A Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Licensing Non-Light-Water Reactors

October 3, 2018
Implementation Action Plans

**Strategy 1**
Knowledge, Skills and Capability
- ONRL Molten Salt Reactor Training
- Knowledge Management

**Strategy 2**
Computer Codes & Review Tools
- Identification & Assessment of Available Codes

**Strategy 3**
Flexible Review Processes
- Regulatory Roadmap
- Prototype Guidance

**Strategy 4**
Consensus Codes and Standards
- ASME BPVC Section III Division 5
- ANS Standards 20.1, 20.2 30.2, 54.1

**Strategy 5**
Policy and Key Technical Issues
- Siting near densely populated areas
- Insurance and Liability
- Periodic Stakeholder Meetings
- NRC DOE GAIN MOU
- International Coordination

**Strategy 6**
Communication
- NRC DOE Workshops
- Periodic Stakeholder Meetings

**Implementation Modernization Project**
- RG 1.232
- Non-LWR Design Criteria
- Non-LWR PRA Standard

**Consequence Based Security**
- EP for SMRs and ONTs
- Functional Containment

**Potential First Movers**
- Micro-Reactors

**Siting near densely populated areas**
- NRC DOE GAIN MOU
- International Coordination

**ONRL Molten Salt Reactor Training**
- Knowledge Management

**SFR and HGTR Training**
- Prototype Guidance
- Non-LWR Design Criteria
- Non-LWR PRA Standard

**ASME BPVC Section III Division 5**

**Consequence Based Security**
- EP for SMRs and ONTs
- Functional Containment

**Regulatory Roadmap**

**Strategy 4**
Consensus Codes and Standards
- ASME BPVC Section III Division 5

**MOU**
- NRC DOE GAIN MOU
- International Coordination

**International Coordination**

**Siting near densely populated areas**
- NRC DOE GAIN MOU
- International Coordination

**Functional Containment**
- EP for SMRs and ONTs

**Potential First Movers**
- Micro-Reactors
Revisit First Principles
Licensing Modernization Project (NEI 18-04)

- **General Approach**
  - Licensing Basis Events
    - Probabilistic Risk Assessment
    - Deterministic
  - SSC Classification
    - Function and Risk Considerations
    - Safety Related
    - Non-Safety Related with Special Treatment
  - Defense in Depth Assessment
    - Structures, Systems and Components
    - Programmatic
NEI 18-04 provides useful guidance for applicants to identify and provide the appropriate level of information needed to satisfy parts of the regulatory requirements in 10 CFR 50.34, 10 CFR 52.47, 10 CFR 52.79, 10 CFR 52.137, and 10 CFR 52.157.

- Combination of deterministic evaluations and probabilistic risk assessments
- Information needed on fuel, primary, and other barriers to define limitations, performance characteristics, and as input to mechanistic source term
- Information needed on SSCs and programmatic controls associated with key safety functions
- Scope and depth for other information (e.g., ancillary plant systems) to be determined based safety/risk significance (i.e., roles in preventing or mitigating licensing basis events)
- Level of detail can also reflect potential performance-based approaches (see Introduction, Part 2, to NUREG 0800)
Draft Regulatory Guide (DG) 1353

Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Inform the Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors

NEI 18-04

Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development

Related SECY

The staff recommends that the Commission approve the use of the technology-inclusive, risk-informed, and performance-based approach described in NEI 18-04 and DG-1353 for identifying LBEs, classifying SSCs, and assessing the adequacy of defense in depth. These key aspects of the design process will also be used to inform the appropriate scope and level of detail for information included to support licenses, certifications, and approvals for non-LWRs.
Availability of Working Drafts

• Industry Guidance (NEI 18-04) ML18271A164
  Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development

• Draft Regulatory Guide (DG) 1353 ML18271A172
  Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Approach to Inform the Content of Applications For Licenses, Certifications, and Approvals for Non-Light Water Reactors

• Draft Commission Paper ML18270A334