# An Analysis Of A Spent Fuel Transportation Cask Under Severe Accident Conditions


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FINITE ELEMENT MODELING CONTINUOUS IMPROVEMENT WORKSHOP

MAY 23, 2002

GREENBELT, MD

# Introduction

- Baltimore Tunnel Fire
- Spent Fuel Transportation Cask
- Preliminary Results
- Conclusions and Future Work

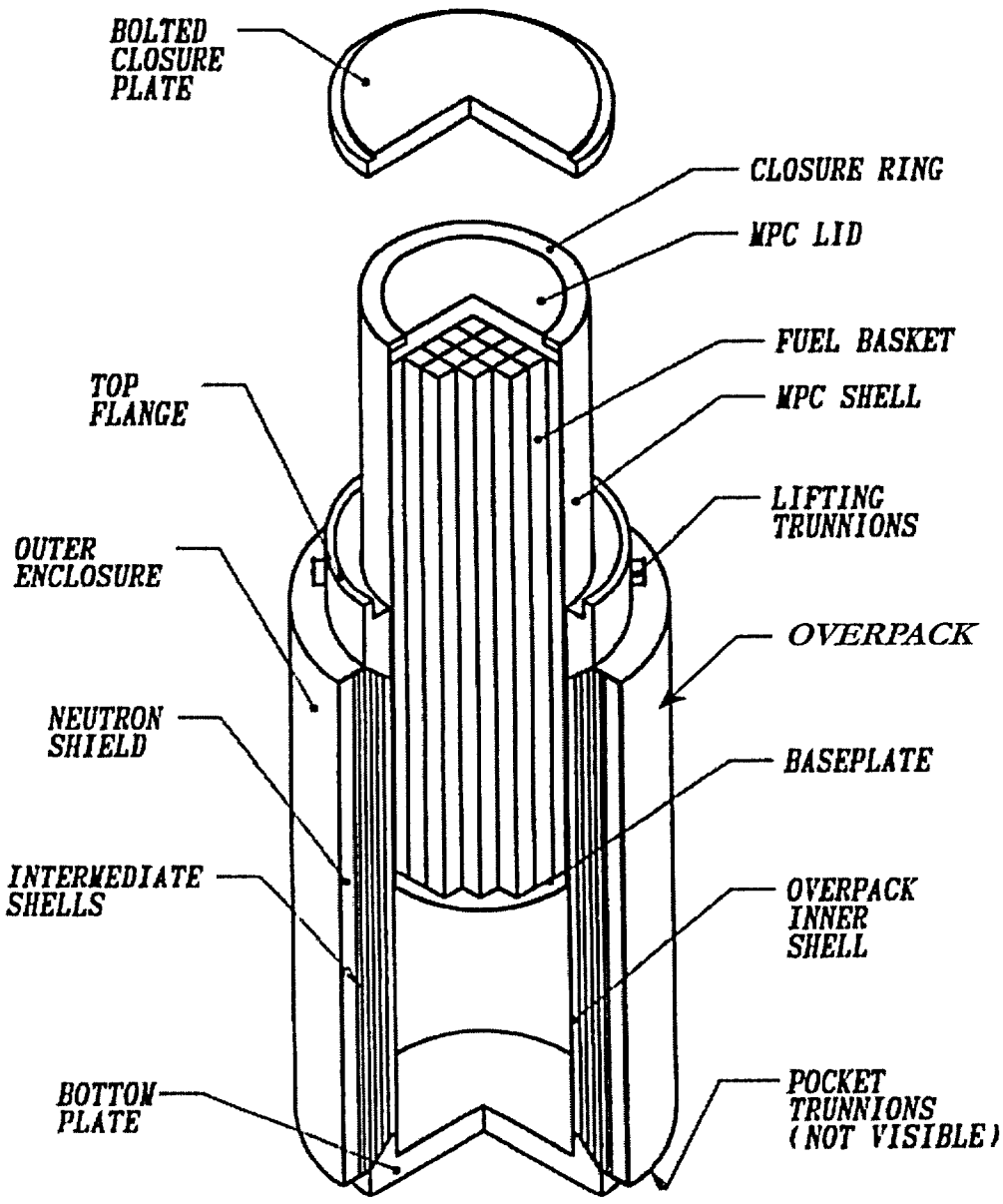
# Baltimore Tunnel fire

- July 18th, 2001
- Howard Street Tunnel
- CSX Freight Train
- Derailment and Fire
  - Tripropylene

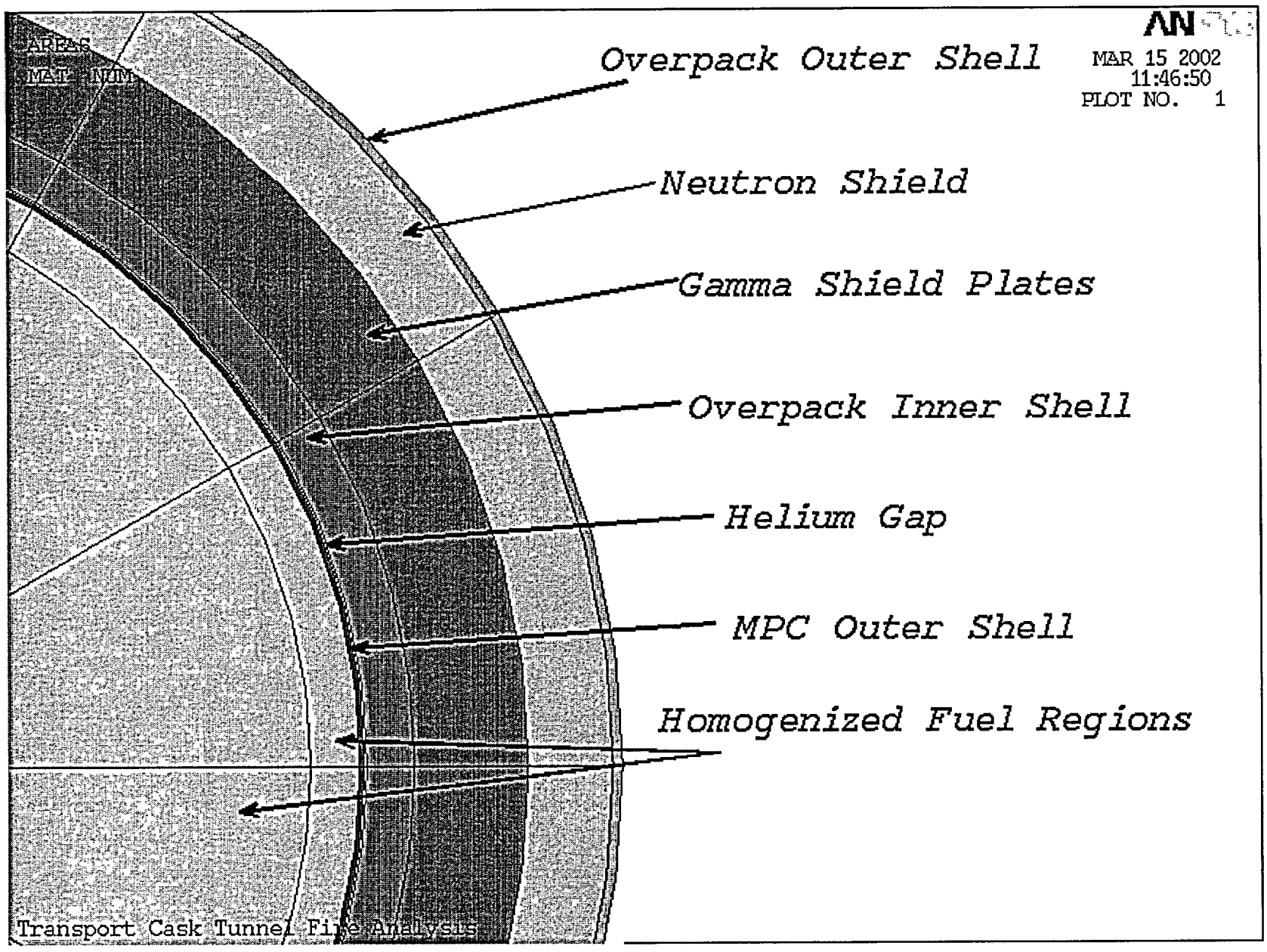
# Spent Fuel Transportation Cask

- 10 CFR 71.73 Fire Accident
- Cask Performance
- Finite Element (ANSYS®) Model

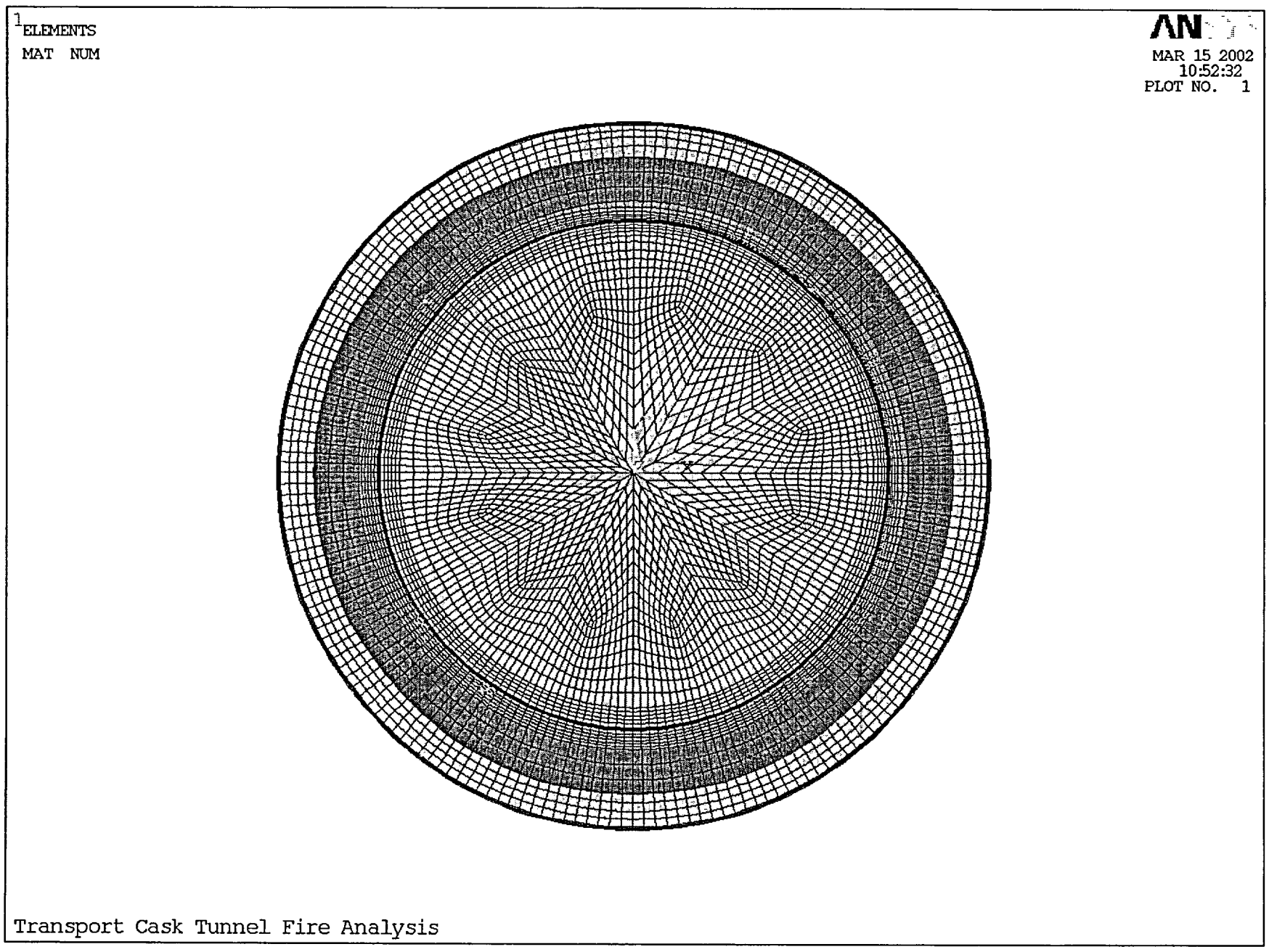
# SPENT FUEL TRANSPORTATION CASK



# ANSYS® MODEL


AREAS
(MAT) NUM
Overpack Outer Shell
MAR 15 2002
11:46:50
PLOT NO. 1
Neutron Shield
Gamma Shield Plates
Overpack Inner Shell
Helium Gap
MPC Outer Shell
Homogenized Fuel Regions
Transport Cask Tunnel Fire Analysis

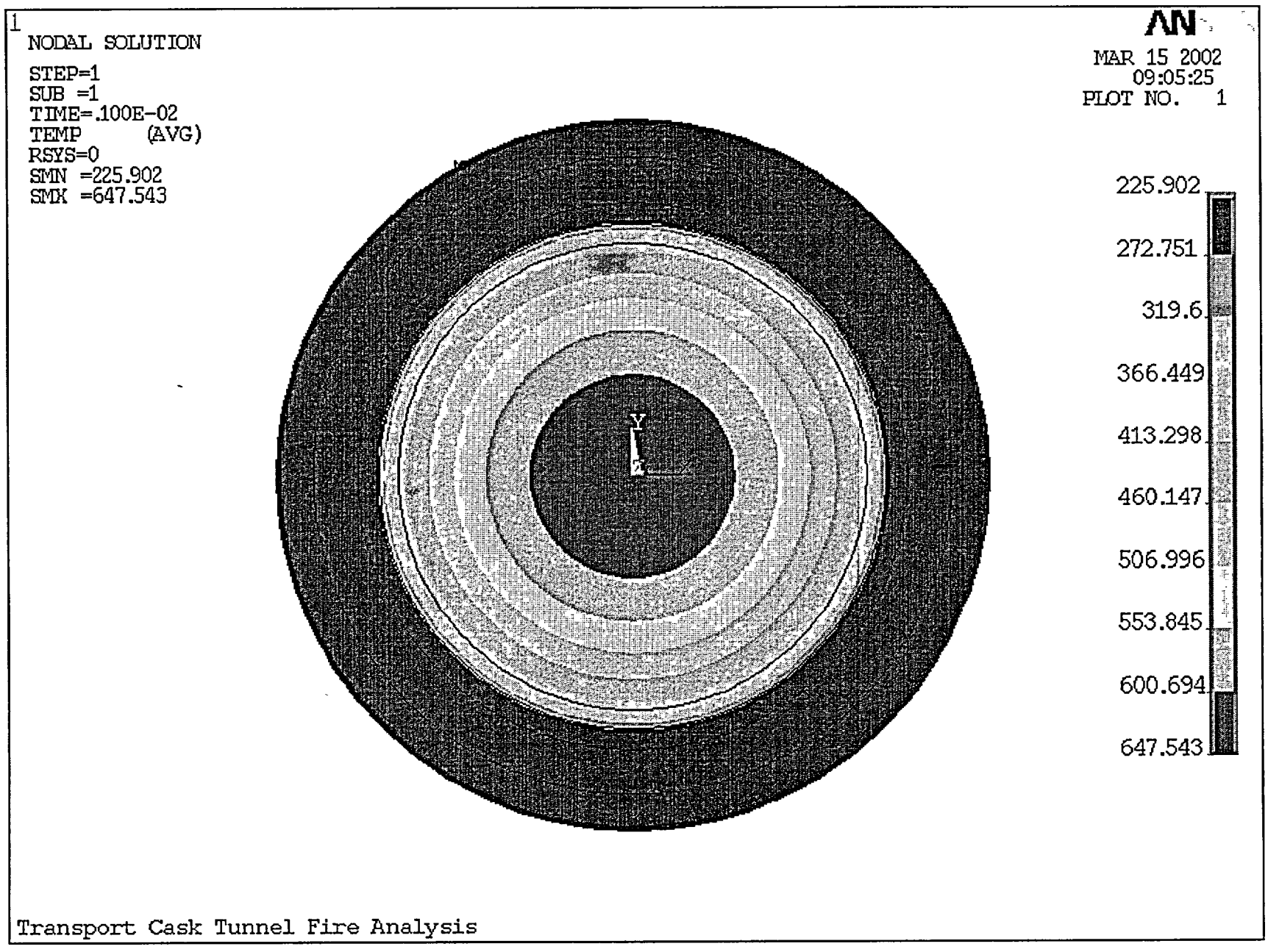
# ANSYS® Model Mesh



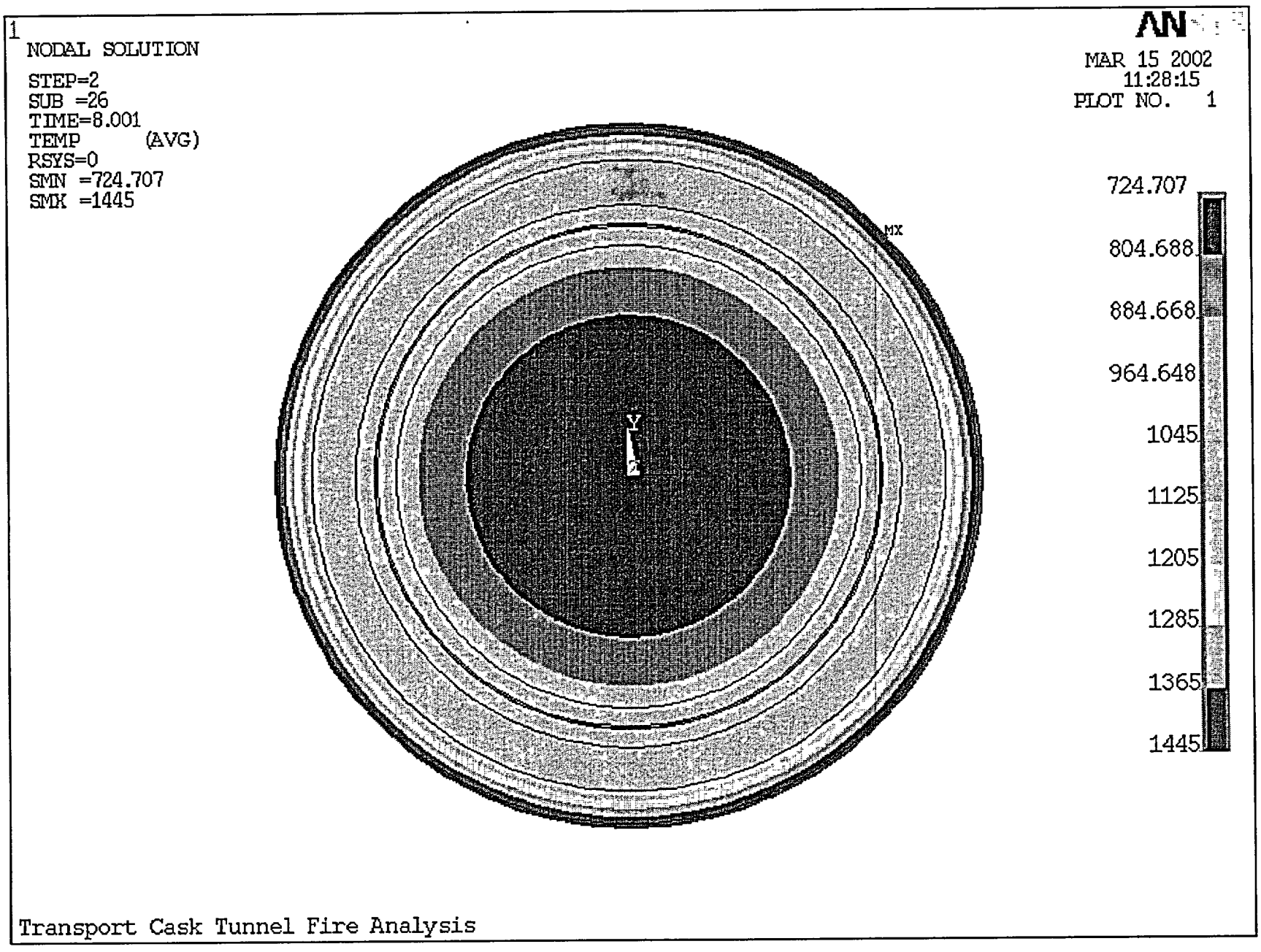
# Boundary Conditions

- Heat Transfer Mechanisms
- Initial Conditions
- Fire conditions

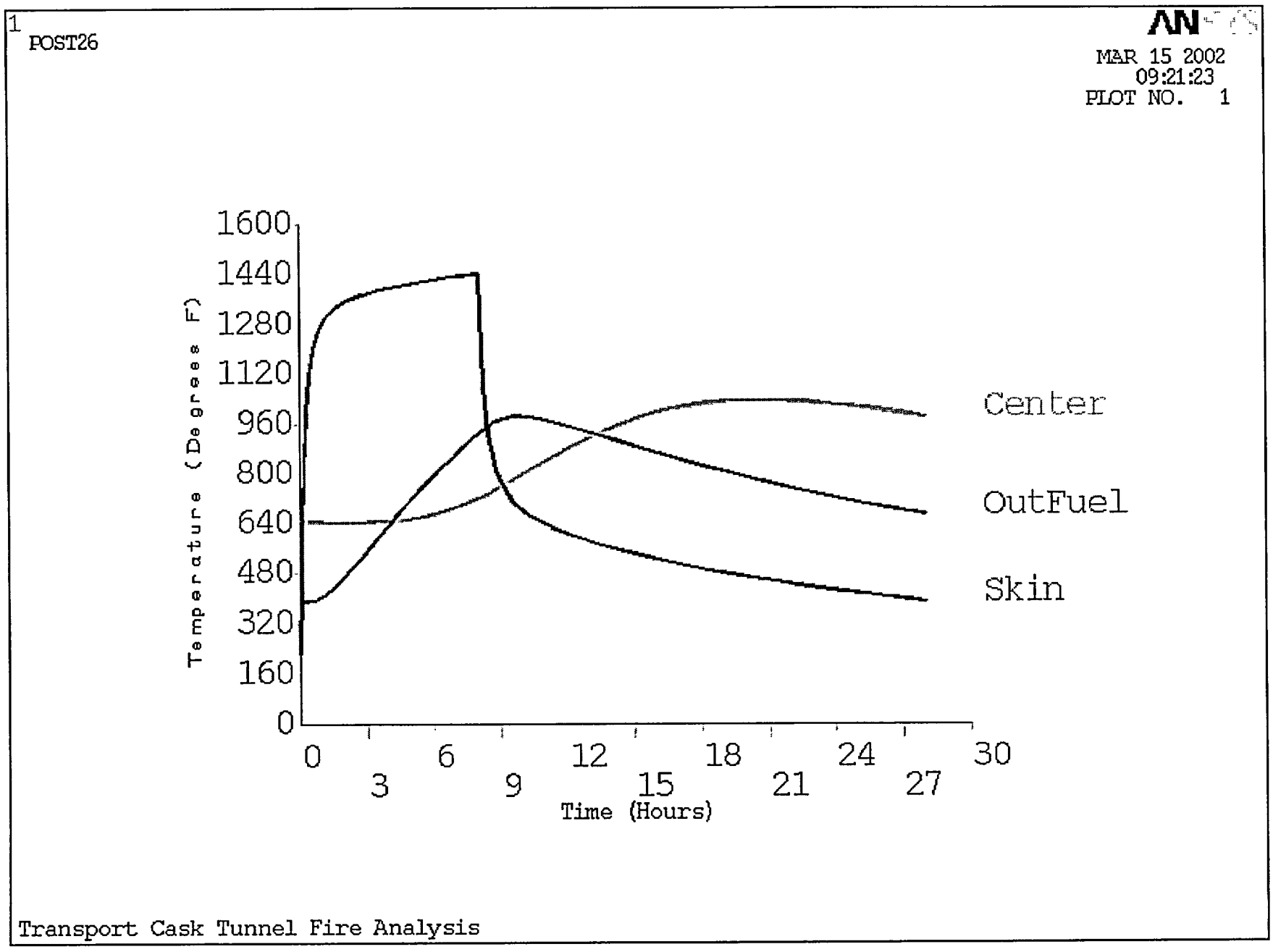
# Normal Condition Temperature Profile



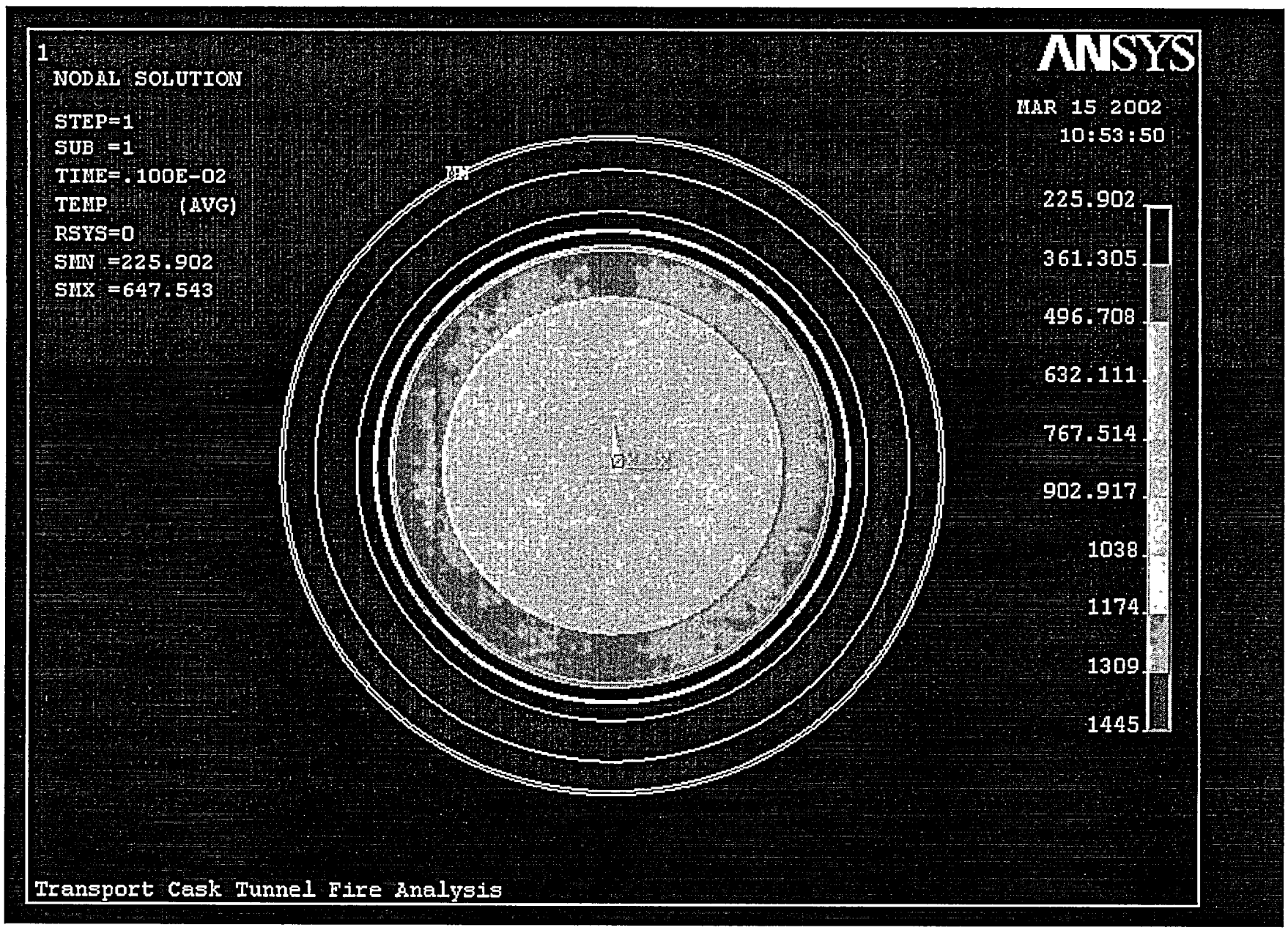
# 8 Hour Fire Temperature Profile



# Cask Component Time vs. Temperature Plot



# 8 Hour Fire with 20 Hour Cooldown



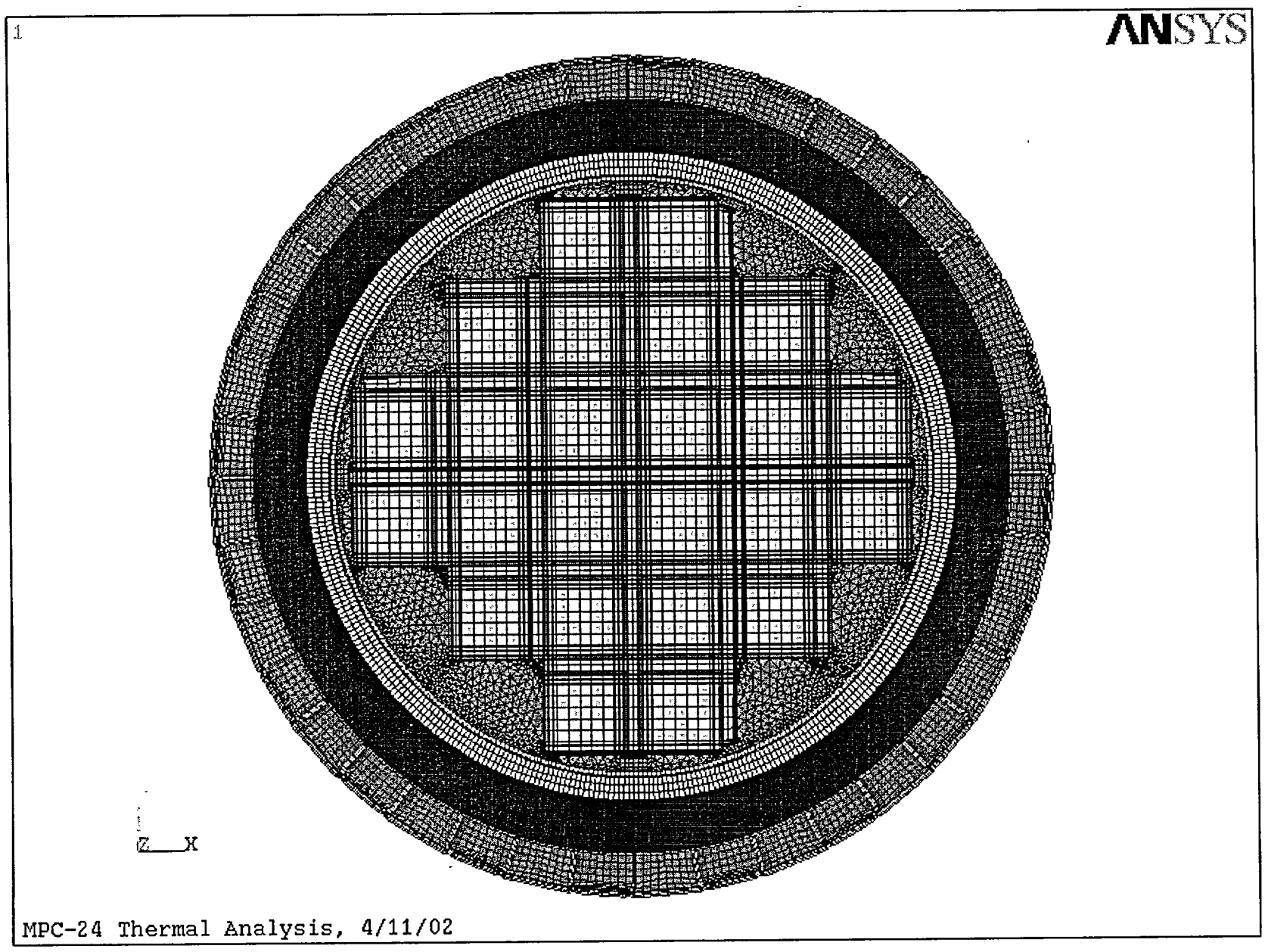
# Preliminary Results

- Fuel Cladding Temperature Limits
- Conservative Assumptions

# Conclusions and Future Work

- Cask Performance
- Refined Cask Model
- Model Tunnel and Railcar
- NIST Tunnel Fire Model
- Revise Boundary Conditions

# Refined Cask Model



# Acknowledgements


- Mr. Thomas E. Michener
- Ms. Judith M. Cuta
- Mr. Harold E. Adkins, Jr.

Pacific Northwest National Labs