Aging Management:
Innovations to Ensure Safe Extended Storage

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Outline

- AREVA TN, Americas
- Our Philosophy
- Aging Management for Licensing Renewal
- Canister Safety Program
- Designing New Systems with AMPs
Established in 1965 to transport nuclear materials in the U.S.
Manages globally more than 6,000 shipments of radioactive materials every year by road, rail and sea
Dry storage since 1985
Acquired high-performance NUHOMS® horizontal system in 1998
Market leader with more than 900 systems loaded in the U.S.
Innovation-Based Aging Management

Our Design Philosophy:

➤ Innovate
  ◆ Responding to Customer Needs
  ◆ Anticipating Future Needs

➤ Adapt and Respond
  ◆ Active TN User’s Group

➤ Continually Improve
  ◆ Existing and New Designs
Innovation-Based Aging Management

Existing Designs

- Site Specific Licenses
- License Renewal, CoC 1004

New Designs

- NUHOMS® EOS
Canister Safety Program

- Inspection
- Monitoring
- Recovery

“With Robust CSP, Extended Safe Storage is Assured.”
Innovative New Tools

- **Visual Inspection**
  - Design allows complete accessibility of canister and module

- **SaltSmart Sensor Device Tool**
  - Surface chloride concentration measurement

- **Canister Surface Inspection**
  - NDE tools designed to read location of any surface defects
  - Capability for numerous testing methods; VT, ET, UT
  - Built-in radiation shielding for worker safety

- **Canister weld inspection**
  - Ring travel – 100% access to welds
Innovative New Tools

- Detailed Design of Inspection Ring and Tools Completed
  - NDE Tooling Designed
  - ET, VT and UT techniques were developed using prototype probes
  - Tested by examining EPRI samples with known flaws
  - HSM – Transfer Trailer Anchor Design
  - RAM design
- Design Reviewed by Independent Experts
- Radiation Shield Designed to Minimize Dose

If a crack is > 2 mm it can be detected by AREVA TN Inspection Tool.
Periodic radiation, temperature monitoring

- Direct measurement of the HSM or DSC temperatures
- The HSM are built ready to receive thermocouple
- HSM cavity accommodates sensors for collecting, analyzing and monitoring important parameters

Pressure monitoring for dual purpose cask

- Monitoring of interspace between inner & outer seals
Canister repair

- Canister repair by grinding per ASME Section XI IWA-4000
- Repairs use remote, easy to use system
- Surface conditioning to mitigate further future damage

Cask coating repair

- Qualification of coating on hot surface

Fabrication techniques to mitigate corrosion

- Selection of material not susceptible to SCC-Duplex Steel
- Control surface stress by methods such as peening
Above ground, horizontal system offers
- Simple retrieval for inspection
- Ease of retrieval for shipment off-site
- Ease of accessibility in case of need for cleaning or repair

Mitigate – Smart Selection of Materials

Testing and Inspections
Design Considerations for AMPs
Smart Selection of Materials

▶ NUHOMS® EOS Canister in Duplex Stainless Steel
  ◆ Not susceptible to stress corrosion cracking in chloride environments
  ◆ Highly resistant to localized and general corrosion
  ◆ Exceptional heat transfer capabilities
  ◆ Exceptional mechanical strength and energy absorption

▶ Used in other AREVA Nuclear Waste Applications
  ◆ TRUPACT-III Transportation Package Containment Boundary
  ◆ High Integrity Radioactive Waste Containers

▶ Use 80+ years in aggressive corrosive environments
Conclusions

Innovation is necessary for strong AMPs

- AREVA TN has tools that are ready for deployment in 2017
- Strategy: Innovate, Adapt, Improve
- AMP Based on: Inspection, Monitoring, and Recovery

Forward looking designs should improve resistance to aging.

- Smart Materials Selection
- Designed with easy access for inspection