Risk-Informed Decision-Making Through the Years

Utility Perspective

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Risk-Informed Decision-Making Through the Years – Utility Perspective

Outline

- Introduction
- Early Experience
- Recent Experience
- Future

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Introduction

- Safety is the main priority
  - Nuclear Safety
  - Industrial Safety
- Utilities are required to comply with regulations, so durable record required
- Compliance sometimes leads to increased industrial risk or increased dose

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Early Experience

- Burnup Measurements
  - Required in initial version of Interim Staff Guidance (ISG) 8 (**May 1999**) to "confirm" reactor records prior to loading fuel in casks
  - Industry argued reactor records are generated from in-core measurements and used for reactor operations (multiple meetings over several years including Advisory Committee on Nuclear Waste meeting in **2007**)
  - Resolution - accept reactor records for loading casks and have a mis-load analysis for cask - NUREG-2215 (**April 2020**)
  - **Benefit - Reactor records determined good for dry cask operation**

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Early Experience (cont'd)

- Westinghouse Top Nozzle SCC
  - Identified issue in **2001** (North Anna) - assemblies required 'modification' for handling
  - Discussions on how these 'modified' assemblies would be addressed for loading into dry casks ensued
  - Process to generate durable record for resolution initiated in **Nov 2010**
  - Durable record (NRC letter) in **April 2012** (RIS in **Sep 2013**)
  - **Benefit - Resurrected Regulatory Issue Resolution Protocol (RIRP)Process…with success**

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Early Experience (cont'd)

- Stack-up
  - Initial questions by NRC in **Feb 2010** – Perry unresolved Issue (URI) in **Mar 2011**
  - Issue began with questions on the analytical methods used for the unrestrained stack-up configuration (compliance
  - Until issue was resolved:
    - Loadings performed with physical restraints (industrial safety concerns)
    - Loadings cancelled / delayed
  - RIS 2015-13 in **Nov 2015** describes seismic analyses details for stack-up configuration
  - **Benefit – RIS provided guidance for industry but took too long to resolve.**

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Recent Experience

- Performance Margins
  - Industry initiated Performance Margin white paper development as a result of High Burnup fuel demo project thermal results (**Mar 2019**)
  - Performance Margin white paper sent to NRC with industry recommendations (**Nov 2019**)
  - Initiated Graded Approach pilots to develop alternative licensing strategy (**Aug 2016**)
  - Initiated Phenomena Identification and Ranking Tables (PIRT) meetings on first of four topics (**Oct 2019**)
  - PIRTs rank items/characteristics based on significance and impact to safety

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Recent Experience (cont'd)

- Graded Approach
  - Graded Approach RIRP I-16-01 to improve format and content of CoC and TS (**Aug 2016**)
  - Graded Approach pilot submitted to NRC by TN (ORANO)
    - Reformatted and reduced content of CoC and TS
  - Graded Approach pilot submitted to NRC by Holtec
    - Alternative Licensing strategies based on significance of change
  - **Benefit – Appropriate level of effort for cask vendors and faster NRC reviews depending on significance of change – efficiency improvement for industry and NRC**

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Recent Experience (cont'd)

- Thermal/Decay Heat/Fuel Performance PIRTs
  - First meeting of the PIRT teams (**Oct 2019**)
  - EPRI PIRT Reports (**Jun/Jul 2020**) identified substantial margins and opportunities for regulatory, safety, and operational benefits using potential alternative fuel performance metrics
    - Potential relaxation of specific regulatory limits based on latest data
  - Options for use of margins discussed by the industry
  - **Benefit - Faster NRC reviews depending on margin to limit and increased operational flexibilities for utilities and vendors**

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Recent Experience (cont'd)

- Gross Rupture
  - First meeting of the Gross Rupture PIRT (**Dec 2020**)
  - Expert team determined that some level of fuel failure can be tolerated in canisters without compromising safety
  - Developed new metric for defining 'Gross Rupture':
    - Detection of transuranics in the RCS (new metric)
    - Clad defect greater than 1mm (old metric)
  - PIRT Report with recommendations issued (**Dec 2021**)
  - **Benefit – Significantly fewer assemblies required to be 'canned'**

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Future

- When issues arise, need to ask:

  "So what?...What is the safety concern?"

- Focus on items that impact safety
  - Will ensure utility and NRC attention and resources are not diverted
- Make decisions based on **RISK**

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