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3rd EPRI Long Term Storage Meeting

Discussion of Technology Gaps Associated with Long Term Storage:

A Roll-up of Issues from the London Meeting

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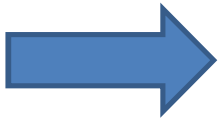
Table 1. Provisional Technical Gaps Based on Storage System Component

	Fuel	Internals/ Canister	Overpack/ISFSI	Transportation
Germany	• See "Transportation" cell	• Corrosion of containment boundary components • Polymer neutron poison degradation	• Degradation of metal and elastomer seals	• Retrievability and subsequent transport of fuel after VLTS
Hungary	• Corrosion • Creep		• Concrete structure degradation	• Retrievability to transfer into transport cask
Japan	• Degradation effects from creep, hydride reorientation, & recovery of hardening for fuels up to 55 GWD/MTU have been studied. • Degradation performance of MOX fuel - gap	• SSC studies complete under extreme environments. • Degradation data for normal SS under a realistic salty air environment with/without reduced residual stress - gap	• Time to corrode for rebar in concrete – gap • Degradation on loss of water content in shielding overpack - gap	• Evaluation method on containment performance of aged metal gasket. • High burnup fuel response to impact accidents.
U.S.	• Hydride re-orientation • Hydride embrittlement • Low-temp embrittlement • Corrosion • Creep	• SCC on canister welds • de-watering effectiveness • neutron poison degradation	• Concrete degradation (marine environments) • Closure lids, seals, bolts	• Fuel retrievability • Clad integrity of high burnup fuel after storage • Kinetic energy transfer to fuel from normal condition loadings

Fuel Data Gaps

	Fuel
Germany	• See "Transportation" cell
Hungary	• Corrosion • Creep
Japan	• Degradation effects from creep, hydride reorientation, & recovery of hardening for fuels up to 55 GWD/MTU have been studied. • Degradation performance of MOX fuel - gap
U.S.	• Hydride re-orientation • Hydride embrittlement • Low-temp embrittlement • Corrosion • Creep

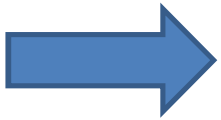


Identified data gaps:

- Hydride re-orientation
- Hydride embrittlement
- Low-temperature embrittlement
- Corrosion
- Creep – handled through modeling and analysis?

Internals/Canister Data Gaps

	Internals/ Canister
Germany	• Corrosion of containment boundary components • Polymer neutron poison degradation
Hungary	
Japan	• SSC studies complete under extreme environments. • Degradation data for normal SS under a realistic salty air environment with/without reduced residual stress - gap
U.S.	• SCC on canister welds • de-watering effectiveness • neutron poison degradation

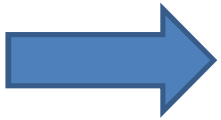


Identified data gaps:

- SSC under realistic conditions
- De-watering effectiveness
- Neutron poison degradation: polymer and metal
- Corrosion of containment boundary components

Overpack/ISFSI

	Overpack/ISFSI
Germany	• Degradation of metal and elastomer seals
Hungary	• Concrete structure degradation
Japan	• Time to corrode for rebar in concrete – gap • Degradation on loss of water content in shielding overpack - gap
U.S.	• Concrete degradation (marine environments) • Closure lids, seals, bolts

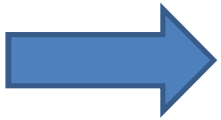


Identified data gaps:

- Degradation of metal and elastomer seals and bolts
- Concrete degradation
- Rebar degradation
- Degradation of loss of shielding from loss of water in concrete overpack

Transportation

	Transportation
Germany	• Retrievability and subsequent transport of fuel after VLTS
Hungary	• Retrievability to transfer into transport cask
Japan	• Evaluation method on containment performance of aged metal gasket. • High burnup fuel response to impact accidents.
U.S.	• Fuel retrievability • Clad integrity of high burnup fuel after storage • Kinetic energy transfer to fuel from normal condition loadings



Identified data gaps:

- Retrievability of fuel after VLTS
- High burnup fuel clad integrity after VLTS
- Transportability of fuel after VLTS
  - Fuel integrity after VLTS
  - Fuel performance subjected to normal and accident conditions of transport
- Holistic approach to examine fuel integrity and safety in post-storage transportation mode

Table 2. Potential Methodology Options for Obtaining Data

	Destructive Examination	Non-destructive Examination/ Analysis	Accelerated Aging Applications	Aging Management Plan
Fuel	PIE • Metallography • Hydride and thermal embrittlement • Corrosion	Physical Measurements • Creep	High burnup fuel • Hydride reorientation • Hydride embrittlement • Thermal embrittlement • Corrosion • Creep • Fuel modeling & analysis	• Limit excursion temperatures/time during dry loadiing
Internals/ Canister	• Marine environment SSC on canister • Neutron poison mat'l examination	• Eddy current inspection on canister welds • Salt concentration measurement on canister surface	• Stress corrosion cracking	• Mitigative measures for SCC in marine environments
Overpack/ ISFSI		• Visual inspections	• SCC/Corrosion of seals and bolts	• Concrete inspection and repair • Closure lid/bolts/seals inspection and repair
Transportation	• Measure internal KE from a 1-meter drop test	• Model and analyze fuel response to a 1-meter drop test (incorporate dindings from corrosion, hydride degradation and KE inputs to analysis)		

EPRI ESCP Committee Technical Gap Analyses
Final Report Outline

Executive Summary

I. Introduction

II. Country storage/transportation regulations

III. Country storage/transportation technical gap analyses

IV. Commonalities in gap analyses

V. Differences in gap analyses

VI. Prioritization of technical needs

VII. Conclusions

VIII. Path Forward

Tentative due date: June 8, 2011