

## SCHEDULING NOTE

**Title:** **BRIEFING ON THE STATUS OF LESSONS LEARNED FROM THE FUKUSHIMA DAI-ICHI ACCIDENT (Public Meeting)**

**Purpose:** To provide the Commission with a status of actions taken by the NRC and industry in response to lessons-learned from the Fukushima Dai-ichi accident.

**Scheduled:** **February 16, 2017**  
**9:00 a.m.**

**Duration:** Approx. 3 hours

**Location:** Commissioners' Conference Room, 1<sup>st</sup> fl OWFN

**Participants:** **Presentation**

**External Panel** **40 mins.\***

**Joseph E. Pollock**, Vice President of Operations and Chief Nuclear Officer, Nuclear Energy Institute 10 mins.\*

Topic:

- Industry progress on Fukushima lessons-learned

**Bill Pitesa**, Senior Vice President and Chief Nuclear Officer, Duke Energy Corporation 10 mins.\*

Topic:

- Site implementation of Fukushima lessons-learned

**Patrick Mulligan**, Chief, Bureau of Nuclear Engineering, Division of Energy Security and Sustainability, New Jersey Department of Environmental Protection 10 mins.\*

Topic:

- State perspective on Group 3 Recommendation 11.3 – Real-time radiation monitoring

**Dave Lochbaum**, Director, Nuclear Safety Project, Union of Concerned Scientists 10 mins.\*

Topic:

- Perspectives on NRC's and industry's implementation of the Fukushima lessons-learned

**Commission Q & A** **30 mins.**

**Break**

**5 mins.**

**NRC Staff Panel**

**50 mins.\***

**Michael Johnson**, Deputy Executive Director for Reactor and Preparedness Programs and Fukushima Steering Committee Chairman

**Bill Dean**, Director, Office of Nuclear Reactor Regulation

**Michael Franovich**, Director (Acting), Japan Lessons-Learned Division, Office of Nuclear Reactor Regulation

**Timothy Reed**, Division of Policy and Rulemaking, Office of Nuclear Reactor Regulation

**Eric Bowman**, Japan Lessons-Learned Division, Office of Nuclear Reactor Regulation

**Topics:**

- Status update on Tier 1 implementation
- Overview of staff's final assessment of Group 3 Recommendations
- Mitigation of Beyond Design Basis Events Rulemaking

**Commission Q & A**

**30 mins.**

**Discussion – Wrap-Up**

**5 mins.**

\*For presentation only and does not include time for Commission Q & A's



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

## Industry Progress

Joseph Pollock  
Vice President, Nuclear Operations  
and Chief Nuclear Officer  
Nuclear Energy Institute

## Key Messages

- Significant safety enhancements across the industry
- Tier 1 activities are substantially complete
- Completing majority of mitigation strategy assessments in 2017
- NRC rulemaking aligned with industry efforts
- Focus on FLEX shifting to inspections



## Substantial Progress on Fukushima Actions

- FLEX implementation – largely complete
- Spent Fuel Pool Level Instrumentation implementation – complete
- Staffing and communications – complete
- Hardened vent implementation – on schedule
- Seismic and flooding reevaluations – on schedule
- Support staff recommendations for disposition of Tier 2/3 actions

## Flooding Reevaluated Hazards

- 10 CFR 50.54(f) request – 85% complete in 2017
- Focused Evaluations and Integrated assessments  
– on schedule (2017-2018)
- Mitigation strategy assessments – 100% complete in 2017



## Seismic Reevaluated Hazards

- 10 CFR 50.54(f) request – 90% complete in 2017
- Seismic Probabilistic Risk Assessments – on schedule (2017-2019)
- Mitigation strategy assessments – 80% complete in 2017

## FLEX Inspections

- Current focus on inspections
- Industry task force to promote consistency in implementation
  - Routinely share lessons learned
  - No safety significant findings identified
  - Knowledge transfer – high priority
  - March 2017 workshop
- NRC consistency through Cross-Regional Panel



## Draft Final Rule for Mitigation Strategies

- Incorporates important actions undertaken by industry and NRC since 2011
- Codification of existing requirements enables timely and successful implementation
- Industry is in agreement with the proposed rule and supports issuance

## Summary

- Safety is our highest priority
- Significant safety enhancements achieved
- Substantial completion of Fukushima actions in 2016
- Committed to timely completion of actions to comply with the final rule
- Remarkable stakeholder involvement since 2011 has enabled success





## Implementation Status of Fukushima Lessons Learned at Duke Energy

Bill Pitesa □ Senior Vice President and Chief Nuclear Officer  
FEBRUARY 16, 2017





# Key Messages

- Duke Energy sites are prepared to mitigate a Fukushima-type event
- Substantial resources allocated to ensure timely and comprehensive implementation of Fukushima response actions
- Duke Energy is committed to completion of remaining Fukushima response actions and implementation of Mitigation Beyond Design Basis Events (MBDBE) rule



# Fukushima Response Status

FLEX and Spent Fuel Pool Level Instrumentation (SFPLI)  
Orders fully implemented

- Significant improvement in safety
- Maintenance and testing programs established for FLEX equipment and SFPLI
- Mitigating strategies integrated into operator training programs
- Investment of \$432 million and 3.3 million work-hours



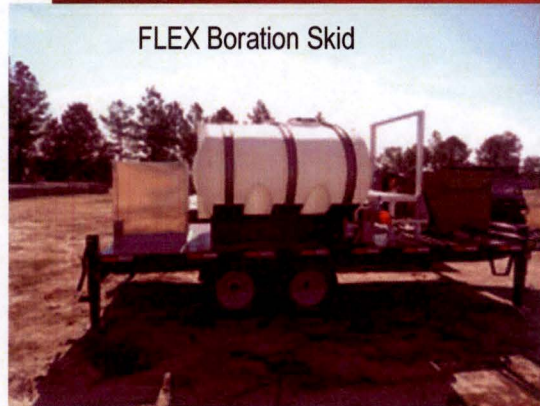
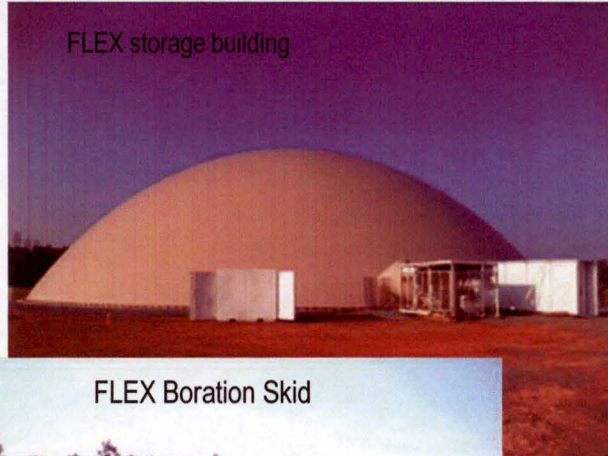
# Fukushima Response Status

Brunswick is on track to implement Hardened Vent Order

- Wetwell venting system installation to be completed in Unit 2 by March 2017 and in Unit 1 by March 2018
- Severe accident water management strategies for both units completed by March 2019
- Significant improvement in safety when completed
- Investment of \$25 million and 161 thousand work-hours



# Fukushima Response Status

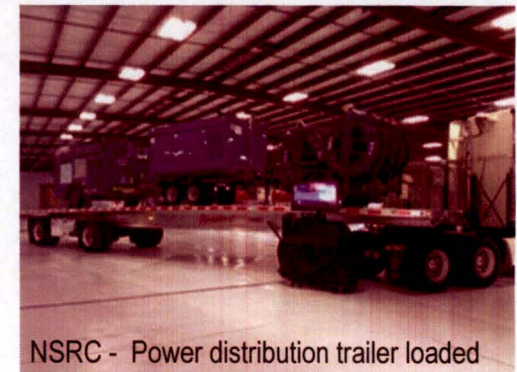


- ✓ Completed modifications to comply with FLEX and SFPLI Orders

- ✓ Purchased equipment to ensure site can withstand ELAP and LUHS events



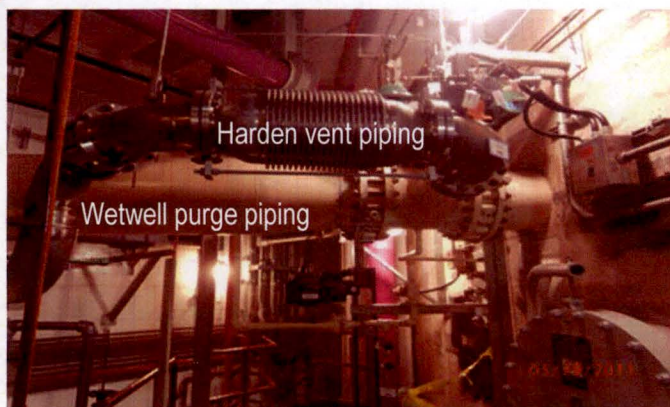
- ✓ Established two National SAFER Response Centers



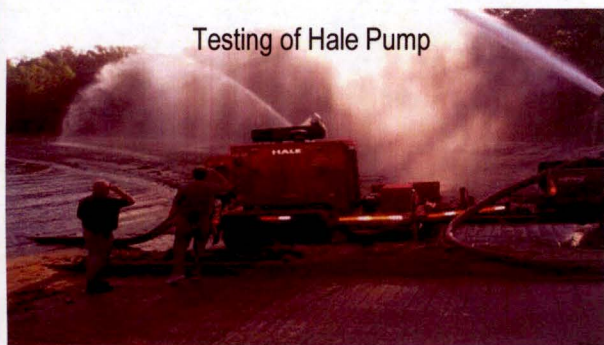


# Fukushima Response Status

- ✓ Validated strategies via analysis and on-site personnel exercises



- ✓ Created and updated procedures



- ✓ Trained Operations, Maintenance, Radiation Protection, Engineering and Emergency Response Organization personnel





# Fukushima Response Status

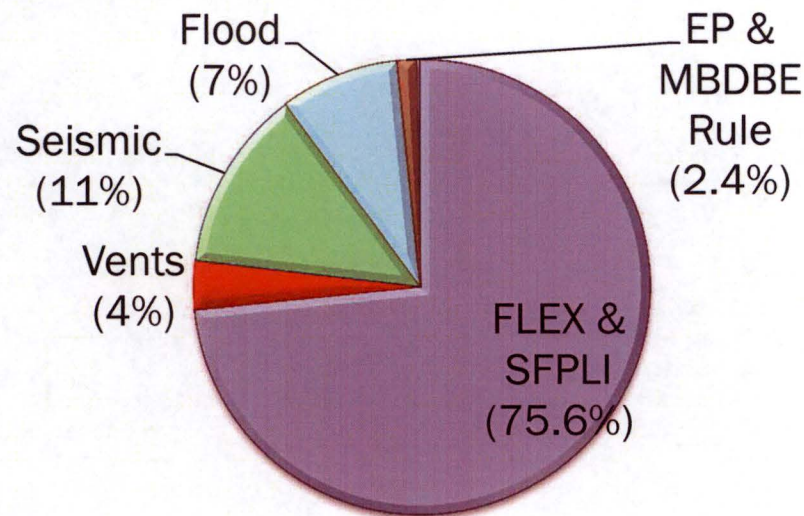
Key Information Requests and Evaluations	Status
Emergency Preparedness	Complete
Seismic and Flood Walkdowns	Complete
Seismic and Flood Reevaluation	Complete
Additional Seismic Evaluations, Including MSA	On Schedule – 2017
Seismic Probabilistic Risk Assessment, includes MSA for Oconee and Robinson	On Schedule – March 2019
Flood MSA	On Schedule – 2018
Flood Focused Evaluations/Integrated Assessment	On Schedule – 2018

- Investment of \$99 million and 750 thousand work-hours



# Summary

## INVESTMENT BREAKDOWN



Total Investment - \$570 million\*

\* excluding MSA mods

- Significant reduction in overall plant risk
- Industry exploring ways to leverage FLEX equipment
- For the final chapter, Duke Energy is committed to completing MBDBE Rule implementation



# Acronyms

CAT	Caterpillar
ELAP	Extended Loss of Alternating-Current Power
EP	Emergency Preparedness
FLEX	Diverse and flexible coping strategies
LUHS	Loss of Ultimate Heat Sink
MBDBE	Mitigation Beyond-Design-Basis Events
MSA	Mitigating Strategies Assessment
NSRC	National SAFER Response Center
SAFER	Strategic Alliance for FLEX Emergency Response
SFPLI	Spent Fuel Pool Level Instrumentation



# Group 3 Recommendation 11.3

## Real Time Radiation Monitoring

Patrick Mulligan, Chief

NJ Department of Environmental Protection  
Bureau of Nuclear Engineering



# New Jersey Assessment

- Current regulation and guidance provides a mechanism for prompt and effective development of Protective Action Recommendations
- Offsite monitoring capabilities are robust and effectively provide technical data to support dose projections and protective action decisions for the public
- Public release of data would not enhance ability to make protective actions but could have beneficial impacts if implemented properly



# New Jersey Assessment

- Fixed Monitoring Stations can provide an early warning and detection of releases from a NPP
  - The potential exists for release pathways that are unmonitored that can be effectively detected by fixed monitoring stations
  - The current EAL scheme includes several initiating conditions that are based on offsite radiological exposure (non-plant condition based) where fixed stations may prove useful



# NJ Fixed Monitoring Capabilities

- Real time radiation monitoring
  - Fixed radiation monitoring stations: Continuous Radiological Environmental Surveillance Telemetry (CREST)
    - 16 stations around Oyster Creek offsite
    - 10 Stations around Salem/Hope Creek
    - 6 stations onsite (ISFSI)
- Transmitted to DEP network database minute by minute via cellular communications with copper transmission as a backup



# CREST Data Resiliency

- Real time radiation data stored within the Garden State Network on a dedicated server
  - Redundant network servers at multiple locations
  - Automatic failover on power outages or system failures
  - Accessible from the DEPs intranet and through the public internet with required credentials
  - Battery back up located at each site to supplement AC power loss



# Field Radiation Data Collection

- Four Vehicles equipped with real time radiation detection equipment for:
  - Ambient Gamma Radiation Detection
  - Air Iodine Concentrations
  - Air Particulate Concentrations
- Data transmitted real time via cellular technology to network servers within the Garden State Network
- Plans and procedures to dispatch additional teams to collect data with handheld instruments



# Data Sharing

- NJ has been actively involved with the CRCPDs E-43 Committee on Interagency Environmental Data Sharing and Communication
- Assisted with the development of data sharing policy recommendations that were incorporated into the Nuclear-Radiological Incident Annex
- Currently involved with cooperatively developing policies for sharing radiation data with the public



# Data Sharing

- Real time fixed monitoring data is shared within the DEP via in house web application developed using ESRI enterprise products
- Project in progress to share ESRI web applications with other state agencies
- Shared with State and Federal partners in real time through the RadResponder Network using the EPAs Exchange Network Protocols.



# Data Sharing

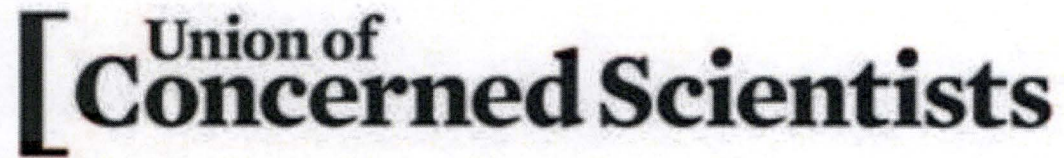
- NJ is committed to making all radiation data accessible within the state government
- NJ is committed to using the RadResponder Network as the principal means of sharing radiation data in real time with state and federal partners
- NJ is evaluating policy recommendations for making radiation data publicly available



# Public Data Concerns

- Context
  - Radiation data must include information for public to use to properly interpret data without creating panic
- Validation/Verification
  - Data must be vetted by radiation control personnel prior to release for public consumption
- Policy Permissions
  - State must have pre-designated process for reviewing, validating and approving data for public release to facilitate process





# **Perspectives on the Implementation of Fukushima Lessons Learned**

**David Lochbaum**

**Director, Nuclear Safety Project**

**[www.ucsusa.org](http://www.ucsusa.org)**

**February 16, 2017**

**(Fukushima plus 5 11/12 years)**



# **Implementation? Or Illusion?**

**NRC's post-Fukushima orders, fleshed out by industry's guides and NRC's regulatory guidance documents, map out a course to better protect against beyond design basis events.**

**Are We There Yet?**





# **Flood Protection**



**NRC's post-Fukushima flood protection mandate\* built upon longstanding regulatory requirements and operating experience.**

**\* Source: 50.54(f) Request for Information (ML12053A340)**



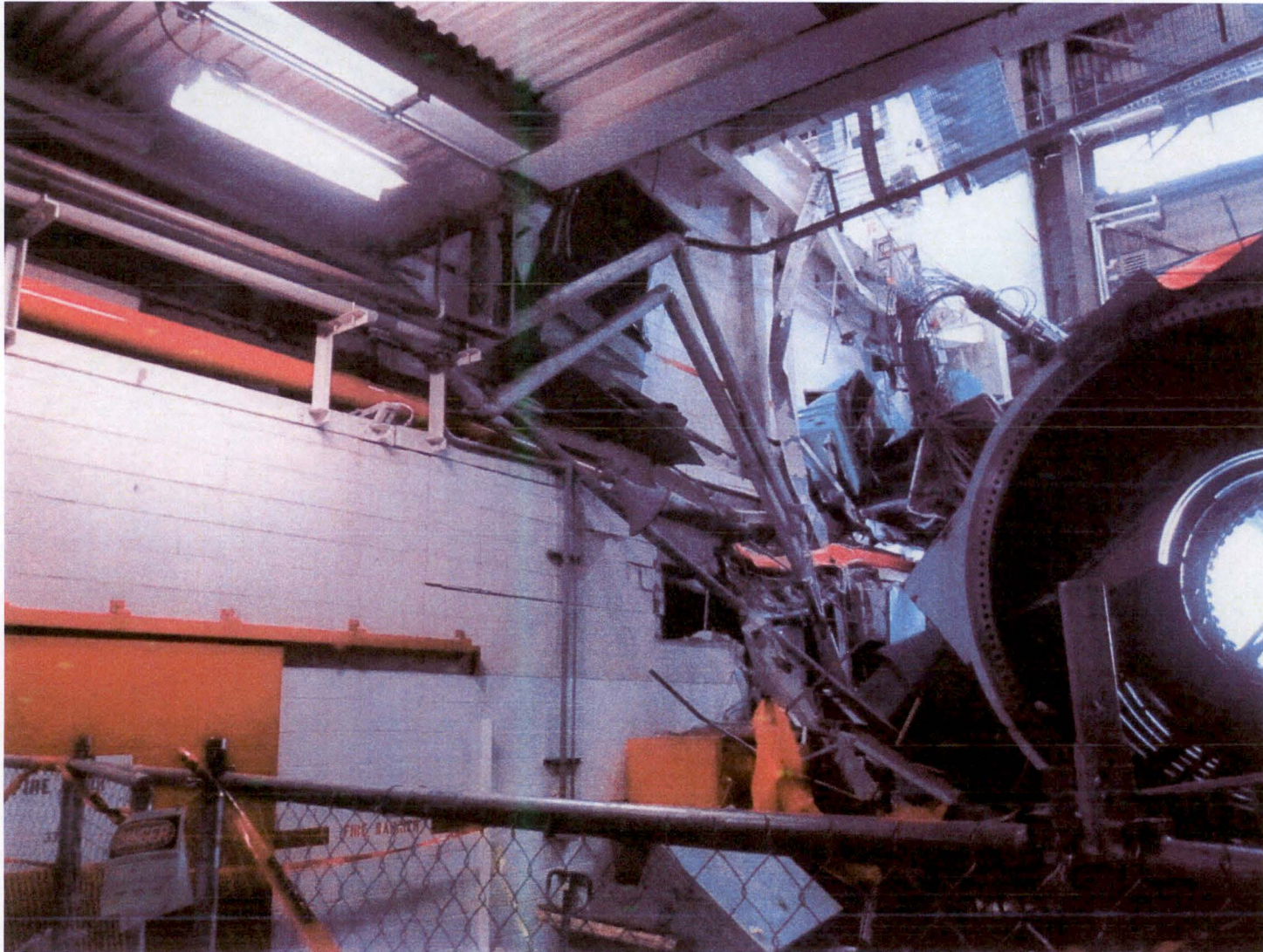
# **NRC Got Fort Calhoun There**



**Source: ML120400493**



# **ANO Was Not There**



**Source: ML14219A433**



# **ANO Was Not There**

**“...there were more than 100 unknown ingress pathways for a flooding event...”**

**“The unexpected rate of flooding would likely be beyond the licensee’s capability to prevent or mitigate as equipment and connections associated with alternative mitigating strategies could be submerged.”**

**“...the licensee did not design, construct, and/or maintain over 100 barriers to ensure design margins were sustained.”**

**Source: NRC letter dated 09/09/2014 (ML14253A122)**



# St. Lucie Was Not There



**Source: ML16236A019**



# **St. Lucie Was Not There**

- **“Approximately 50,000 gallons of water entered the -0.5 foot elevation of the RAB through two degraded conduits in the ECCS pipe tunnel which were severely corroded and lacked internal flood barriers.”**
- **“After the [January 9, 2014] event, the licensee identified four additional conduits in the ECCS pipe tunnel without internal flood barriers...”.**

**Source: NRC letter dated 09/24/2014 (ML1426A337)**



# **St. Lucie Was Not There**

- **“The licensee evaluated the missing flood barriers and concluded that a design basis external flood event would have allowed water to enter the Unit 1 RAB and potentially impact both trains of high head and low head ECCS pumps.”**
- **“The licensee also concluded that modifications implemented in 1978 and 1982 had installed the six conduits below the design basis flood elevation without internal flood barriers.”**

**Source: NRC letter dated 09/24/2014 (ML1426A337)**



# Where Are the Others?



## Observations from Walkdown Reports

- Approximately 90% of licensees entered an issue into its Corrective Actions Program
- Common issues identified include:
  - Inadequate procedures
  - Flood protection features that may not perform as planned
  - Degraded or missing seals

**Source: NRC Slides 11/12/2013 (ML13311A268)**





# Mitigating Strategies



**NRC's post-Fukushima mitigating strategies mandate\* built upon fewer and more recent regulatory requirements and operating experience.**

**Consequently, there's even less confidence that any reactor is really there.**

**\* Source: Order (ML12054A735)**



# **Are We There Yet?**

**Success entails mapping a proper course and reaching its destination.**

**NRC has mapped out proper courses for flood protection and mitigating strategies.**

**There's insufficient evidence to conclude that all reactors have reached the proper destination.**



# **Are We There Yet?**

**To ensure/verify the answer is Yes, UCS recommends that the NRC conduct 8 vertical slice inspections:**

- One vertical slice inspection in each region of flood protection measures**
- One vertical slice inspection in each region (not the same sites as above) of mitigating strategies measures**



# **List of Acronyms**

**ANO – Arkansas Nuclear One**

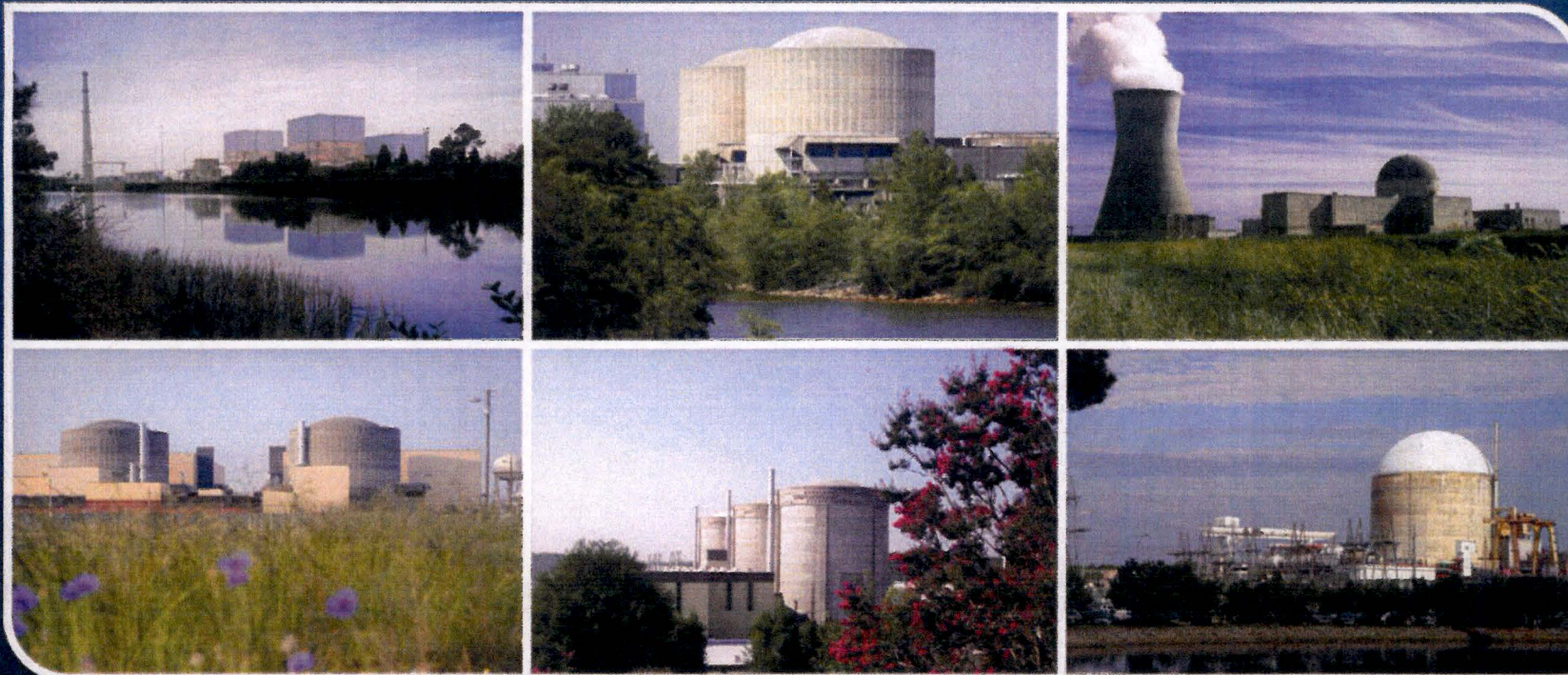
**ECCS – emergency core cooling systems**

**NRC – Nuclear Regulatory Commission**

**RAB – reactor auxiliary building**

**UCS – Union of Concerned Scientists**





## Implementation Status of Fukushima Lessons Learned at Duke Energy

Bill Pitesa □ Senior Vice President and Chief Nuclear Officer  
FEBRUARY 16, 2017





# Key Messages

- Duke Energy sites are prepared to mitigate a Fukushima-type event
- Substantial resources allocated to ensure timely and comprehensive implementation of Fukushima response actions
- Duke Energy is committed to completion of remaining Fukushima response actions and implementation of Mitigation Beyond Design Basis Events (MBDBE) rule



# Fukushima Response Status

FLEX and Spent Fuel Pool Level Instrumentation (SFPLI)  
Orders fully implemented

- Significant improvement in safety
- Maintenance and testing programs established for FLEX equipment and SFPLI
- Mitigating strategies integrated into operator training programs
- Investment of \$432 million and 3.3 million work-hours



# Fukushima Response Status

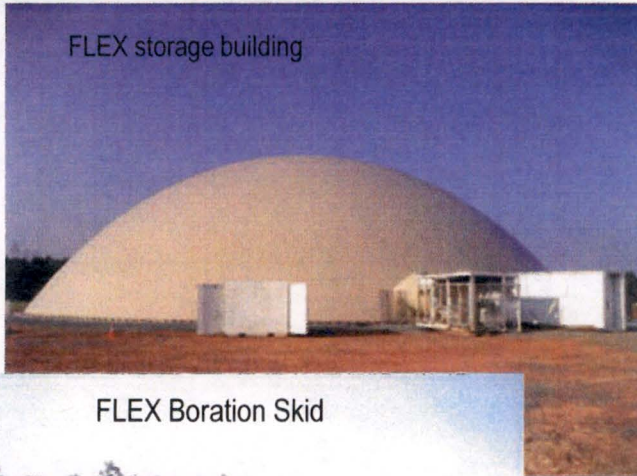
Brunswick is on track to implement Hardened Vent Order

- Wetwell venting system installation to be completed in Unit 2 by March 2017 and in Unit 1 by March 2018
- Severe accident water management strategies for both units completed by March 2019
- Significant improvement in safety when completed
- Investment of \$25 million and 161 thousand work-hours



# Fukushima Response Status

FLEX storage building

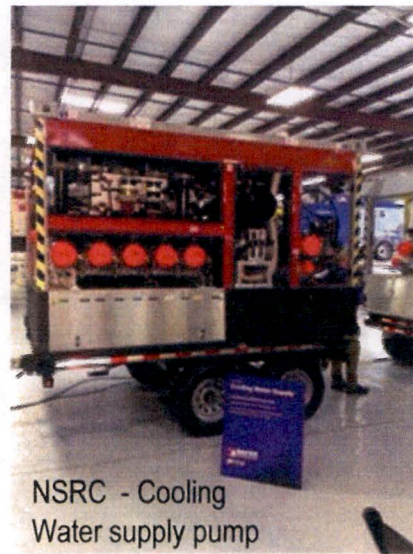


FLEX Boration Skid



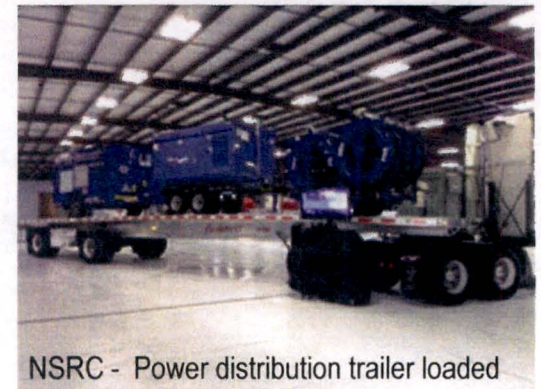
- ✓ Completed modifications to comply with FLEX and SFPLI Orders

- ✓ Purchased equipment to ensure site can withstand ELAP and LUHS events



NSRC - Cooling  
Water supply pump

CAT 924 - Debris removal



NSRC - Power distribution trailer loaded

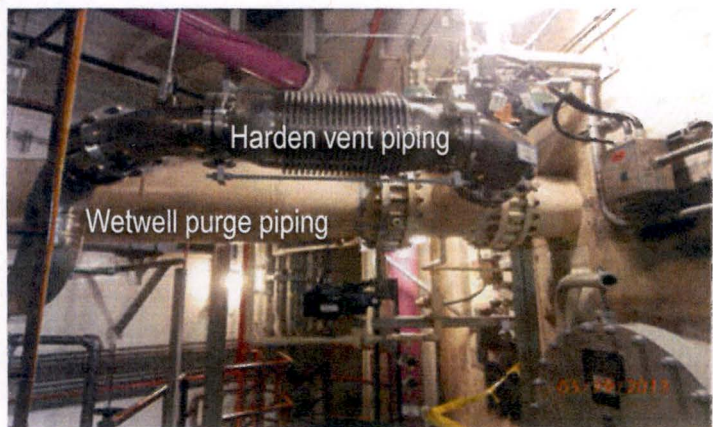
- ✓ Established two National SAFER Response Centers



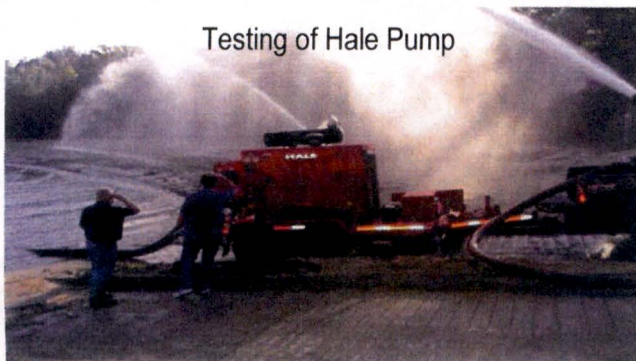


# Fukushima Response Status

- ✓ Validated strategies via analysis and on-site personnel exercises



- ✓ Created and updated procedures



- ✓ Trained Operations, Maintenance, Radiation Protection, Engineering and Emergency Response Organization personnel



# Fukushima Response Status

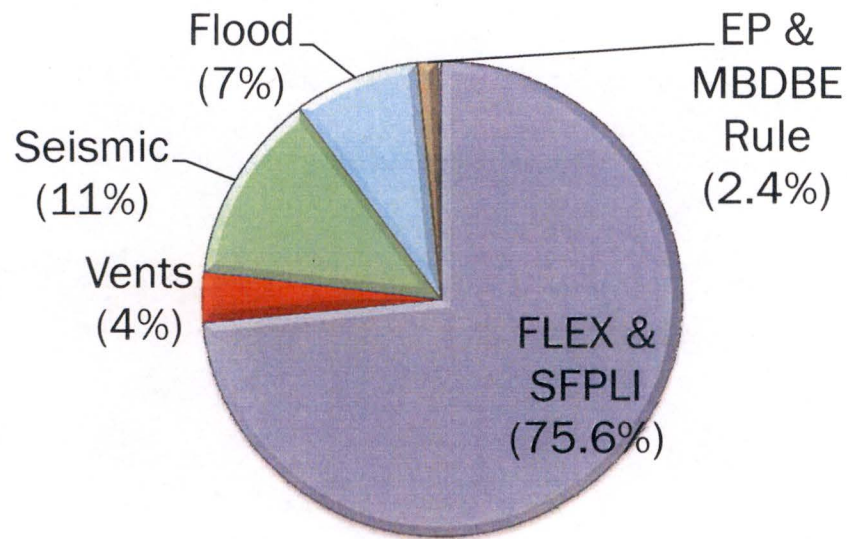
Key Information Requests and Evaluations	Status
Emergency Preparedness	Complete
Seismic and Flood Walkdowns	Complete
Seismic and Flood Reevaluation	Complete
Additional Seismic Evaluations, Including MSA	On Schedule – 2017
Seismic Probabilistic Risk Assessment, includes MSA for Oconee and Robinson	On Schedule – March 2019
Flood MSA	On Schedule – 2018
Flood Focused Evaluations/Integrated Assessment	On Schedule – 2018

- Investment of \$99 million and 750 thousand work-hours



# Summary

## INVESTMENT BREAKDOWN



Total Investment - \$570 million\*

\* excluding MSA mods

- Significant reduction in overall plant risk
- Industry exploring ways to leverage FLEX equipment
- For the final chapter, Duke Energy is committed to completing MBDBE Rule implementation



# Acronyms

CAT	Caterpillar
ELAP	Extended Loss of Alternating-Current Power
EP	Emergency Preparedness
FLEX	Diverse and flexible coping strategies
LUHS	Loss of Ultimate Heat Sink
MBDBE	Mitigation Beyond-Design-Basis Events
MSA	Mitigating Strategies Assessment
NSRC	National SAFER Response Center
SAFER	Strategic Alliance for FLEX Emergency Response
SFPLI	Spent Fuel Pool Level Instrumentation



# Group 3 Recommendation 11.3

## Real Time Radiation Monitoring

Patrick Mulligan, Chief  
NJ Department of Environmental Protection  
Bureau of Nuclear Engineering



# New Jersey Assessment

- Current regulation and guidance provides a mechanism for prompt and effective development of Protective Action Recommendations
- Offsite monitoring capabilities are robust and effectively provide technical data to support dose projections and protective action decisions for the public
- Public release of data would not enhance ability to make protective actions but could have beneficial impacts if implemented properly



# New Jersey Assessment

- Fixed Monitoring Stations can provide an early warning and detection of releases from a NPP
  - The potential exists for release pathways that are unmonitored that can be effectively detected by fixed monitoring stations
  - The current EAL scheme includes several initiating conditions that are based on offsite radiological exposure (non-plant condition based) where fixed stations may prove useful



# NJ Fixed Monitoring Capabilities

- Real time radiation monitoring
  - Fixed radiation monitoring stations: Continuous Radiological Environmental Surveillance Telemetry (CREST)
    - 16 stations around Oyster Creek offsite
    - 10 Stations around Salem/Hope Creek
    - 6 stations onsite (ISFSI)
- Transmitted to DEP network database minute by minute via cellular communications with copper transmission as a backup



# CREST Data Resiliency

- Real time radiation data stored within the Garden State Network on a dedicated server
  - Redundant network servers at multiple locations
  - Automatic failover on power outages or system failures
  - Accessible from the DEPs intranet and through the public internet with required credentials
  - Battery back up located at each site to supplement AC power loss



# Field Radiation Data Collection

- Four Vehicles equipped with real time radiation detection equipment for:
  - Ambient Gamma Radiation Detection
  - Air Iodine Concentrations
  - Air Particulate Concentrations
- Data transmitted real time via cellular technology to network servers within the Garden State Network
- Plans and procedures to dispatch additional teams to collect data with handheld instruments



# Data Sharing

- NJ has been actively involved with the CRCPDs E-43 Committee on Interagency Environmental Data Sharing and Communication
- Assisted with the development of data sharing policy recommendations that were incorporated into the Nuclear-Radiological Incident Annex
- Currently involved with cooperatively developing policies for sharing radiation data with the public



# Data Sharing

- Real time fixed monitoring data is shared within the DEP via in house web application developed using ESRI enterprise products
- Project in progress to share ESRI web applications with other state agencies
- Shared with State and Federal partners in real time through the RadResponder Network using the EPAs Exchange Network Protocols.



# Data Sharing

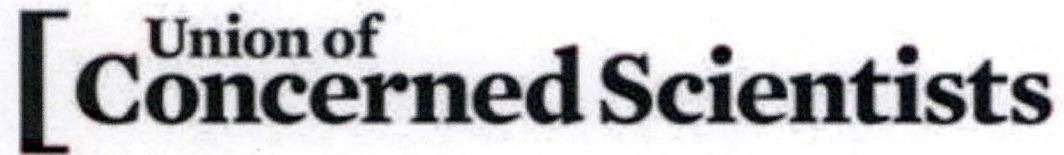
- NJ is committed to making all radiation data accessible within the state government
- NJ is committed to using the RadResponder Network as the principal means of sharing radiation data in real time with state and federal partners
- NJ is evaluating policy recommendations for making radiation data publicly available



# Public Data Concerns

- Context
  - Radiation data must include information for public to use to properly interpret data without creating panic
- Validation/Verification
  - Data must be vetted by radiation control personnel prior to release for public consumption
- Policy Permissions
  - State must have pre-designated process for reviewing, validating and approving data for public release to facilitate process





# **Perspectives on the Implementation of Fukushima Lessons Learned**

**David Lochbaum**

**Director, Nuclear Safety Project**

**[www.ucsusa.org](http://www.ucsusa.org)**

**February 16, 2017**

**(Fukushima plus 5 11/12 years)**



# **Implementation? Or Illusion?**

**NRC's post-Fukushima orders, fleshed out by industry's guides and NRC's regulatory guidance documents, map out a course to better protect against beyond design basis events.**

**Are We There Yet?**





# **Flood Protection**



**NRC's post-Fukushima flood protection mandate\* built upon longstanding regulatory requirements and operating experience.**

**\* Source: 50.54(f) Request for Information (ML12053A340)**



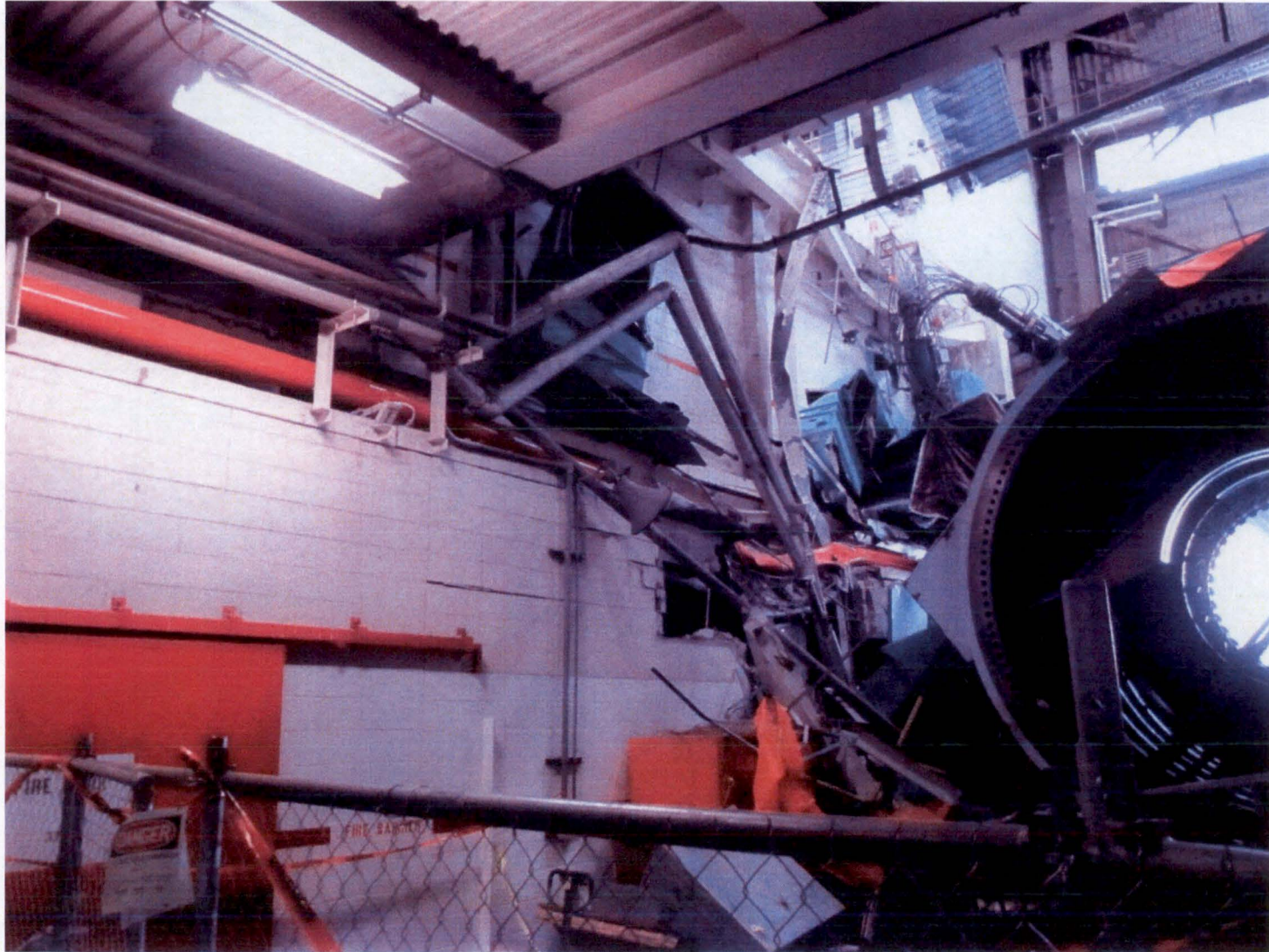
# **NRC Got Fort Calhoun There**



**Source: ML120400493**



# **ANO Was Not There**



**Source: ML14219A433**



# **ANO Was Not There**

**“...there were more than 100 unknown ingress pathways for a flooding event...”**

**“The unexpected rate of flooding would likely be beyond the licensee’s capability to prevent or mitigate as equipment and connections associated with alternative mitigating strategies could be submerged.”**

**“...the licensee did not design, construct, and/or maintain over 100 barriers to ensure design margins were sustained.”**

**Source: NRC letter dated 09/09/2014 (ML14253A122)**



# St. Lucie Was Not There



**Source: ML16236A019**



# **St. Lucie Was Not There**

- **“Approximately 50,000 gallons of water entered the -0.5 foot elevation of the RAB through two degraded conduits in the ECCS pipe tunnel which were severely corroded and lacked internal flood barriers.”**
- **“After the [January 9, 2014] event, the licensee identified four additional conduits in the ECCS pipe tunnel without internal flood barriers...”.**

**Source: NRC letter dated 09/24/2014 (ML1426A337)**



# **St. Lucie Was Not There**

- **“The licensee evaluated the missing flood barriers and concluded that a design basis external flood event would have allowed water to enter the Unit 1 RAB and potentially impact both trains of high head and low head ECCS pumps.”**
- **“The licensee also concluded that modifications implemented in 1978 and 1982 had installed the six conduits below the design basis flood elevation without internal flood barriers.”**

**Source: NRC letter dated 09/24/2014 (ML1426A337)**



# Where Are the Others?



## Observations from Walkdown Reports

- Approximately 90% of licensees entered an issue into its Corrective Actions Program
- Common issues identified include:
  - Inadequate procedures
  - Flood protection features that may not perform as planned
  - Degraded or missing seals

**Source: NRC Slides 11/12/2013 (ML13311A268)**





# Mitigating Strategies



**NRC's post-Fukushima  
mitigating strategies mandate\*  
built upon fewer and more  
recent regulatory requirements  
and operating experience.**

**Consequently, there's even less  
confidence that any reactor is  
really there.**

**\* Source: Order (ML12054A735)**



# **Are We There Yet?**

**Success entails mapping a proper course and reaching its destination.**

**NRC has mapped out proper courses for flood protection and mitigating strategies.**

**There's insufficient evidence to conclude that all reactors have reached the proper destination.**



# **Are We There Yet?**

**To ensure/verify the answer is Yes, UCS recommends that the NRC conduct 8 vertical slice inspections:**

- One vertical slice inspection in each region of flood protection measures**
- One vertical slice inspection in each region (not the same sites as above) of mitigating strategies measures**



# **List of Acronyms**

**ANO – Arkansas Nuclear One**

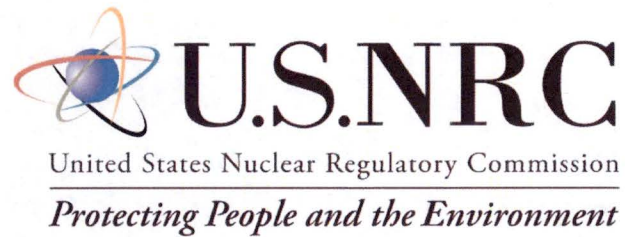
**ECCS – emergency core cooling systems**

**NRC – Nuclear Regulatory Commission**

**RAB – reactor auxiliary building**

**UCS – Union of Concerned Scientists**





# STATUS OF LESSONS LEARNED FROM THE FUKUSHIMA DAI-ICHI ACCIDENT

Commission Meeting  
February 16, 2017





# Safety has been significantly improved

	Recommendation	Status
✓	Ensuring Protection from External Events	2.1 – Reevaluation of seismic & flooding hazards
		2.2 – Periodic reconfirmation of hazards
		2.3 – Seismic & flooding hazard walkdowns
		Other – Reevaluate other external hazards
✓	Enhancing Mitigation of Beyond-Design-Basis Events	4.1 – Mitigation of beyond design basis events rulemaking*
		4.2 – Mitigation of beyond design basis events order
		5.1 – Severe accident capable hardened vents order
		5.2 – Vents for other containment designs
		6 – Hydrogen control and mitigation
		7.1 – Reliable spent fuel pool instrumentation
		7.2- 7.5 – Spent fuel pool water makeup capability*
✓	Strengthening Emergency Preparedness for Multi-Unit Events	8.1-8.4 – Onsite emergency response capabilities*
		9.1-9.4 – Rulemaking to enhance emergency plans*
		10.1-10.2 – Analyze and evaluate other EP considerations*
		10.3 – Evaluate ERDS capabilities
		11.2&11.4 – Decision-making and public education
✓	Regulatory Philosophy	1 – Reassess regulatory framework
		12.1 – Include defense in depth requirements within ROP
		12.2 – Enhance staff training on severe accidents & SAMGs
✓	Radiological Consequences	11.3 – Real time radiation monitoring within EPZ
		Other – Containment vent filters/filtering strategies
		Other – Expand EPZ size beyond 10 miles
		Other – Pre-stage KI to residents beyond 10 miles
		Other – Expedited transfer of spent fuel to dry storage

\*Integrated into MBD BE rulemaking

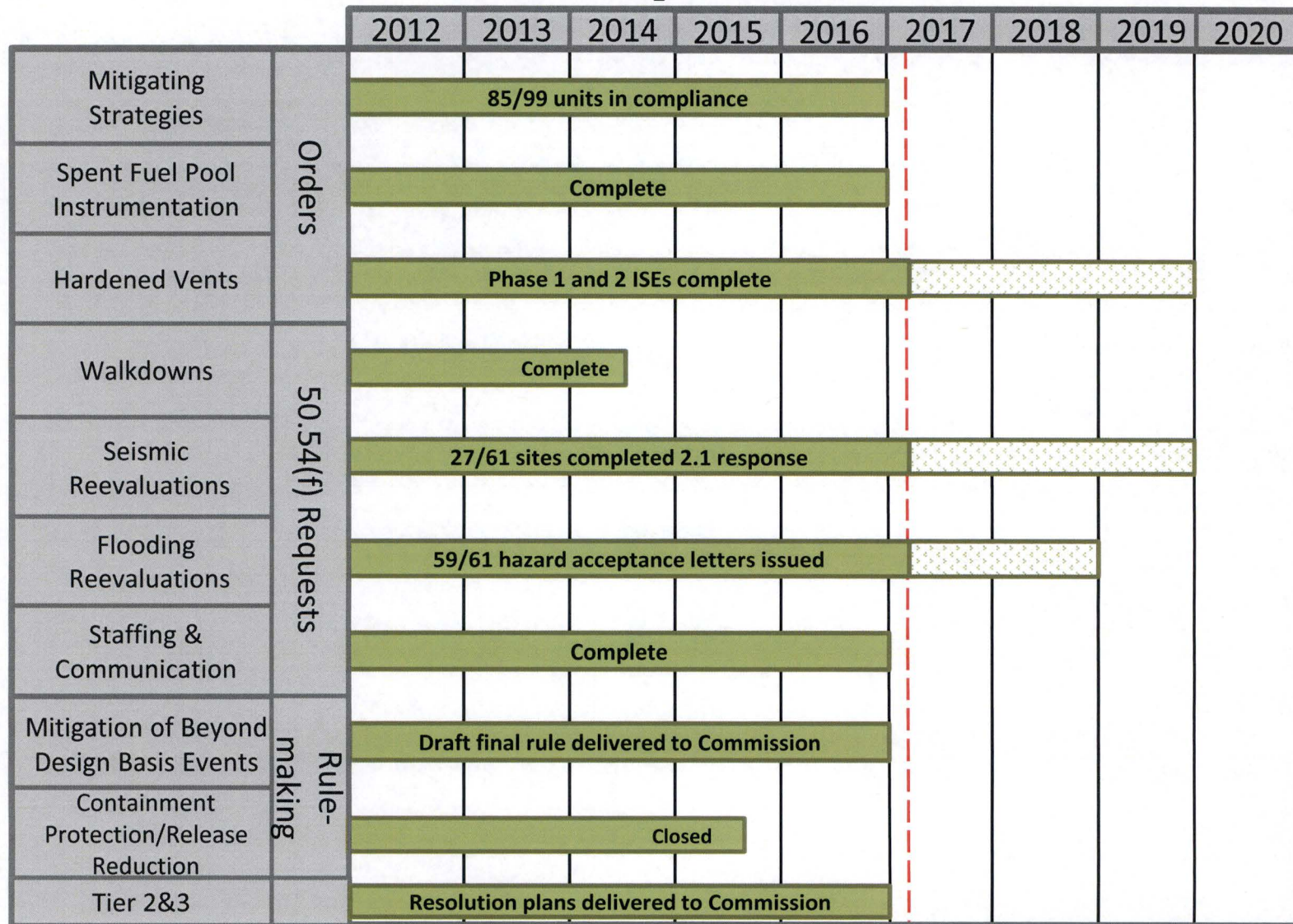


# Agenda

- William Dean, Director, Office of Nuclear Reactor Regulation
  - Tier 1 implementation
- Michael Franovich, Director (A), Japan Lessons-Learned Division
  - Remaining Tier 1 work and Tier 2&3 final assessments
- Timothy Reed & Eric Bowman
  - Mitigation of Beyond-Design-Basis Events (MBDBE) Rulemaking



# Tier 1 activities substantially complete



Today



\*For illustrative purposes only



# Mitigating strategies implementation is nearing completion

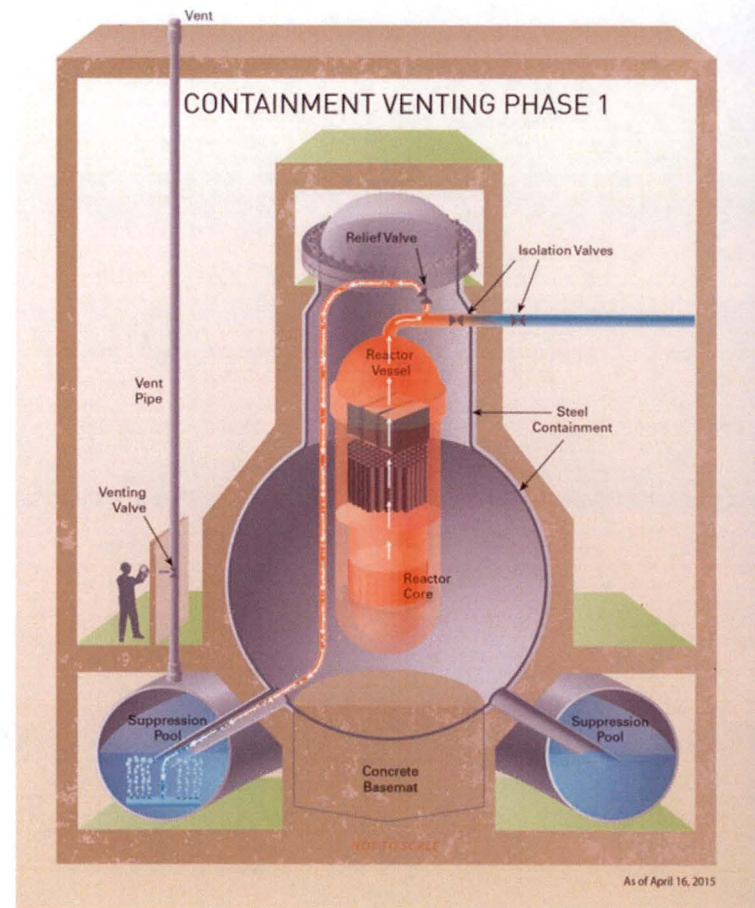
- Regions conducting inspections confirming order compliance
- No substantive findings to date
- Transition to long-term oversight plan






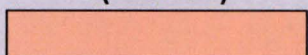



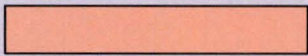
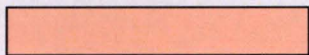

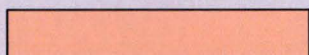

# Staff working to expedite vent order closure

- Interim staff evaluations complete
- Implementing enhanced closure process
- Developing inspection procedure





# Significant progress in hazard reevaluations

Seismic		Flooding	
Hazard Reevaluation Reports Received	(100%) 	Hazard Reevaluation Reports Received	(100%) 
Acknowledgement Letters Issued	(100%) 	Hazard Acceptability Letters Issued	(97%) 
Expedited Approach Received	(100%) 	Interim Actions Received	(100%) 
Expedited Approach Response	(100%) 	Interim Actions Inspected	(100%) 
Staff Assessments Issued	(100%) 	Staff Assessments Issued	(60%) 

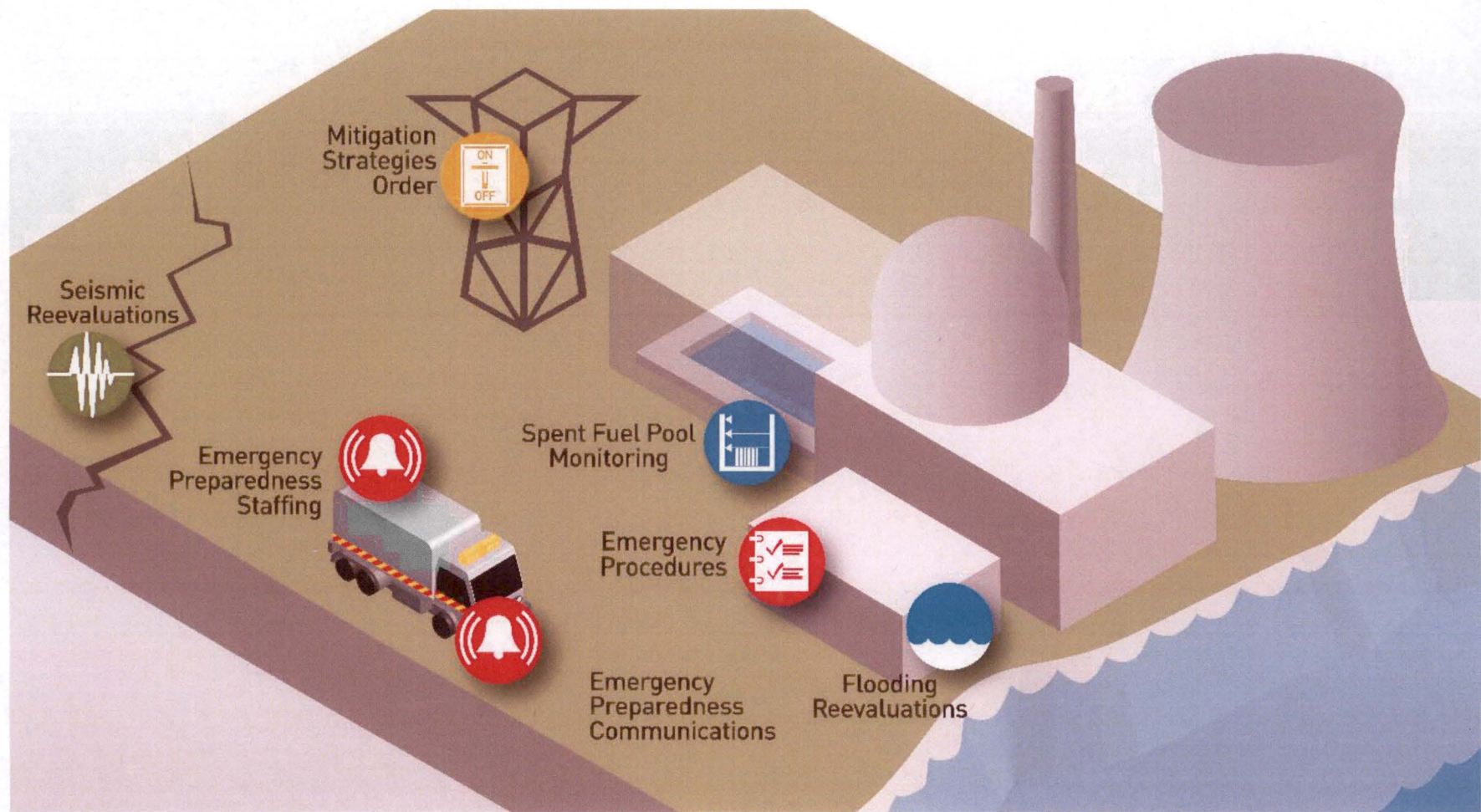


# Completed assessment of final Tier 2&3 recommendations

- Significant stakeholder interaction
- Natural hazards other than seismic and flooding
  - Recommend no further action
- Real-time radiation monitoring
  - Recommend no further action
- Ongoing confirmation of natural hazards
  - Enhancements to existing processes



# MBDBE rule integrates the post-Fukushima efforts





# **Performance-based regulation enables innovative approaches**

- Performance-based approach and broad view
- Phase-in/Phase-out
  - Specifically considers decommissioning
- Flexible scheduling option
- Rescission of orders and removal of license conditions



# **Rule establishes an integrated response capability**

- Assists operators in executing strategies
- Includes:
  - Mitigation strategies
  - Reevaluated seismic and flooding hazards
  - Extensive damage mitigation guidelines (post-9/11 strategies)
- Integration with emergency operating procedures



# Ensures equipment supports implementation of strategies

- Capacity and capability
- Reasonable protection
- Communications capability
- Maintenance





# Comprehensive approach to organizational readiness/capability

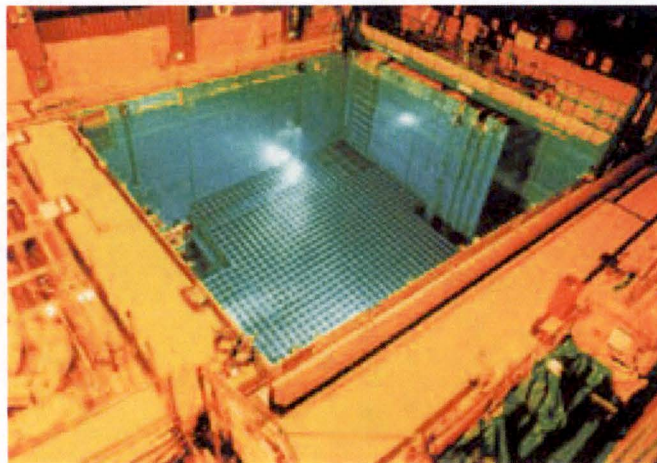
- Sufficient staffing
- Systems approach to training
- Periodic drills or exercises





# Remote monitoring of wide-range spent fuel pool level

- Prioritization of actions between reactor and pool
- May support SFP portions of integrated response capability





# Regulatory guidance incorporates lessons learned

- Evolutionary from guidance used for Orders and RFI



## **DRAFT REGULATORY GUIDE DG-1301**

*(Proposed New Regulatory Guide 1.226)*

## **DRAFT REGULATORY GUIDE DG-1317**

*(Proposed New Regulatory Guide 1.227)*

## **DRAFT REGULATORY GUIDE DG-1319**

*(Proposed New Regulatory Guide 1.228)*



# Leveraging FLEX in safety and security decision making

- Significant investment in equipment and implementation
- Substantial risk benefits
- Developing guidance





# **Effective transition to ensure lasting benefit**

- Considerable achievements to date
- Important work remains
- Sunset Japan Lessons-Learned Steering Committee
- Transition of work to line organization



# Acronyms

- EP – Emergency preparedness
- EPZ – Emergency planning zone
- ERDS – Emergency response data system
- FLEX – Diverse and flexible coping strategies
- ISE – Interim staff evaluation
- KI – Potassium iodide
- MBDBE – Mitigation of beyond-design-basis events rulemaking
- RFI – Request for information
- ROP – Reactor oversight process
- SAMGs – Severe accident management guidelines
- SFP – Spent fuel pool