Opportunities for Continuous Improvement and Research for New Plant Projects

Design Development

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EPRI’s Mission

Advancing **safe**, **reliable**, **affordable** and **environmentally responsible** electricity for society through global collaboration, thought leadership and science & technology innovation.
Nuclear Sector Membership

U.S. Participants

All U.S. nuclear owners/operators
(100 reactors)

Non-U.S. Participants

20 countries, >220 reactors

Global Breadth and Depth

~80% of the world’s commercial nuclear units

Participants Encompass Most Nuclear Reactor Designs
ANT Program Overview

- Accelerates and focuses work targeted at new plants
  - Work not already being done in other areas of EPRI

- Primary focus is on light water reactor designs
  - Gen III, Gen III+, and light water Small Modular Reactor (SMR) designs

- Minor focus on longer term designs
  - Gen IV and non-light water SMRs

- Address Multiple Stakeholders
  - Global Issues and Various Stages of Deployment

- Target issues where EPRI can have an impact
  - Clear value in our collaborative environment
Design Change Impact and Cost

- Cost and schedule overruns – many new build issues …
  - Construction speed and quality
  - Risk management
  - Dormant supply chain
  - Integration challenges
  - Outdated Codes
  - First of a generation construction issues

Source: RAND Corp. Study, 1981
Part 52 Process and Regulatory Oversight

- Many variables in play when considering new nuclear
- Demonstration of Part 52 licensing ... and licensing stability
- New licensing challenges, new construction/operating paradigms
- What was once “minutiae” is now common for evaluation
- ITAAC issues
  - Systems engineering approach
The Role of Research: Design Change Management

Opportunities to …
- Inform industry and regulatory positions
- Proactively address issues
- Identify technical improvements impacting licensing
- Continuous improvement in approach
Environmentally Assisted Fatigue (EAF)

- **Industry-wide appeal to reduce conservatism**
- **Strategy**: demonstrate material improvement through testing
  - Work with industry, standards bodies, and regulators
  - Update the Codes
  - Improve licensing process
10 CFR 50.55
- Code of Federal Regulation is federal law and utilities are bound by their license to strictly adhere to it.
- 10 CFR 50.55a(c) requires components of the reactor coolant pressure boundary to meet the requirements of ASME Code for Class 1 components in Section III

ASME Boiler and Pressure Vessel Code
- Section III “Rules for Construction of Nuclear Power Plant Components”

Regulatory Guide 1.207
- Provides guidance for determining the acceptable fatigue life of ASME pressure boundary components with consideration of LWR environment
- Reg. Guide 1.207 is not law or regulation.

NUREG/CR-6909
- Provides the technical basis for the $F_{en}$ method recommended in Reg. Guide 1.207
Design Maturity and Moving Forward

- Managing project risk
- Comparative understanding of licensing process
- Looking for harmonization in design and process
- On the horizon: Small Modular Reactors
Together…Shaping the Future of Electricity