INMM 2016 Spent Fuel Seminar – Calvert Cliffs Aging Mgmt

Ray Termini
Manager, ISFSI Implementation & Support
Exelon Generation Company, LLC
January 13, 2016
Site Specific License Renewal Issued

• On October 23, 2014, the NRC issued a 40-year license renewal for the Calvert Cliffs ISFSI.
• The license will now expire on November 30, 2052.
• The renewed license contains conditions that require periodic inspections of the casks and their components to make sure potential aging effects are identified and managed.
ISFSI Pad Status

ISFSI Pad designed to hold 132 HSMs
96 HSMs currently installed
• 78 Operable and Loaded
  – 48 - NUHOMS 24P Canisters
  – 30 - NUHOMS 32P Canisters
• Installed 24 HSMs in 2013
• Future: one 24- and one 12-unit HSMs to be added
Aging Management Program

The Licensee SHALL have an overarching Aging Management Program document, containing the 10 elements of the AMP, as submitted in the LRA, amended by responses to NRC RAIs, and approved by the NRC, to govern site implementation and ongoing configuration control of the AMP.
Aging Management Program Elements (NUREG-1927)

1. Scope of Program
2. Preventive Actions
3. Parameters Monitored or Inspected
4. Detection of Aging Effects
5. Monitoring and Trending
6. Acceptance Criteria
7. Corrective Actions
8. Confirmation Process
9. Administrative Controls
10. Operating Experience
TLAAS = Time-Limited Aging Analyses

This Aging Management Program document SHALL also contain TLAA descriptions as well as providing reference to the underlying TLAA related calculation/evaluation.

TLAAs are analyses and evaluations in the ISFSI or cask design basis that are performed to determine the life of in-scope SSCs that have time-dependent aging mechanisms.
To maintain safety focus and avoid assigning resources to less significant matters, NRC change control should be limited to information that is particularly safety- and risk-significant.

Aging Management Activities for ISFSIs and DSSs should incorporate future operating experience, research, monitoring, and inspections in a “learning” manner.
The components for aging management are

- the HSMs,
- the transfer cask and its lifting yoke,
- the cask support platform,
- DSC external surface,
- and high burnup fuel.
Horizontal Storage Modules (HSMs)

- Constructed on a common reinforced concrete foundation slab (2x6 arrays, back-to-back)
- 3-foot thick end walls, roof slab
- 3.5-foot thick front wall
- 2-foot thick interior walls
- Canister support rails
- Thermal shields
- Passive ventilation
Empty HSM Ready for Loading
DSC in HSM
Horizontal Storage Module

• Visual inspection of accessible exterior surfaces 1/year
• Based on above, visual inspections of minimum 5 targeted HSMs every five years
• Perform visual inspections of internal surfaces HSM-1 and HSM-15 every five years
• Obtain and evaluate HSM groundwater samples from minimum three locations every five years – monitor pH, sulfates, chlorides
High Burnup Fuel

High Burnup Fuel AMP relies upon the joint EPRI and Dept. of Energy “High Burnup Dry Storage Cask Research & Development Project” (HDRP) or an alternative program as described in ISG-24, as a surrogate program to monitor the condition of high burnup spent fuel assemblies in dry storage.
Loading Fuel into DSC
Dry Shielded Canisters

Program monitors DSCs for the following aging effects:

- Loss of material due to corrosion (e.g., crevice corrosion and/or pitting that may be a Precursor to SCC)
- Cracking due to SCC
DSC Basket Installed in Canister
DSC Inspections – At Intervals Not to Exceed Five Years

• Perform inspections on DSCs determined to be most susceptible to aging effects
• EPRI Susceptibility Assessment Criteria
• Include DSC-6 and DSC-11 (inspected in 2012) throughout the duration of the PEO (Period of Extended Operation)
DSC Inspections – Methodology

• DSC surface deposits to be collected and analyzed
• Inspect DSC external surfaces using proven technology
  • Capable of meeting VT-3 standards to the extent allowed by inspection equipment
  • Include DSC bottom and top end and longitudinal and circumferential welds
Location of Canister Welds

Figure 1. Representative configuration of a stainless steel canister
Aging Management Program Elements (NUREG-1927)

1. Scope of Program
2. Preventive Actions
3. Parameters Monitored or Inspected
4. Detection of Aging Effects
5. Monitoring and Trending
6. Acceptance Criteria
7. Corrective Actions – further analysis, inspection, repair or replacement
8. Confirmation Process
9. Administrative Controls
10. Operating Experience
Transfer Cask and Lift Yoke

Aging Effects

- Loss of material due to general corrosion or pitting
- Cracking of material due to stress/strain from lifting

Visual and penetrant exams performed prior to moving a DSC
DSC Lift Yoke
Transfer Cask & Lift Yoke
Transfer Cask & Lift Yoke
Raymond P. Termini
Mgrs, ISFSI Program Implementation & Support
Exelon Generation Company, LLC