U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Aging Management Program Example for Stress Corrosion Cracking

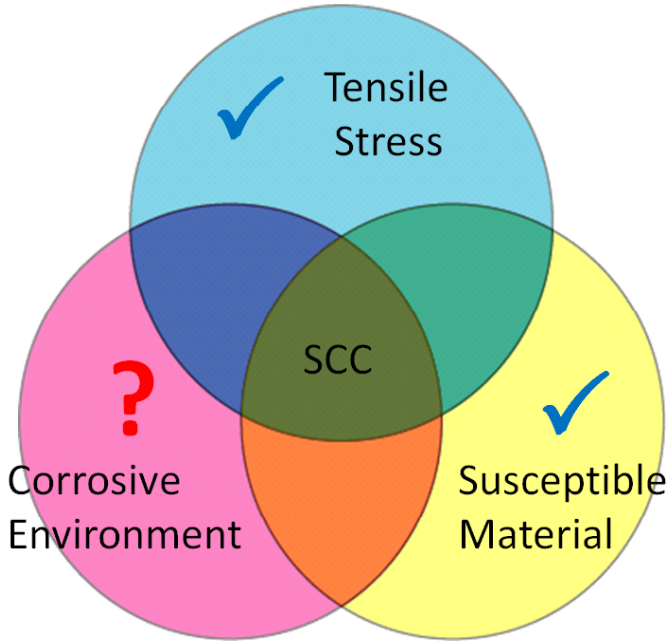
Darrell S. Dunn

Meeting to Obtain Stakeholder Input on Potential Changes to Guidance for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance

July 14, 2014

Stress Corrosion Cracking Background Information

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



2/3 of the requirements for SCC are present in welded stainless steel canisters

- 304 and 316 Stainless steels are susceptible to chloride stress corrosion cracking (SCC)
  - Sensitization from welding increases susceptibility
  - Crevice and pitting corrosion can be precursors to SCC
  - SCC possible with low surface chloride concentrations
- Welded stainless steel canisters have sufficient through wall tensile residual stresses for SCC
- Atmospheric SCC of welded stainless steels has been observed
  - Component failures in 11-33 years
  - Estimated crack growth rates of 0.11 to 0.91 mm/yr

AMP Element 10
Operational Experience

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NUREG-1927: Include past corrective actions; provide objective evidence to support a determination that the effects of aging will be adequately managed so that the SSC intended functions will be maintained during the period of extended operation

- No reported cases of localized corrosion or SCC in welded stainless steel canisters
- Atmospheric deposits on canister surfaces have been observed
- Several reported cases of chloride induced SCC from atmospheric deposits observed in operating reactors (NRC Information Notice 2012-20)
- Laboratory and field test data on conditions necessary for chloride induced SCC and SCC growth rates