NRC Fukushima Steering Committee Meeting Nuclear Utility Report

September 27, 2012

Major Accomplishments

- ✓ B.5.b equipment readiness affirmed by inspection and test
- ✓ Inspections completed for flooding and seismic vulnerabilities
- ✓ Station blackout procedures and equipment readiness validated
- ✓ Periodic maintenance and drills verified to exist or established

Major Accomplishments

- ✓ Fuel pool monitoring enhanced
- ✓ Design features and procedural guidance for station response to loss of AC power validated
- ✓ FLEX equipment specified, purchased, arriving at sites
- ✓ Industry response protocol issued
- ✓ Regional response center vendor has been selected

Major Work in Progress

- Flooding guidance established / training conducted / walk-downs being completed
- Seismic guidance established / training conducted / walk-downs being completed
- Flooding hazards - scope and methodology progressing
- Seismic hazards - working on alternate methodologies
- EP rule actions progressing on schedule
- Site Specific FLEX strategies under development
- Integration of EOPs, SAMGs, EDMGs and FLEX in development
- Fuel pool level instrumentation in design
- Hardened Vents on BWR Mark I & II

Issues Needing Concurrence

- Approach to further reducing the risk to land contamination (slides 6-12)

- Approach to gaining the safety benefits from seismic hazards updates (slide 13)

Reducing the Risk of Land Contamination

- Approach should be **Performance Based** to address the wide variation in technologies and plant specific designs.
- Approach should be based on **Scientific and Factual** analysis**.**
- Approach should be comprehensive by ensuring **Containment and Filtering** for extreme core damage events.

Containment Filtering Strategies for BWR Mark I and II Plants

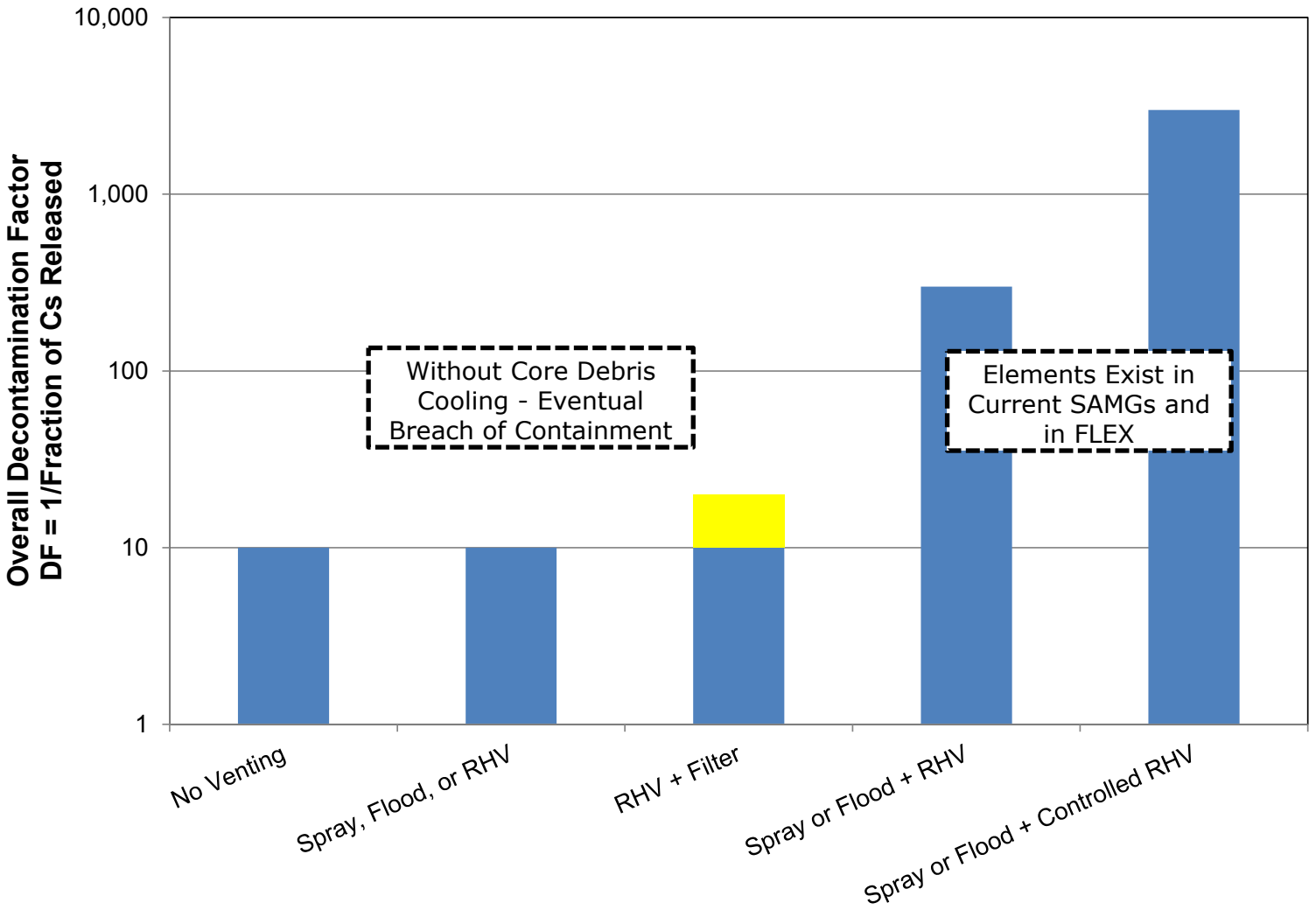
- Filtering strategies have been developed through an initiative to provide the best and safest methods to mitigate land contaminating releases from BWR Mark I and Mark II containments during severe events with a damaged core.
- The findings have been released this week by the Electric Power Research Institute in a technical report that covers the work that the industry engineers and scientists have completed over the past year.
- The findings demonstrate that substantial decontamination factors for releases can be achieved by a comprehensive strategy engaging operator actions, installed equipment, and FLEX.

Important Conclusions

- All filtering strategies (with or without external filters) rely on operator action to cool the core debris to be effective
- Maintain containment integrity
  - Active debris cooling
  - Containment vent cycling
- Water injection into containment filters potential releases
  - Water spray and flood filter airborne aerosols
  - Cycling of vent maximizes aerosol capture and manages hydrogen
- Decontamination factor greater than 1000
  - Common international requirement

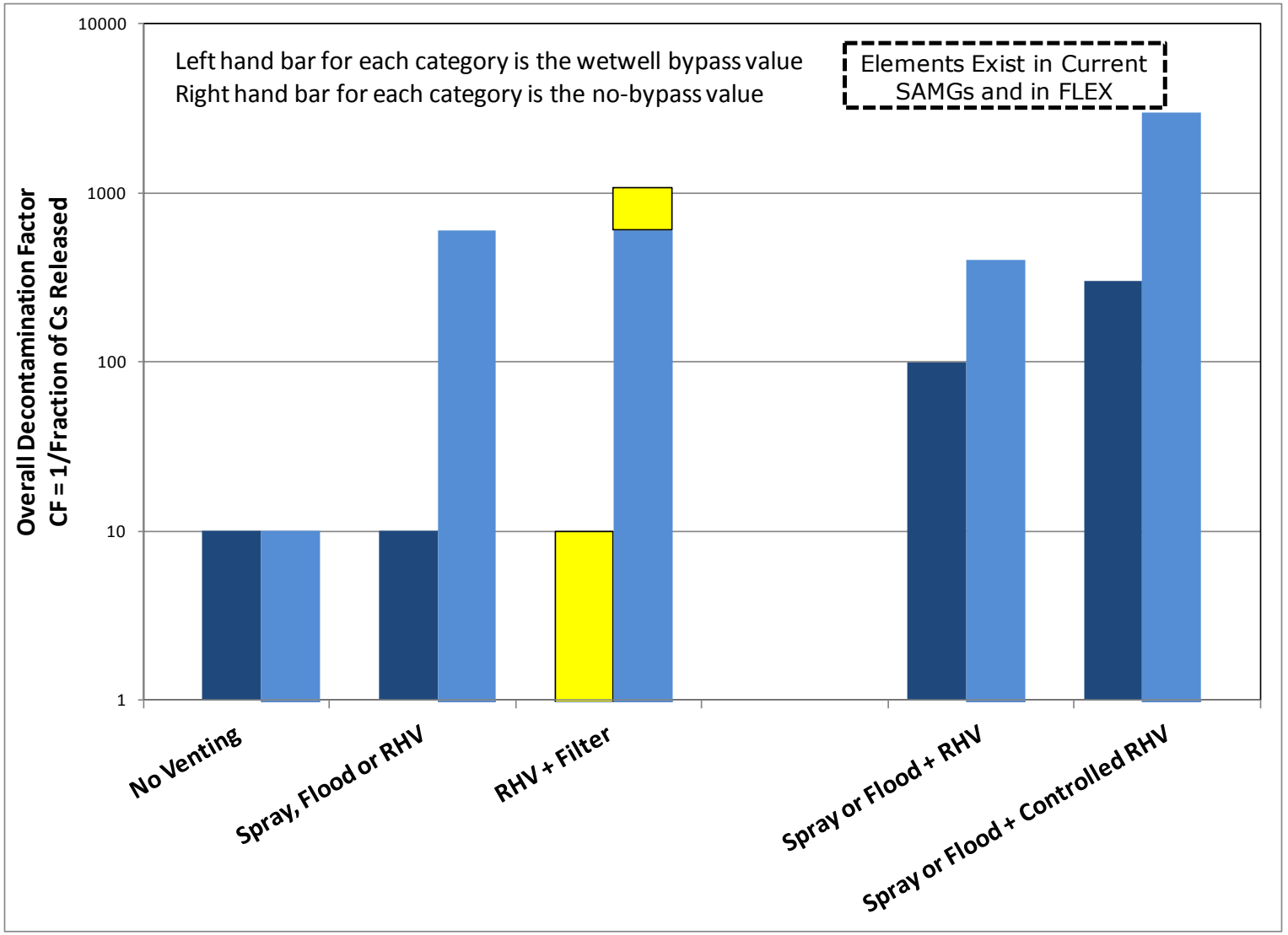
BWR Mark I Results

(EPRI Report)

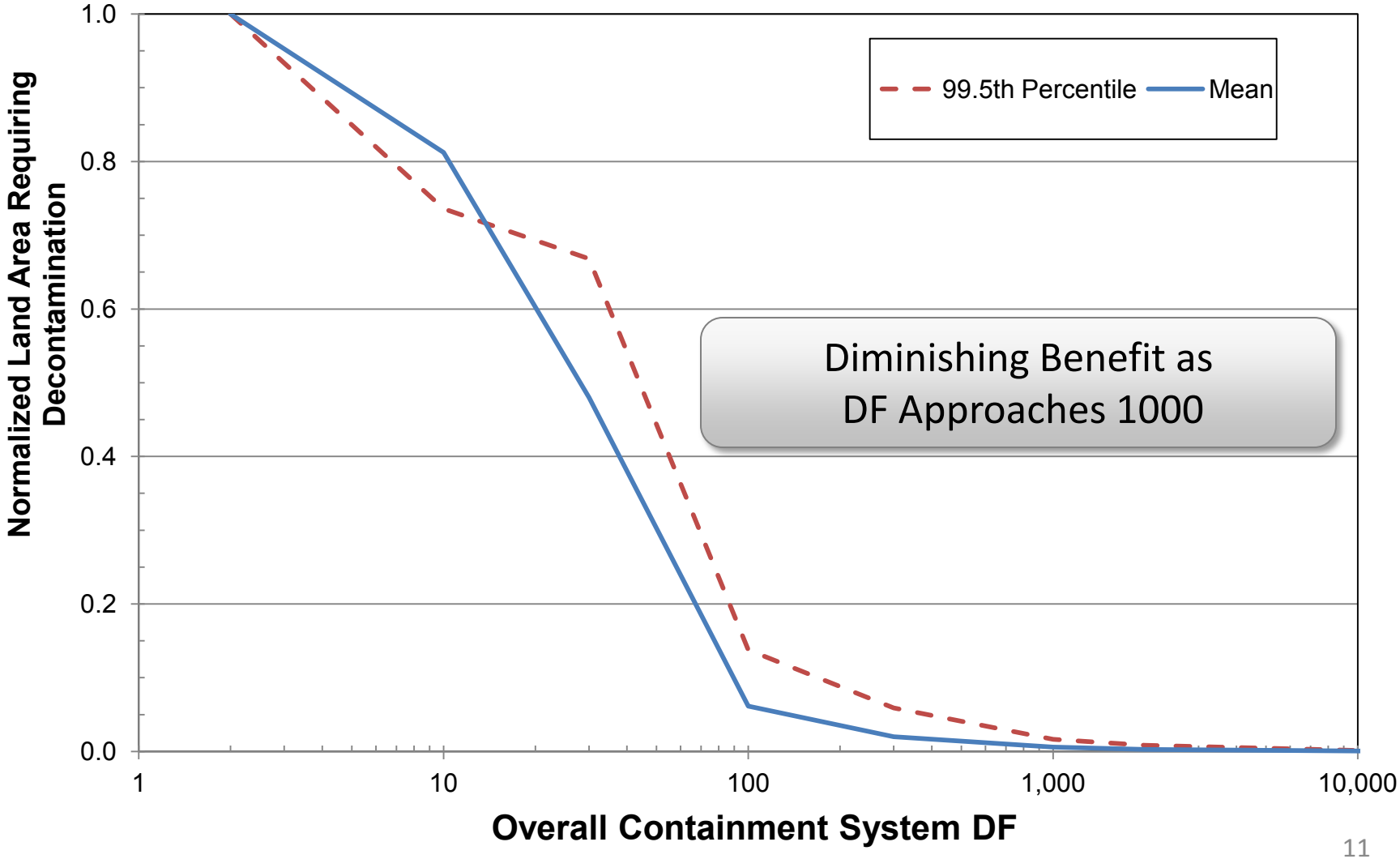


BWR Mark II Results

(EPRI Report)



Performance Basis Decontamination Factor (DF)



Impact on Plants

- Individual plant evaluations determine strategy
  - Performance basis required
- Plant modifications may be needed
  - Ensure severe event spray and/or flood
  - Wetwell and drywell vents required
  - FLEX capability enhanced
  - SAMGs enhanced
  - Mark II pedestal drains require protection
  - Possible additional filters needed on plant specific basis (limited value)
- Encourage innovation

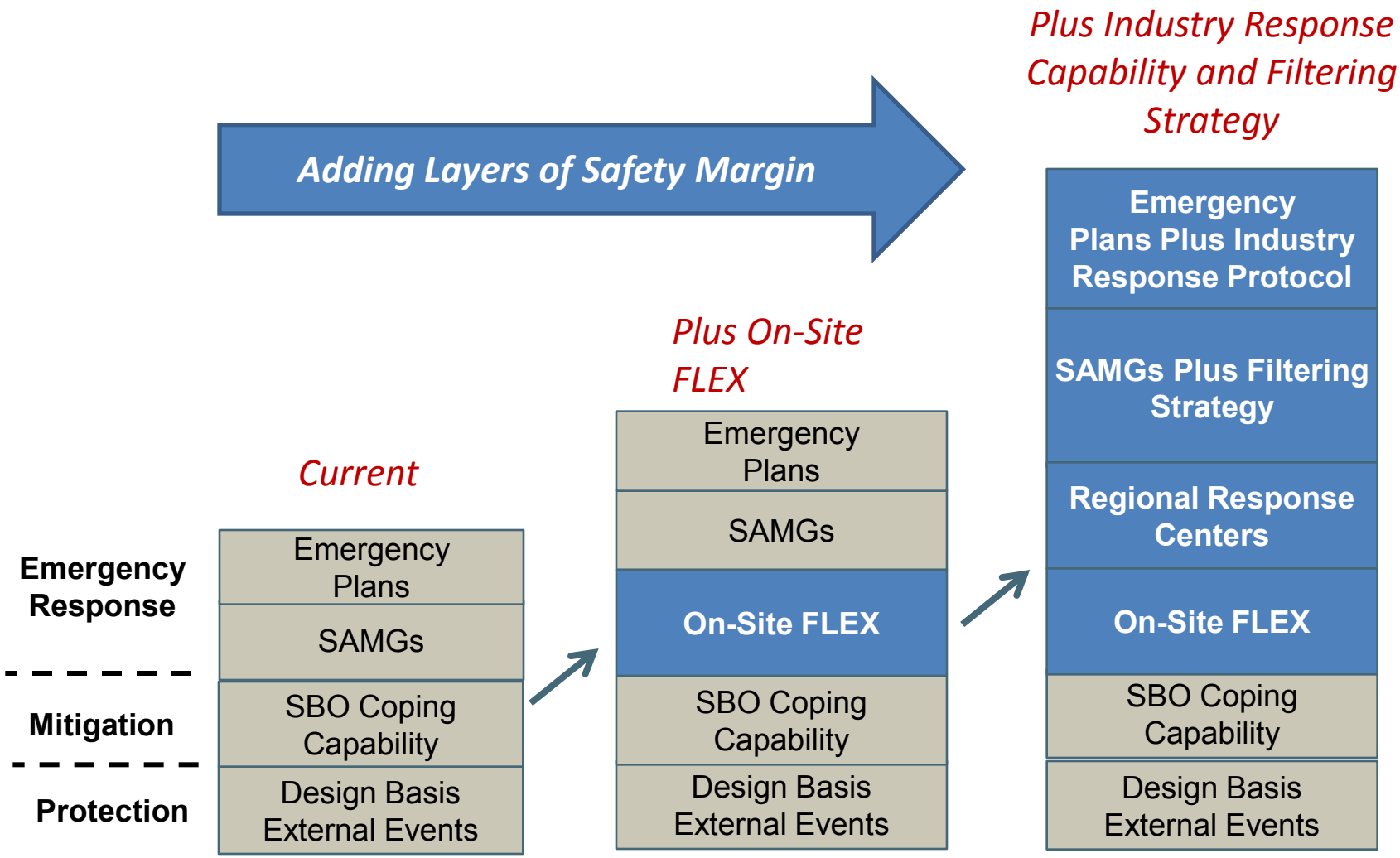
Gaining the Safety Benefit from the Seismic Hazard Update

- Current 50.54f only directs analysis but does not disposition the results
- Operating Experience supports that design models for seismic have provided safety margin in actual events
- Industry is working on a potential augmented approach that will validate or add margin as necessary to those systems needed to provide core cooling on a priority basis
- The objective in developing an augmented approach is to ensure safety margin is in place on the most significant systems to core cooling at the earliest opportunity
- The augmented approach will also more effectively utilize the limited knowledgeable resources in both the PRA and Seismic technical areas

Delivering Improved Safety

- Industry remains committed to expeditiously implement the actions defined under Tier 1
- Industry supports the continued efforts to appropriately disposition Tier 2 and Tier 3 based on the potential for further safety enhancements not adequately addressed in Tier 1
- Scope Control – Each change in direction should pass two criteria
  - Is the change technically warranted?
  - Does the safety impact of the change surpass the impact of rework and delay of task completion?

US Industry Post Fukushima Actions



Back-up Material

Flex implementation considerations

- Connection point reasonable survivability and accessibility
- Standard fitting and ease of connection
- Design Ratings – fittings, hoses, pumps, motors, generators, breaker coordination / protection, loads
- Water sources – survivability, chemistry, flow rates
- Decay heat removal analysis and time lines
- Heat transfer analysis and particulate build-up rates
- Transportation pathways and methods
- Room ventilation, heat-up rates, cooling sources
- Procedure development
- Training development
- Workforce task analysis and skill set matching
- Storage strategy / design / construction
- Maintenance and surveillance development
- Drill and exercise integration – design / conduct / simulate
- Workload analysis and staffing – EP, FP, Ops, Maint., Engineering, Training, Procedure Writers

Flooding Walk-down Observations

No major issues have been identified however there were examples of deficiencies in each of the following areas:

- Flooding design features that have not all been included in maintenance programs
- Seals / gaskets that were found missing or degraded
- Sealant or grout found degraded
- Dams may not be within oversight of nuclear departments
- Flood response procedures that lacked execution detail
- Corrosion found in some components
- Drain blockage found in some areas
- Configuration control was not adequately captured or maintained