

ISG-22

`Potential Rod Splitting Due to Exposure to an Oxidizing Atmosphere During Short-term Cask Loading Operations in LWR or Other Uranium Oxide Based Fuel

- Issued for public Comment 11/15/2005
- Public Comment Period Closed – 12/30/2005
- Comment response an ISG published -3/2006
- Public meeting on ISG–22 - 3/14/2006

Cause of Concern

- Many definitions of intact fuel allow pinhole cladding breaches
- At high enough temperatures, pinholes can propagate into gross breaches in short period of time
- An applicant recently indicated that they would blow half the water out of a cask using air and the temperature would exceed 380°C

Suggested preventative measures

- Use an inert gas from blow-down or draining cask
- Do not uncover rods below fuel line
- Use records and examinations to show that no intact rods with pinholes are in cask
- Based on time-temperature history after blow-down (draining) show gross degradation does not occur

Some concerns with solutions

- Examinations may not find all pinhole breaches
- Oxidation data base only supports time-temperature correlations for low burnup fuel having Zircaloy cladding
 - Different phenomena at high burnup?
 - Fracture strain may vary with cladding alloy
 - Fuel/cladding gap not well defined
 - High moisture level might speed up reaction

Reasons issue might not have shown up in past cask loadings

- No breached fuel
- Temperature too low
- Fuel not uncovered
- No radiation monitoring on the vent line during vacuum drying
- Fission Gas Release during limited fuel oxidation is very small and may not be detectable.
- Cask must be opened for direct observation of event