



# **Status of Lessons Learned from the Fukushima Dai-ichi Accident**

**Joint Steering Committee Meeting  
October 20, 2015**

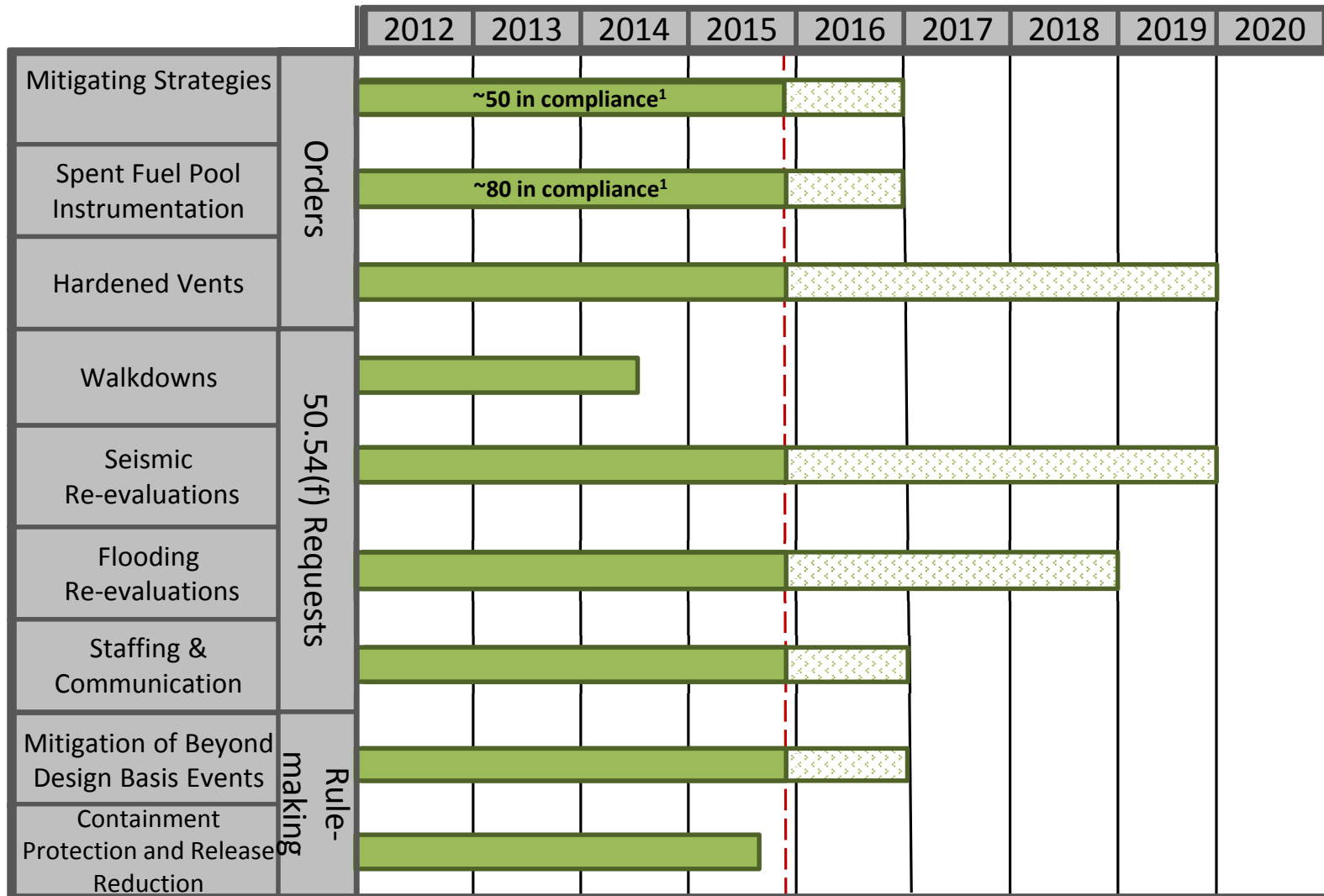
# Agenda

- Progress on Tier 1 Recommendations
- Seismic and Flooding Reevaluations
- Guidance for Mitigating Strategies Assessments
- Tier 2 and 3 Resolution Plans
- Upcoming Milestones
- Public Comments and Questions



# Tier 1 Implementation\*









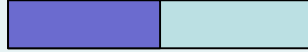

The NRC is on or ahead of schedule.



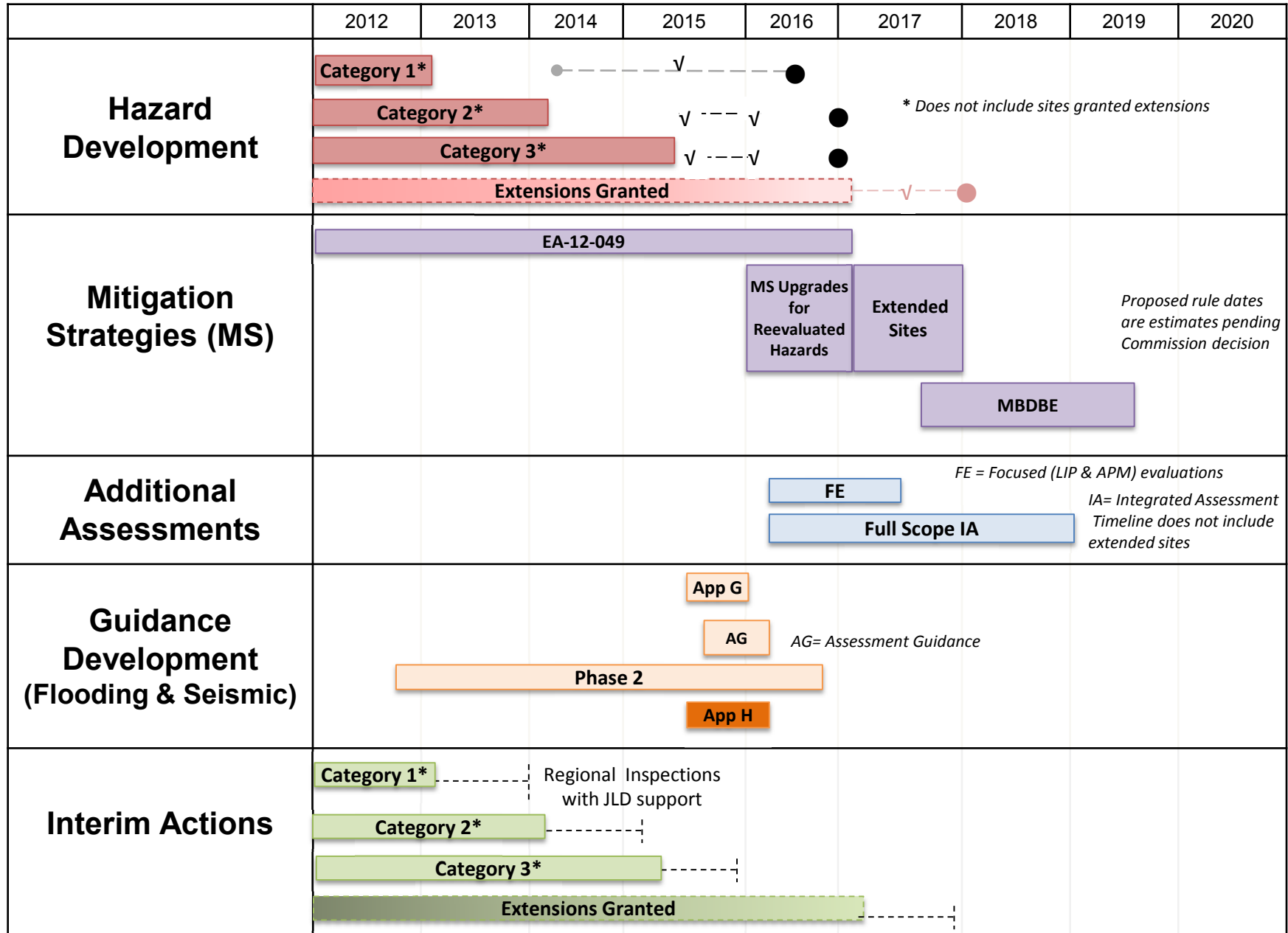
Today

\*For illustrative purposes only 3  
<sup>1</sup> expected after Fall 2015 outages

# Hazard Reevaluations

Seismic		Flooding	
Hazard Reevaluation Reports Received	61/61 (100%) 	Hazard Reevaluation Reports Received	55/61 (90%) 
Acknowledgement Letters Issued	59/61 (97%) 	Mitigation Strategies Hazard Information Issued	19/44 (43%) 
Expedited Approach Received	33/34 (97%) 	Interim Actions Received	38/46 (83%) 
Expedited Approach Response	21/33 (64%) 	Interim Actions Inspected	36/38 (95%) 
Staff Assessments Issued	32/61 (52%) 	Staff Assessments Issued	12/55 (22%) 

# Schedule for Flood Hazard Reevaluation and Subsequent Actions



√ Staff acknowledges hazard to use for mitigating strategies

● Last Staff Assessment issued

# Resolving Tier 2 and 3 Recommendations

- Assessments with a focus on identifying and evaluating regulatory gaps
- Evaluations consider:
  - Existing requirements
  - Tier 1 safety enhancements
  - Insights from completed Tier 2&3 work
  - Insights from previously completed analyses
- Engagement with stakeholders
- Importance of maintaining an appropriate level of technical rigor



# Resolution Groups

Group 1 – Can be closed now based on completed evaluations, progress made, and existing processes available to address future work.

Group 2 – Sufficient information available and staff's initial technical assessment complete; closure approach would benefit from interactions with ACRS/external stakeholders; work to be completed by March 2016.

Group 3 – More detailed assessment and/or justification for resolution being prepared; ACRS/external stakeholder interactions would inform resolution of the recommendation; work to be completed in 2016.



# Summary of Tier 2 and 3 Recommendation Plans

- Expedited transfer of spent fuel to dry cask storage
- 7.2 – 7.5 Spent Fuel Pool Makeup Capability
- 9.1/9.2 Emergency preparedness (EP) enhancements for prolonged SBO and multiunit events
- 9.3 Emergency preparedness (partial)
- 9.4 Improve ERDS capability
- 10 Additional EP topics for prolonged SBO and multiunit events (partial)
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- 12.1 Reactor Oversight Process modifications to reflect DID framework
- 12.2 Staff training on severe accidents and resident inspector training on SAMGs
- Revisit Emergency Planning Zone Size & Pre-stage Potassium Iodide Beyond 10 Miles
- 5.2 Reliable hardened vents for other containment designs
- 6 Hydrogen control and mitigation inside containment or in other buildings
- Reactor and Containment Instrumentation
- Reevaluation of “Other” External Hazards
- 2.2 Periodic confirmation of seismic and flooding hazards
- 10 Additional EP topics for prolonged SBO and multiunit events (partial)
- 11 EP topics for decision-making, radiation monitoring, and public education (partial)

Completed

Subsumed in Tier 1

Ready to Close

Further Interaction

Further Assessment



# Group 1 – ROP Modifications to Reflect Defense-in-Depth Framework

12.1: Expand ROP self-assessment and biennial ROP realignment to include defense-in-depth considerations

Tier 3 → Dependent on Recommendation 1

## Evaluation

- Rec. 1 now closed to RMRF initiative.
- ROP self-assessment and realignment processes being enhanced.
- General ROP enhancements underway.
- Existing agency processes in place.

## Recommendation

Close

. . . Follow normal agency processes for future ROP enhancements

# Group 1 – Staff Training on Severe Accidents and Severe Accident Management Guidelines

12.2: Enhance training to include lessons learned and training on SAMGs for resident inspectors

Tier 3 → Dependent on Recommendation 8 (now subsumed in MBDBE rulemaking)

## Evaluation

- Severe accident training enhanced to include the accident and lessons learned.
- SAMG training is being developed.
- Qualification programs being updated.

## Recommendation

Close

. . . Enhancements to training and qualification programs are underway

# Group 1 – Seismically-Induced Fires and Floods

3: Evaluate potential enhancements to prevent or mitigate seismically-induced fires and floods

Tier 1 → Initiate development of a PRA methodology  
Tier 3 → Determine if regulatory action is needed

## Evaluation

- Existing robust NRC requirements.
- Safety enhancements associated with Tier 1 activities mitigate risk.
- Draft feasibility study for the PRA methodology is currently under review.

## Recommendation

Close

. . . Additional safety enhancements not necessary

# Group 1 – Basis of EPZ Size and Pre-Staging Potassium Iodide Beyond 10 Miles

Additional Recommendation: Reevaluate the basis of EPZ size and pre-staging KI beyond 10 miles

Tier 3 → Dependent on long-term studies

## Evaluation

- 2014 denial of rulemaking petition to expand EPZ size.
- Insights from international studies at Fukushima.
- New data from the site supports existing regulations and policies.

## Recommendation

Close  
... Information continues to support existing regulations and policies

# Group 1 – Various Emergency Preparedness Recommendations

Rec. 9.3 (Partial): Maintain ERDS throughout accident

Rec. 10.3c: Continuous ERDS transmission

Rec. 11.2: Evaluate recovery and reentry insights from Fukushima

Rec. 11.4: Training in the local community on radiation, radiation safety, and the use of KI

## Evaluation

- ERDS design considerations
- Some licensees voluntarily transmit ERDS continuously
- FEMA is leading the ongoing efforts for 11.2 and 11.4

## Recommendation

Close

. . . Cost/benefit considerations; progress to date

# **Group 1 – Emergency Preparedness Recommendations Addressed by Rulemaking Activities**

**Rec. 9.1: Initiate rulemaking to require EP enhancements for multiunit events**

**Rec. 9.2: Initiate rulemaking to require EP enhancements for prolonged station blackout**

**Rec. 9.3 (Partial): Order licensees to perform various EP enhancements until rulemaking is complete**

**Rec. 10.1: Analysis of protective equipment Requirements**

**Rec. 10.2: Command and control structures**

**Rec. 11.1: Enhanced resources to get equipment onsite**

# Group 2 – Instrumentation Enhancements for Beyond-Design-Basis Events

ACRS: Assess need to enhance reactor and containment instrumentation to survive beyond-design-basis events

Tier 3 → Further staff study; dependent on higher priority recommendations

## Evaluation

- Tier 1 enhancements and existing requirements.
- Insights from MBDBE rulemaking analyses.
- Ongoing work to develop consensus standard.

## Recommendation

No need for regulatory action identified, but staff plans additional interaction before finalizing assessment

# Group 2 – Vents for Other Containment Designs

5.2: Reevaluate the need for hardened vents for other containment designs. . . [take] appropriate regulatory action . . .

Tier 3 → Dependent on insights from Tier 1 activities (Order EA-13-109 and related rulemaking)

## Evaluation

- Significant information from previous studies.
- EA-13-109 in progress.
- Mitigating strategies enhance safety.
- Commission disapproved CPRR rulemaking.

## Recommendation

No need for regulatory action identified, but staff plans additional interaction before finalizing assessment



# Group 2 – Hydrogen Control and Mitigation

6: Identify insights about hydrogen control and mitigation inside containment or in other buildings as additional information is revealed through further study. . .

Tier 3 → Dependent on insights from Tier 1 activities and further evaluation

## Evaluation

- 10 CFR 50.44
- Significant information from previous studies.
- EA-13-109 in progress.
- Mitigating strategies enhance safety.
- NRC participated in international studies.

## Recommendation

No need for regulatory action identified, but staff plans additional interaction before finalizing assessment

# Group 3 – Evaluation of Other Natural Hazards

ACRS and Consolidated Appropriations Act for 2012:  
The [NRC] shall require reactor licensees to reevaluate the seismic, tsunami, flooding, and other external hazards at their sites . . .

Tier 2 → Lack of critical skill set for both NRC and industry

## Evaluation

- External natural hazards are addressed by mitigation strategies.
- Staff developed four step screening process to enhance efficiency.

## Recommendation

Further assessment/  
interaction needed  
  
. . . To include previous supporting assessments, summary of protection under current regulations, and input from stakeholders

# Proposed Steps for Other External Hazard Assessment (Group 3)

1. Define the population of natural hazards other than seismic and flooding to determine those hazards that should be reviewed generically (complete).
2. Determine and apply screening criteria to exclude certain natural hazards from further generic evaluations or exclude some licensees from considering certain hazards.
3. Perform a technical evaluation to assess the need for additional actions if the hazard or licensee was not screened out generically in Task 2.
4. Determine if additional actions are needed on a site- or hazard-specific basis.



# Group 3 – Periodic Reconfirmation of Natural Hazards

2.2: . . . rulemaking to require licensees to reevaluate the seismic hazards and flooding hazards every 10 years and address any new and significant information. If necessary, update the design basis. . .

Tier 3 → to be based on insights from Tier 1 reevaluations (also Tier 2 other external hazards)

## Evaluation

- Existing processes ensure safety maintained.
- Rulemaking not necessary.
- Internal processes should be enhanced to make them more proactive and systematic.

## Recommendation

Further assessment/  
interaction needed  
. . . To complete process  
enhancements; input from  
stakeholders

# Group 3 – Various Emergency Preparedness Activities

Rec. 10.3a: Alternative method for transmitting ERDS

Rec. 10.3b: ERDS data set

Rec. 11.3: Efficacy of real-time radiation monitoring in EPZ and onsite

## Evaluation

- ERDS Alternative Transmission Study to be reviewed.
- Input to be sought from incident responders for ERDS data set.
- Consider history with real-time radiation monitoring.

## Recommendation

Further assessment/  
interaction needed

. . . To document work done  
and gather stakeholder input

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# Upcoming Milestones

- October 2015
  - SECY paper on Tier 2&3 plans due
- November 2015
  - ACRS Full Committee meeting on Tier 2&3 plans
  - Proposed MBDBE rule out for public comment
  - ISGs for NEI 12-06, Appendices G and E, out for public comment
  - Commission meeting on status of lessons learned
- December 2015
  - All Mitigating Strategies Flood Hazard Information letters issued
  - Phase 2 OIPs for EA-13-109 submitted



# Focus Areas

- Review of Focus Areas from Prior Meetings:
  - Guidance development for the integration of reevaluated hazards and mitigating strategies
  - Schedule to provide feedback on flooding hazards by the end of 2015
  - Plans for Tier 2&3 recommendations
- Focus Areas for Next Meeting
  - Continuing guidance development
  - Plans for sunseting Steering Committees





# Additional Industry Comments



# Public Questions & Comments



# Acronyms

<b>ACRS</b>	<b>Advisory Committee on Reactor Safeguards</b>	<b>ISG</b>	<b>Interim Staff Guidance</b>
<b>CPRR</b>	<b>Containment Protection and Release Reduction</b>	<b>KI</b>	<b>Potassium Iodine</b>
<b>DID</b>	<b>Defense in Depth</b>	<b>MBDBE</b>	<b>Mitigation of Beyond-Design-Basis Events</b>
<b>EA</b>	<b>Enforcement Action</b>	<b>PRA</b>	<b>Probabilistic Risk Assessment</b>
<b>EP</b>	<b>Emergency Preparedness</b>	<b>RMRF</b>	<b>Risk Management Regulatory Framework</b>
<b>EPZ</b>	<b>Emergency Planning Zone</b>	<b>ROP</b>	<b>Reactor Oversight Process</b>
<b>ERDS</b>	<b>Emergency Response Data System</b>	<b>SAMGs</b>	<b>Severe Accident Management Guidelines</b>
<b>FEMA</b>	<b>Federal Emergency Management Agency</b>	<b>SBO</b>	<b>Station Blackout</b>
<b>IA</b>	<b>Integrated Assessment</b>		