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

Christopher S. Bajwa
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission

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 18\textsuperscript{th}, 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
Transport Cask Tunnel Fire Analysis
Boundary Conditions

- Heat Transfer Mechanisms
- Initial Conditions
- Fire conditions
Normal Condition Temperature Profile

Transport Cask Tunnel Fire Analysis
NODAL SOLUTION
STEP = 2
SUB = 26
TIME = 8.001
TEMP (AVG)
RSYS = 0
SMN = 724.707
SMX = 1445

8 Hour Fire Temperature Profile
8 Hour Fire with 20 Hour Cooldown

NODAL SOLUTION
STEP=1
SUB =1
TIME= 1.000E-02
TEMP (AVG)
RSYS=0
SMN =225.902
SMX =647.543

Transport Cask Tunnel Fire Analysis
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