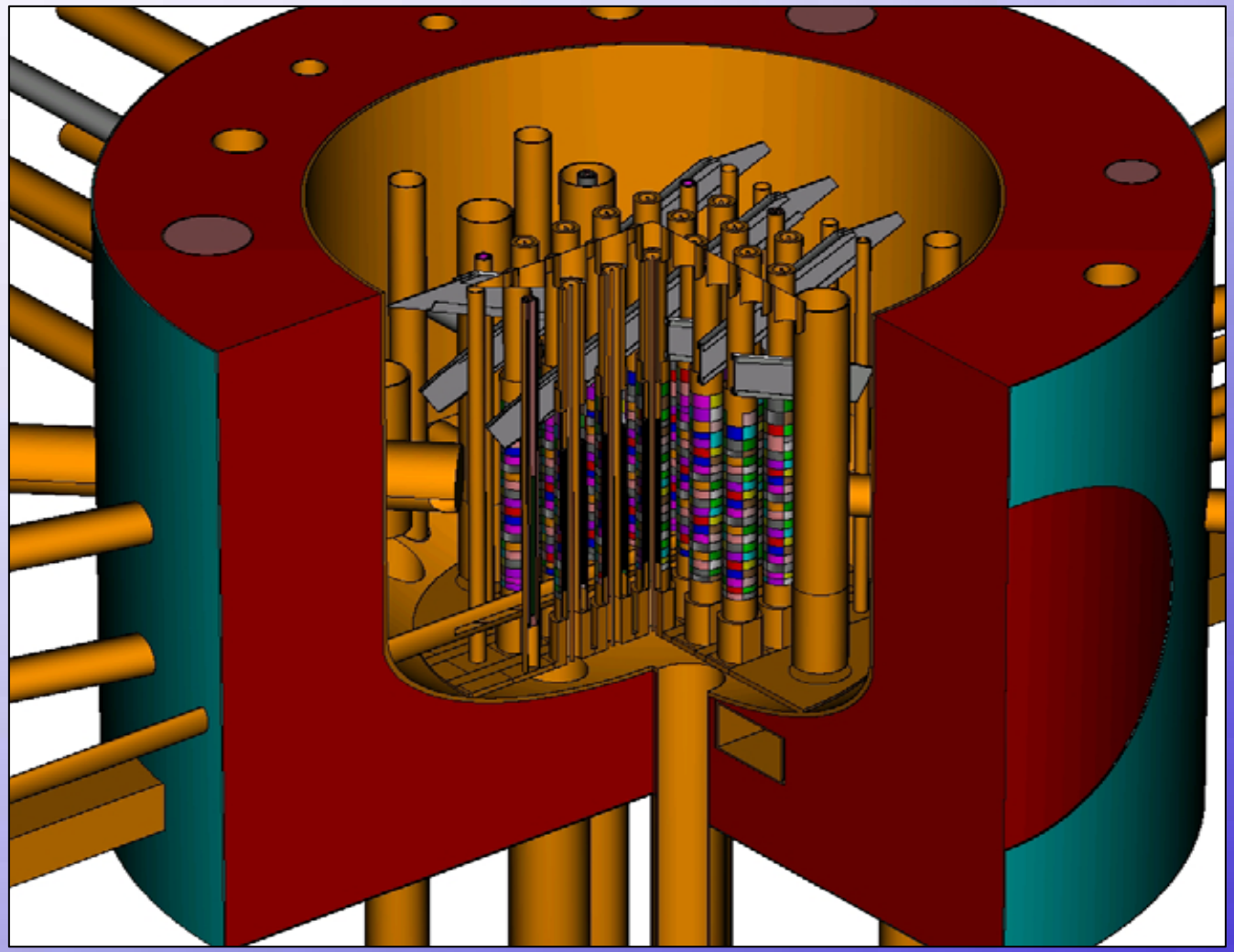
Table of Contents

- Description of the Jülich Research Reactor FRJ-2
- Utilization of Monte Carlo Code MCNP for flux calculation
  - > Nodalization of the FRJ-2 MCNP model
- Neutron flux distribution in the reactor components
- Effects of geometrical inhomogenities
- Results and Summary

Nodalization of the whole reactor block



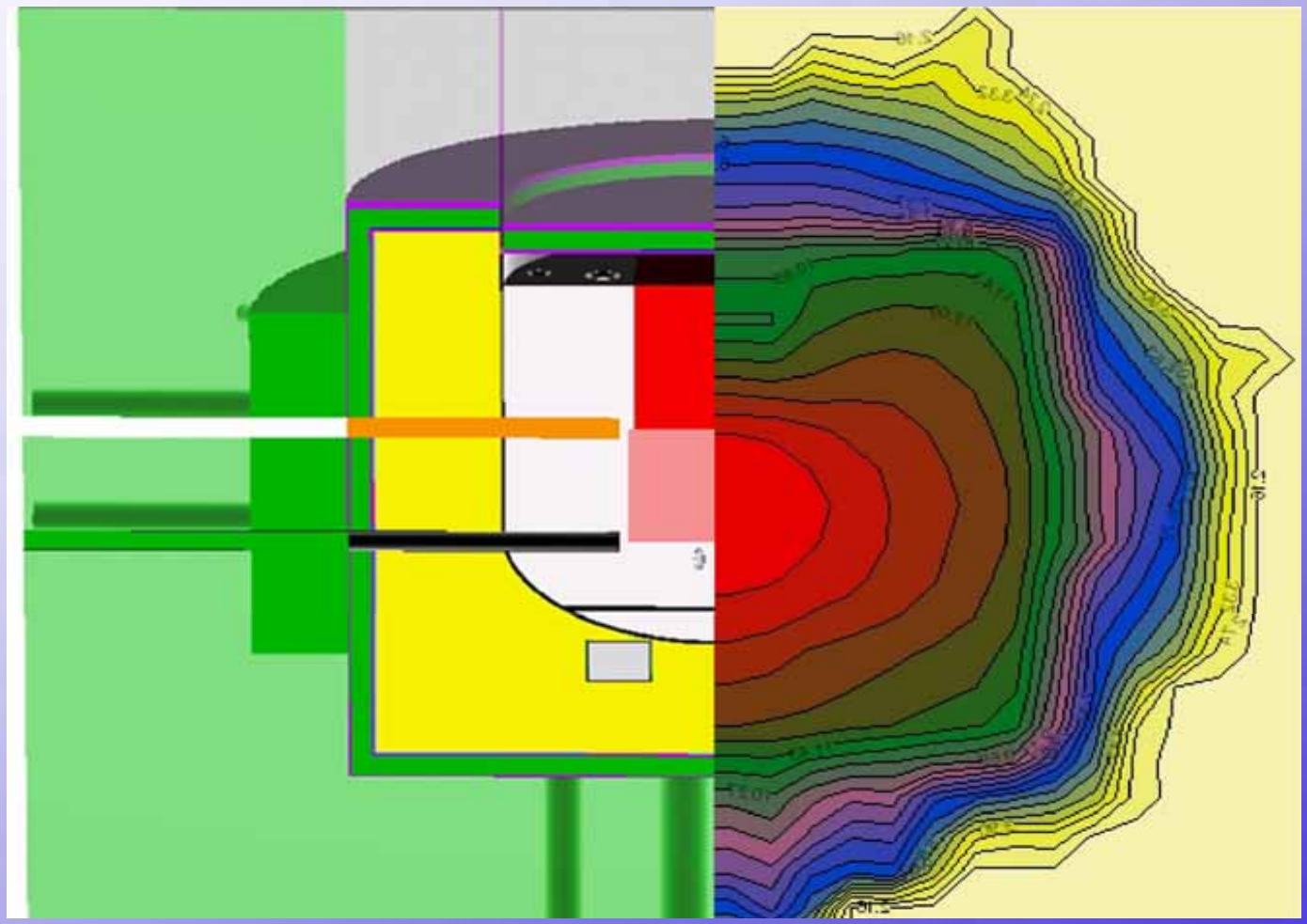
MCNP: FRJ-2 model with the nodalized reactor core



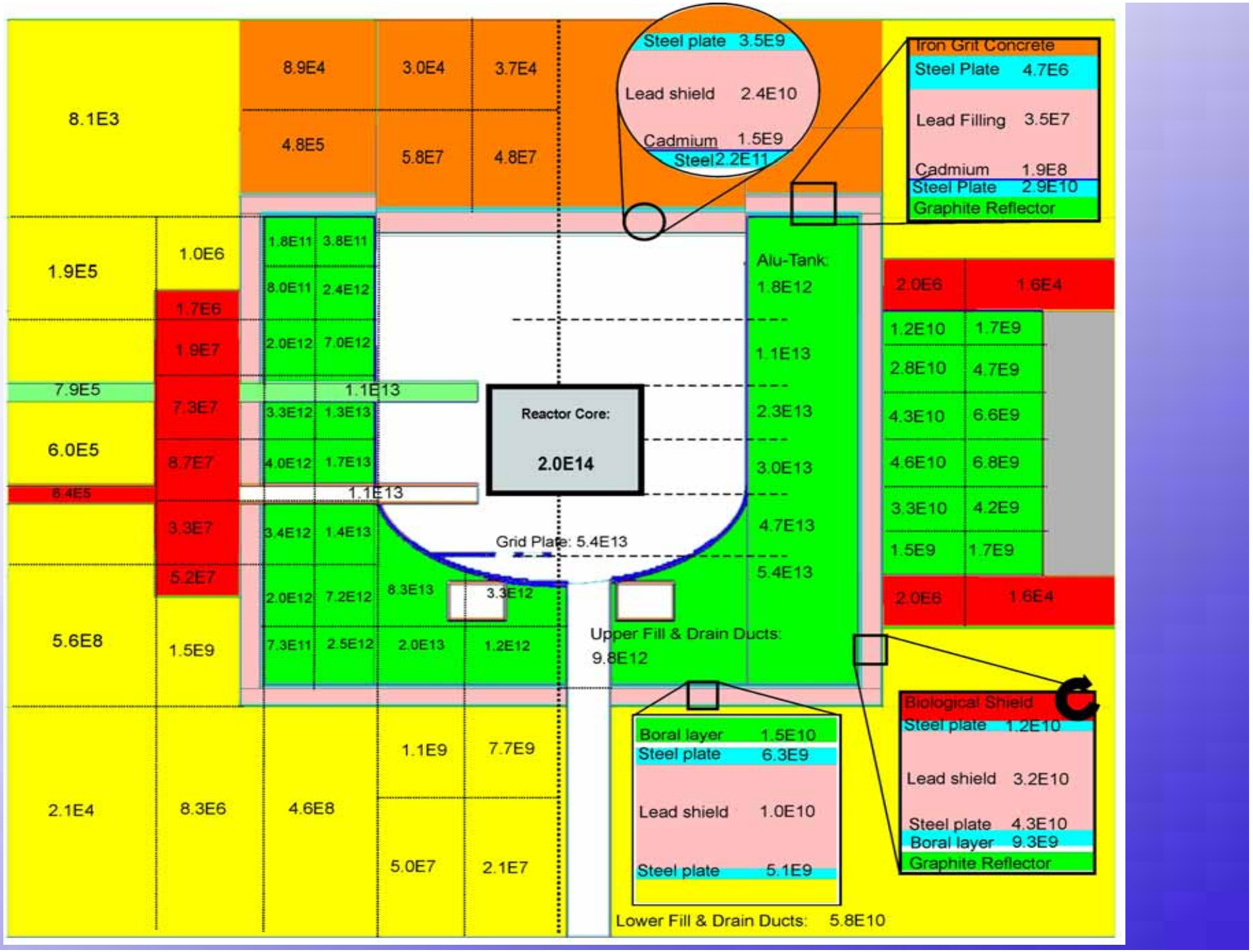
The main design data of the FRJ-2 Research Reactor

Type:	**Tank**
Operation:	**1962 - 2006**
Thermal Power:	**10/15/23 MW**
Moderator / Coolant:	**D_2O (Heavy Water)**
Vertical experimental tubes:	**25 inside core and 25 inside reflector**
Horizontal experimental tubes:	**10 inside D_2O and 21 inside graphite reflector**
Neutron flux:	
core max.:	**$3{,}2*10^{14}$ 1/(cm^2s)**
reflector max.:	**$2{,}6*10^{14}$ 1/(cm^2s)**

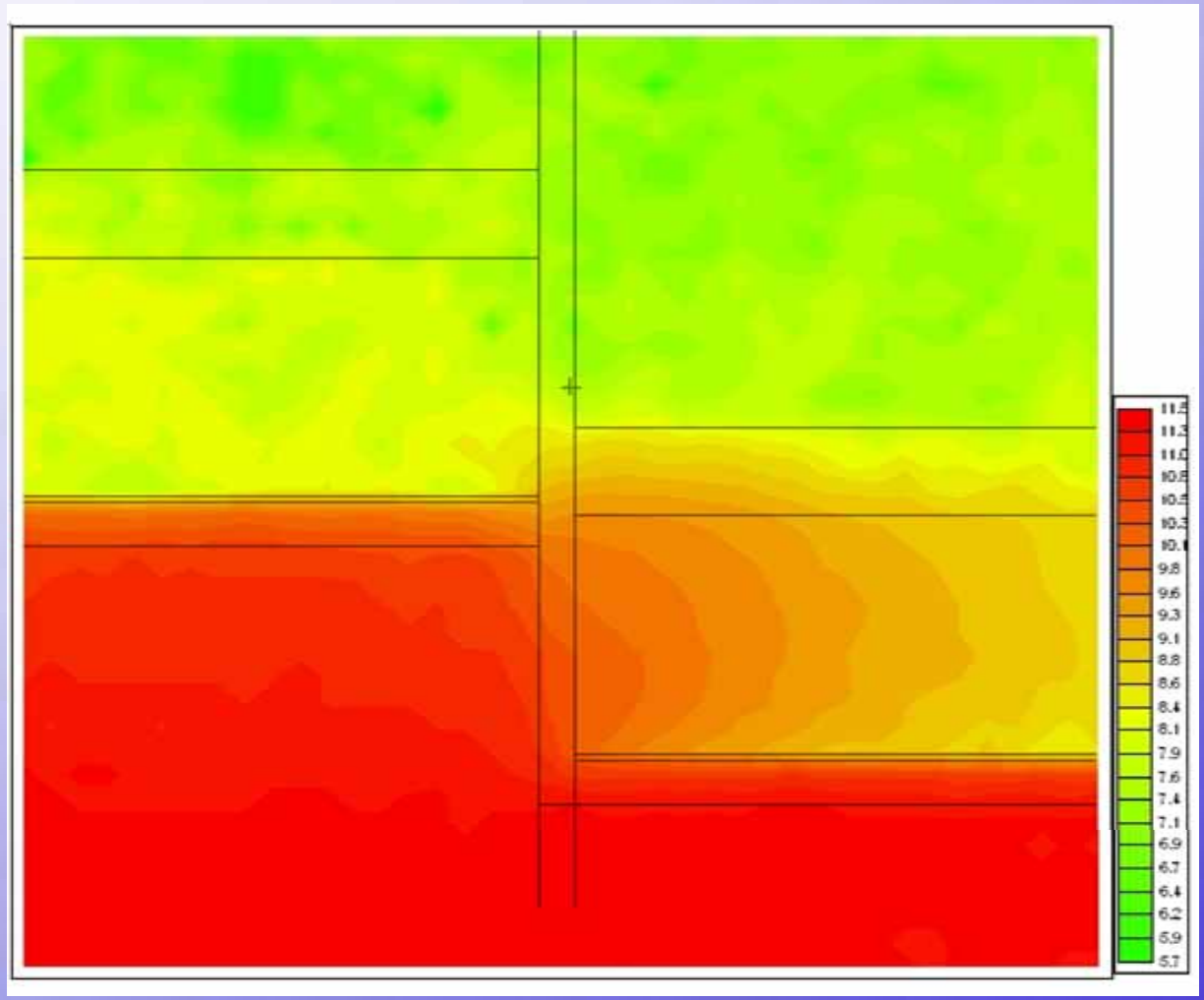
Neutron flux distribution in the structure



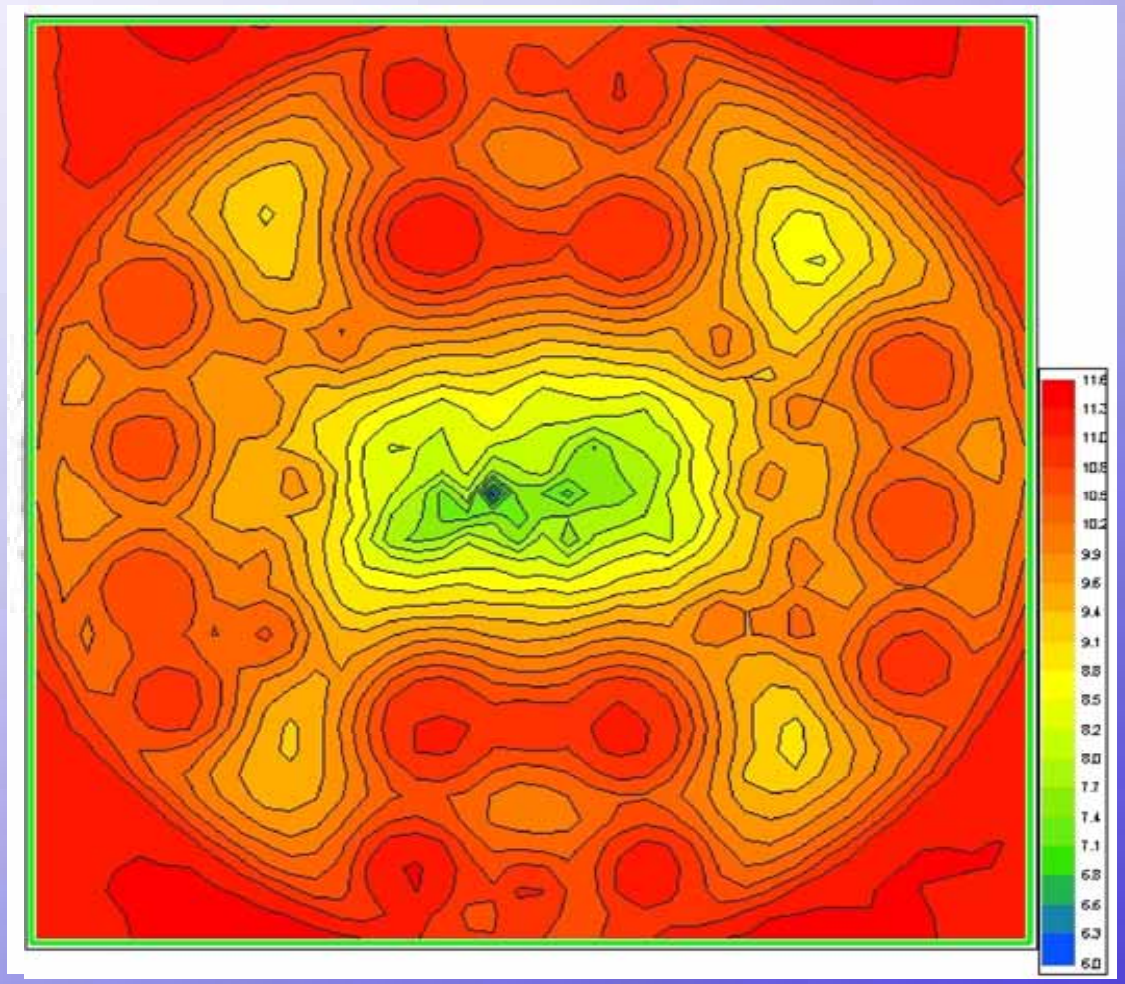
Detailed neutron flux distribution in the structure



Details of the structures and the neutron flux around the top shield



Radial geometrical details and neutron flux in the top shield



Summary & Conclusions

- Using MCNP Code with a highly nodalized geometrical model the neutron flux was determined with a high level of fidelity.

- By homogenization and application of appropriate cell importances (variance reduction) a flux map with low standard deviations could be generated within acceptable simulation time

- Using graphical tools the inhomogenity in the neutron flux distribution could be visualized for further neutronic analysis and processing

- On the basis of the neutron flux distribution and the material composition the activity concentration in different components could be determined for the future dismantling process