

Industry Perspective

NRC Public Meeting
Other External Events Protections

February 22, 2012



NUCLEAR
ENERGY
INSTITUTE

Overview

- Major challenges
- Resources
- Prioritization
- Examples
 - New plant
 - Operating plant
- Anticipated timeline
- Summary

Major Challenges

- Retaining focus on continued safe operations
- Integration with other Fukushima response activities
- Lack of widespread familiarity and experience with methods
- Finite pool of experts for NRC and industry to utilize
- Potential for differences in results between new evaluations and existing design basis
- Definition of regulatory expectations for resolution
- Expectations for fleet-wide implementation schedule



Resources Needed

- Site specific hazard screening criteria and process
 - Definition of universe of hazards to be considered
 - Development of industry guidance
 - NRC acceptance of screening approach
 - Piloting

Resources Needed

- Comprehensive pilot effort
- Subject matter experts
 - Hazard specific spectra
 - Site specific experts
 - PRA modeling support
 - NRC expertise
 - Peer review support
 - Training and mentoring

Resource Limitations

- Necessity of sequential conduct of activities
 - Piloting of methods and guidance at operating plants
 - Development of industry prioritization process
 - Definition of scope of applicable hazards
 - Reviews and follow-up responses
 - Saturation of analysis infrastructure
 - NRC review resources
- Integration with other Fukushima response activities
- Appreciable expansion of effort scope from new plants to operating plants

Regulatory Infrastructure Resources

- Stakeholder dialogue
- NRC acceptance of methods
- Development of regulatory guidance for operating plants
- Eventual rulemaking
- Uncertainties with future Congressional direction

Resources – Present Day Methods

- Current analysis codes and knowledgeable personnel
- Potential standards updates
- Event combinations
- Methodology guidance
 - Realistic methods
 - Updates based on most recent data
- Potential expectations for periodic updates

Additional Resource Considerations

- Fleet-wide extrapolation of pilot experience for plant-specific hazard evaluation
- Design basis clarity
- Impact on other analyses
- Applicability to spent fuel pools
- Operating modes

Prioritization – First Steps

- Definition of overall scope
 - Complete evaluation vs. most relevant hazards
 - Design and location specific
- Sequencing
 - Piloting prior to fleet-wide rollout
 - Specific hazard prioritization
 - Plant prioritization
 - Walkdowns
 - Availability of applicable regulatory guidance
 - Review prioritization
 - Expectations from other government agencies
 - Prioritization against other competing needs

Prioritization - Walkdowns

- Acceptance criteria
- Piloting
- Hazard-specific priorities
- Regulatory interface
- Consideration of impact on personnel and radiation safety
- Coordination with outage schedules and activities

Prioritization – Screening and Analysis

- Screening
 - Initial screening
 - Follow-on detailed screening
- Analysis
 - IPEEE validation
 - Interface with FLEX
 - Hazard duration

Example – New Plant

- Design basis evaluation/comparison (overall) – 150 person-hours
 - Site characteristic values based on latest guidance – 500 person-hours
 - Hazard evaluation results/documentation – 120 – person hours
 - Hazard specific resource requirements (average/upper bound)
 - Tornado – 400/800 person-hours
 - Hurricane – 500/3500 person-hours
 - Severe wind – 300/400 person-hours
 - Roof design precipitation – 1000/4000 person-hours
 - Ambient temperature – 1000/2000 person-hours
 - UHS design - 1500/4000 person-hours
 - Other natural hazards (e.g. lighting, sand storms, volcanic) – 300/1000
 - Project management – additional 25% of technical time noted above
 - Licensing – additional 40% of technical time noted above

Note: Estimates are extreme lower bounds for operating plants



Example – New Plant

- Anticipated variances for operating plants
 - More recent site data for new plants
 - New plants designed to more recent standards
 - Fewer vulnerabilities due to new plant designs
 - Design basis established based on newer criteria and data
- Additional activities for operating plants
 - Definition of hazard magnitude given newest data
 - Walkdowns
 - Screening
 - More extensive existing design basis evaluation
 - Documentation reviews
 - Knowledge transfer activities and training

Example – Operating Plant (Tornado Evaluation)

- Resource constraints
 - Subject matter experts
 - Competition with other analysis needs (e.g. fire, seismic)
 - Methodology development
 - Data updates
 - Availability of regulatory guidance

Example – Operating Plant (Tornado Evaluation)

- Availability of personnel
 - Expertise limited
 - Plant-specific knowledge needs
 - Design-basis expertise
 - PRA personnel
 - Maintaining focus on continuing safe operation of plant

Example – Operating Plant (Tornado Evaluation)

- Modeling challenges
 - Treatment of non-safety equipment
 - Switchyard impacts
 - Treatment of beyond design basis hazards
 - Updated data
 - Operating modes
 - Mitigation strategies

Example – Operating Plant (Tornado Evaluation)

- Time required
 - Clear regulatory framework and direction necessary before analytical work
 - 1500 person-hours for expertise
 - 2000 person-hours for plant specific documentation
 - Additional licensing/LAR follow-on work
 - NRC review

Note: Resources estimates are only for one hazard and do not include screening needs



Proposed Timeline

- Specific dates to be developed later after more evaluation
- Sequence proposal
 - Prioritization process
 - Screening methodology development
 - Regulatory consensus on screening methodology
 - Provisions for initial screening process
 - Walkdowns
 - Development of walkdown criteria
 - Regulatory consensus on walkdown criteria
 - Conduct of screening walkdowns

Proposed Timeline

- Sequence proposal (continued)
 - Hazard specific evaluations
 - Development of hazard specific methodologies
 - Piloting of specific hazard evaluations
 - Updates to guidance and standards
 - Regulatory evaluation of pilot activities and findings

Proposed Timeline

- Sequence proposal (continued)
 - Detailed screening
 - Hazard-specific walkdowns
 - Fleet-wide hazard specific evaluations
 - Licensing work
 - NRC review

Summary

- Consideration as a Tier 2 Fukushima response activity is appropriate given safety significance
- Conduct of this activity will be challenging, even with extended timeline
- Recognition of limited subject matter experts vital to development of appropriate resolution timeframe
- Early NRC engagement with stakeholders beneficial to achieving timely resolution