Update on NRC Transportation and Storage Activities and Decommissioning

David W. Pstrak

Senior Project Manager
Inspections and Operations Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission

2016 Joint Meeting of the Radioactive Materials Transportation Committee & Transuranic Waste

December 7, 2016
Overview

- Reactor Decommissioning Activities
- Draft Managing Aging Processes in Storage (MAPS) Report
- WCS Application
- Greater than Class C Waste
- Safety of Spent Fuel Transportation
- NRC Issues Paper on Revisions to Transportation Regulations
- Questions
Reactor Decommissioning Options

• DECON: Equipment, structures, etc removed or decontaminated to a level that permits release

• SAFSTOR: Plant placed in a safe stable condition and maintained in that state until it is subsequently decontaminated to levels that permit release

• ENTOMB: Plant is encased in a structurally long-lived substance to allow decay until levels permit unrestricted release (not currently available)
Ongoing Activities in Reactor Decommissioning

• 19 power reactors in decommissioning
  – 6 in active DECON or active dismantling
  – 13 in SAFSTOR or deferred dismantlement

• power reactors announcing permanent cessation of operations by 2019
  – James A. Fitzpatrick
  – Pilgrim Nuclear Power Station
  – Oyster Creek Nuclear Generating Station
  – Clinton
  – Quad Cities
Maine Yankee
Zion
Zion
Draft Managing Aging Processes in Storage (MAPS) Report
Background

- NRC staff experience with the renewal of licenses and certificates of compliance for the storage of spent nuclear fuel revealed a need for expanded guidance

- NRC team assessed current regulatory framework to determine what changes were needed
  - NUREG-1927, Rev. 1 (Standard Review Plan for storage renewals) - issued June 2016
  - Managing Aging Processes in Storage (MAPS) Report
  - Guidance for NRC oversight of licensees’ aging management activities
  - Regulatory Guide on the use of NRC and industry guidance for renewal applications
Infrastructure for Updated Storage Renewal Framework

TI / IP Inspections

SRP 1927R1

Staff consideration of Stakeholder inputs

MAPS

RG

Technical Issue Resolution

Consensus Codes

Storage/Reactor OpE

SRP NUREG-1927R0

NEI 14-03

DOE/ANL Report
MAPS Report – What it will provide

• Clarity of NRC staff technical position
  – Identification of the credible aging mechanisms and appropriate aging management activities
  – Applicants must still show that the generic guidance is applicable to their specific sites and CoCs

• Efficiency in the preparation and review of renewal applications
  – Reference to the MAPS guidance in renewal applications will allow the staff to focus its review on those areas where applicants propose an alternative approach
## Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>Introduction &amp; purpose</td>
</tr>
<tr>
<td>2. Definitions</td>
<td>Descriptions of terms used</td>
</tr>
<tr>
<td>3. Technical Basis</td>
<td>Technical basis for credibility of aging mechanisms</td>
</tr>
<tr>
<td>4. System Descriptions</td>
<td>Description and drawings of select storage systems</td>
</tr>
<tr>
<td>Aging Management Tables</td>
<td>Identification of subcomponents, materials, environments, aging effects, and the recommended aging management activity</td>
</tr>
<tr>
<td>5. Aging Management Programs</td>
<td>Example aging management programs</td>
</tr>
</tbody>
</table>
Chapter 4
Evaluated Storage Systems

• MAPS addresses a variety of designs and near-term renewal applications
  – Standardized NUHOMS (horizontal welded canister)
  – HI-STORM 100 (vertical welded canister: concrete overpack)
  – HI-STAR 100 (vertical welded canister: metal overpack)
  – TN-32, 68 (vertical metal bolted cask)

• Lessons can be extended to other systems

• Future revision of MAPS will incorporate additional designs
# Chapter 4

## Aging Management Tables

Aging management review results for all components in the selected storage systems

<table>
<thead>
<tr>
<th>Structure, System, or Component</th>
<th>Intended Safety Function</th>
<th>Material</th>
<th>Environment</th>
<th>Aging Mechanism</th>
<th>Aging Effect</th>
<th>Aging Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer shell</td>
<td>SR</td>
<td>Steel</td>
<td>Air - outdoor</td>
<td>General corrosion</td>
<td>Loss of material</td>
<td>External Surfaces Monitoring of Metallic Components AMP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pitting and crevice corrosion</td>
<td>Loss of material</td>
<td>External Surfaces Monitoring of Metallic Components AMP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Microbiologically influenced corrosion</td>
<td>Loss of material</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fatigue</td>
<td>Cracking</td>
<td>A TLAA or a supporting calculation may be needed</td>
</tr>
</tbody>
</table>

Example: HI-STORM 100 overpack outer shell
Chapter 5
Aging Management Programs

- Localized Corrosion and Stress Corrosion Cracking of Welded Stainless Steel Dry Storage Canisters*
- Reinforced Concrete Structures*
- External Surfaces Monitoring of Metallic Components
- Ventilation Systems
- Bolted Cask Seal Leakage Monitoring
- Transfer Casks
- High Burnup Fuel Monitoring and Assessment*

[*largely consistent with NUREG-1927, Rev 1]
Example

HI-STORM 100

FSAR

<table>
<thead>
<tr>
<th>Primary Function</th>
<th>Component (1)</th>
<th>Safety Class (2)</th>
<th>Codes/Standards (as applicable to component)</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Integrity</td>
<td>Baseplate</td>
<td>B</td>
<td>ASME Section III; Subsection NF</td>
<td>SA516-70</td>
</tr>
<tr>
<td>Structural Integrity</td>
<td>Outer Shell</td>
<td>B</td>
<td>ASME Section III; Subsection NF</td>
<td>SA516-70</td>
</tr>
<tr>
<td>Structural Integrity</td>
<td>Inner Shell</td>
<td>B</td>
<td>ASME Section III; Subsection NF</td>
<td>SA516-70</td>
</tr>
</tbody>
</table>

MAPS aging management table

<table>
<thead>
<tr>
<th>Structure, System, or Component</th>
<th>Intended Safety Function</th>
<th>Material</th>
<th>Environment</th>
<th>Aging Mechanism</th>
<th>Aging Effect</th>
<th>Aging Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer shell</td>
<td>SR</td>
<td>Steel</td>
<td>Air - outdoor</td>
<td>General corrosion</td>
<td>Loss of material</td>
<td>External Surfaces Monitoring of Metallic Components AMP</td>
</tr>
<tr>
<td>Pitting and crevice corrosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Loss of material</td>
<td>External Surfaces Monitoring of Metallic Components AMP</td>
</tr>
<tr>
<td>Microbiologically influenced corrosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Loss of material</td>
<td>No</td>
</tr>
</tbody>
</table>

NMSS Division of Spent Fuel Management
HI-STORM 100

MAPS: External Surfaces Example AMP

- Inspection Method:
  - Visual inspections in accordance with ASME Code Section XI for VT-3
- Coverage:
  - All accessible external surfaces
- Sample Size:
  - All casks
- Frequency:
  - At least once every 5 years
- Acceptance Criteria
  - No detectable loss of material
  - No corrosion products
  - No coating defects
Path Forward

• Spring 2017: Issue draft guidance for public comment
• Fall 2017: Present final guidance to ACRS
• Winter 2017: Publish final guidance

• NUREG-1927, Rev. 1: “Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance”
  – ADAMS Accession No. ML16179A148
WCS Application

- **Status**
  - License application
    - April 28, 2016
  - Requests for Supplemental Information (RSI)
    - 4th input received November 16, 2016
    - Final input planned for mid-December

- **Environmental review**
  - NRC’s intent to prepare an EIS and conduct a scoping process
    - 81 FRN 79531
  - Scoping period begins on Nov 14, 2016, and if the application is docketed, will end 45 days after publication of a notice of docketing the application
Greater Than Class C Waste

- 10 CFR 61.55
  - Class A, B, C [GTTC]
- Transported under US DOT and US NRC transportation regulations
- If stored on an ISFSI
  - 10 CFR 72.212 assessment needed
Safety of Spent Fuel Transportation

- NUREG/BR-0292, Rev 1
- August 2016
- ML16237A133
NRC Issues Paper on Proposed Revision to the Transportation Regulations

- Issues paper (ML16299A298)
- FRN (81 FR 83171)
  - Public meeting December 5 – 6, 2016
  - 60 day comment period - November 21, 2016 through January 20, 2017
- Electronically on Federal Rulemaking Website: [http://www.regulations.gov](http://www.regulations.gov), Docket ID NRC-2016-0179
- Mail comments to: Cindy Bladey, Chief, Rules, Announcements, and Directives Branch (RADB), Division of Administrative Services, Office of Administration, Mail Stop: OWFN-12-H08, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001
Radiation level limits
49 CFR 173.441(b)

• Open transport
• Exclusive use
Radiation level limits
49 CFR 173.441(b)

- Closed transport
- Exclusive use