

Industry Fukushima Response

**NRC-Industry Fukushima Steering
Committees Meeting
January 13, 2012**



NUCLEAR
ENERGY
INSTITUTE

Industry Objectives

- Prime focus – continued safe operation of the existing fleet
- Understand the root cause and lessons learned from Fukushima
- Prioritize actions and strategies that provide the **greatest safety benefit first**
- Focus on prevention of fuel damage (core & spent fuel pool) and containment integrity

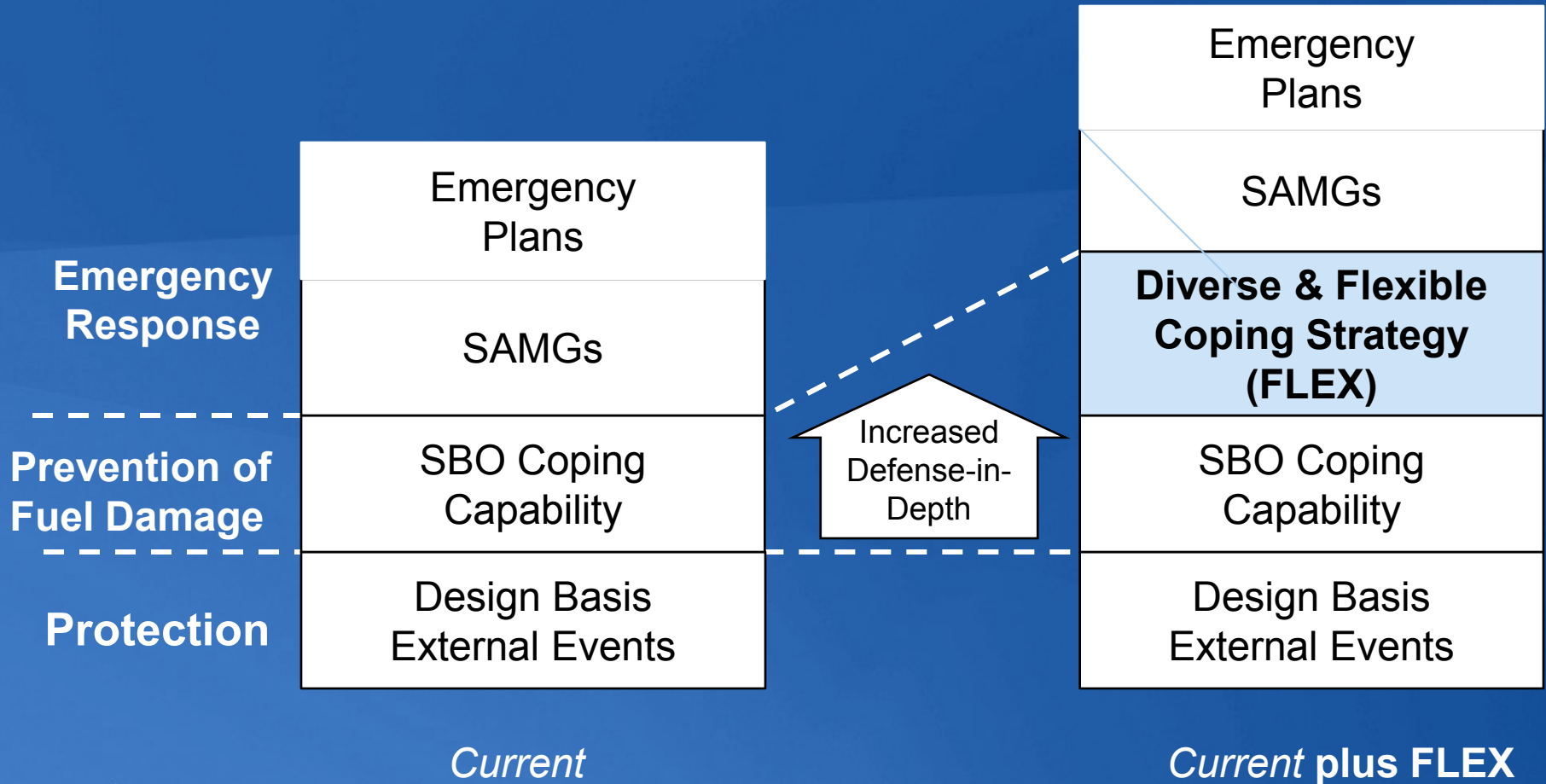
U.S. Industry Actions to Date

- **Verified equipment, procedures and staffing are capable of mitigating extreme events**
- **Enhanced capability to protect spent fuel storage pools against extreme external events**
- **Assessed effectiveness of reactor operator training**
- **Improving ability to cope with an extended loss of AC power**
- **Assessing additional instrumentation for monitoring spent fuel pool**
- **Improving coordination of industry response**

Diverse and Flexible Coping Capability (FLEX)

- **Additional layer of safety for beyond design bases external events to prevent fuel damage**
- **Focuses on maintaining key safety functions**
 - **Core cooling, containment integrity, SFP cooling**
- **Multiple supplies of power and cooling water**
- **Portable equipment reasonably protected**
- **Symptom-based guidance and instructions**
- **Programmatic controls**
- **Offsite support centers**

Diverse & Flexible Coping Capability (FLEX)



FLEX Relationship to Tier 1 Recommendations

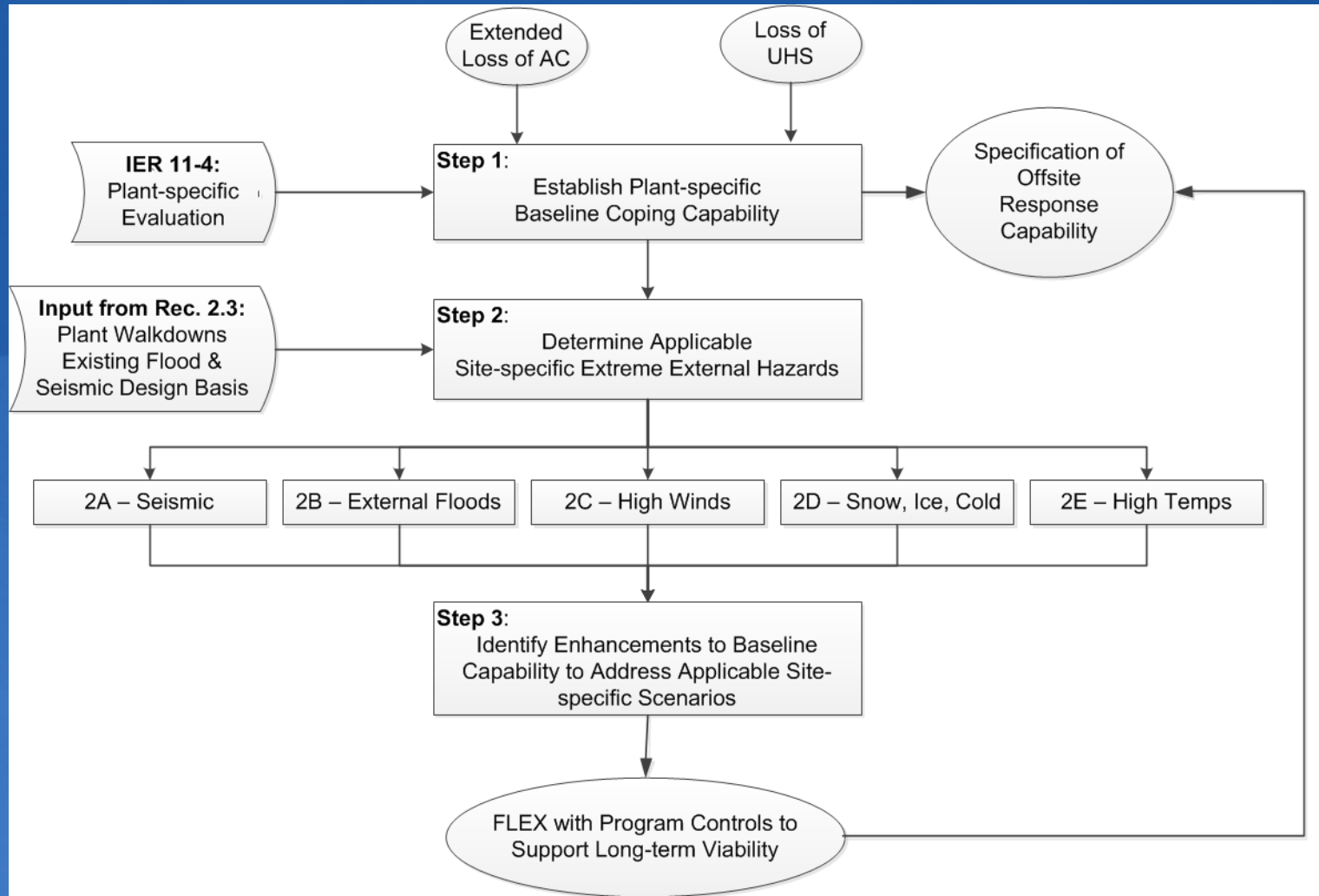
- **Effective implementation of FLEX requires close coordination with other activities**
 - **2.1/2.3 – Seismic and Flooding Design Bases**
 - **4.1/4.2 – Station Blackout/B.5.b**
 - **5.1 – BWR hardened vents for containment**
 - **7.1 – SFP monitoring**
 - **8 – EOP/SAMG activities**
 - **9.3 – ERO staffing and communications**

FLEX

Three Phase Approach

- **Phase 1**
 - **Cope with installed plant equipment**
- **Phase 2**
 - **Supplement installed plant equipment with onsite FLEX equipment**
- **Phase 3**
 - **Obtain additional capability and redundancy from offsite**

Potential Implementation Guide Outline



Example FLEX Equipment

Onsite Response

- Diesel driven pumps (High capacity and high pressure)
- Suction, discharge hose, strainers, pipe fittings
- 480v DG or 600v DG
- 120/240v DG
- Cables
- Air compressors & nitrogen bottles
- DC power supplies
- Fuel supplies & transfer equipment
- Communications equipment

Offsite Response

- Closed loop cooling system:
- 4 kv and 6.9 kv DG & equipment
- RP Equipment
- Commodities including food & water
- Provision for Diesel Fuel resupply
- Makeup water treatment supplies
- Portable lighting
- Containment berms
- Dewatering pumps
- Water filtration/demineralization

Additional Industry Perspectives

- **Order and rulemaking for enhanced capability should provide inspectability and enforceability**
- **FLEX equipment**
 - **Store in diverse locations, use local codes and standards, apply programmatic controls**
- **Multi-unit and ERO staffing considerations should not preclude use of all onsite personnel**

Challenges

- **Ensure industry and NRC remain focused on safe operations**
- **Shortage of technically qualified resources to perform analyses, reviews and walkdowns simultaneously**
 - E.g., Seismic and Flooding
- **Recognition of integrated approach need – numerous task interdependencies**
- **Potential plant modifications generally require two refueling outages to implement**

Summary

- **Industry has already taken significant actions that enhance safety**
- **Benefits of FLEX**
 - Earlier tangible safety benefit
 - Increases defense-in-depth & safety margins
- **Greatest concern is viability of Recommendation 2.1**
- **Assessment of subsequent potential actions should consider safety enhancements provided by FLEX**
- **FLEX guideline under development**
 - Start guideline regulatory interactions soon after issuance of orders