International Atomic Energy Agency

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Post-Fukushima ~USNRC Activities

IAEA Expert Mission
Risk Management, Risk Monitor Development
and Risk-Informed Applications

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Lessons Learned: The Near-Term Task Force

- Within weeks of the accident, USNRC created a task force to review the events and provided recommendations to enhance safety at U.S. plants
- Near-Term Task Force report issued July 2011

Summary of Regulatory Actions

- Orders (issued March 2012)
  - Mitigation strategies for extreme external events
  - Containment venting system for Mark I and II containments
    - Superseded by new order in June 2013 to require that the vents be capable of operating under severe accident conditions
  - Spent fuel pool water level instrumentation
- Request for Information (issued March 2012)
  - Seismic and flooding walkdowns (completed Nov. 2012)
  - Seismic and flooding hazard reevaluations
  - Emergency Preparedness staffing and communications
- Rulemakings (ongoing)
  - Station Blackout Mitigation Strategies (SBOMS)
  - Onsite Emergency Response Capabilities
  - Filtering and Confinement Strategies

Mitigation Strategies
For Extreme External Events

Requires a three-phase approach for maintaining or restoring core cooling, containment, and spent fuel cooling

Phase	Licensee may use
Initial	Installed equipment
Transition	Portable, onsite equipment
Final	Resources obtained from offsite

Mitigation Strategies

- U.S. industry procuring equipment for each site (N + 1)

- Establishing Regional Support Centers with equipment capable of transport to any site within 24 hours
  - Phoenix, Arizona
  - Memphis, Tennessee

- Consolidation of other lessons learned with Mitigating Strategies
  - SBO rulemaking
  - Spent Fuel Pool makeup capability (Tier 2)

Reliable Hardened Vents

- March 2012 – issued order requiring a reliable hardened containment vent system for BWR Mark I and II containments

- June 2013 – new order issued requiring that the vents be capable of operating under severe accident conditions
  - Phase 1: wetwell vents
  - Phase 2: drywell vents or sufficient water management strategy

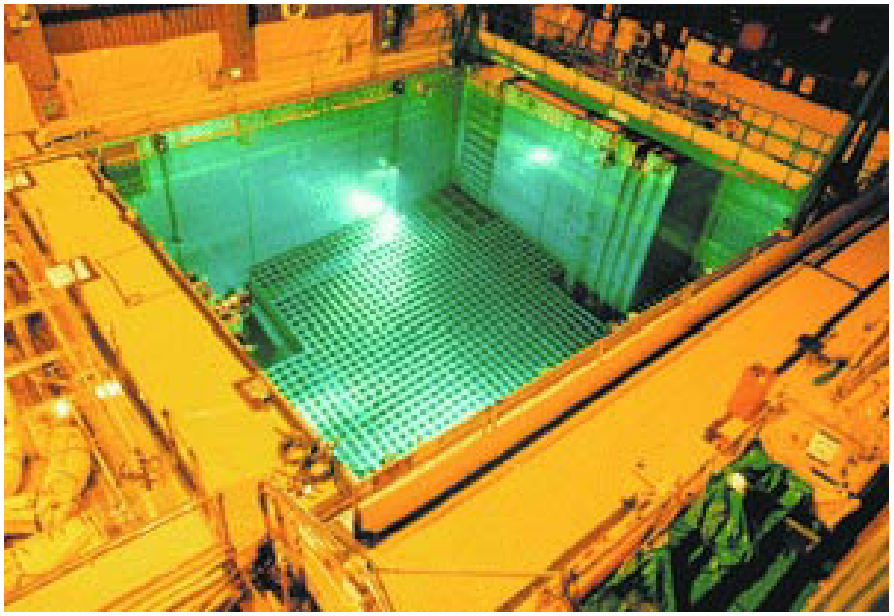
Reliable Hardened Vents

- Controls containment pressure by removing heat, if normal capability is lost
- May help prevent core damage
- Must be able to function under station blackout conditions as well as severe accident conditions

Spent Fuel Pool Instrumentation

Requires installation of water level instrumentation to indicate:

1) Normal fuel pool level
2) Below-normal level that still provides radiation shielding
3) Very low level, near top of fuel racks, where immediate action to add make-up water should be taken



Tier 1 Orders Status

- ✓ March 2012 – Issued Orders
- ✓ August 2012 – Issued Implementation Guidance
- ✓ October 2012 – Received Status Reports
- ✓ February 2013 – Received Integrated Plans
- ✓ November 2013 – Issue Safety Evaluations
- ❑ December 2016 – Full Implementation Complete*

- Note – Containment vents will be approximately 1-2 years behind this schedule due to modification of original order

- *Full licensee implementation is required within 2 refueling cycles or December 2016, whichever comes first

Requests for Information

- NRC asked licensees to:
  - Inspect or “walk down” currently installed seismic and flooding protection features, and correct degraded conditions
  - Use present-day information to reevaluate the potential effects (hazard) of an earthquake or flooding event
  - Enhance emergency plans to ensure sufficient staffing and communication capabilities if multiple reactors at a single site are affected by the same event

Seismic and Flooding Walkdowns

- Licensee plant walkdowns complete (November 2012)
- Issues are being addressed through licensee Corrective Action Programs and the NRC Reactor Oversight Process. Potential issues identified include:
  - For Flooding:
    - procedures that may not be feasible
    - temporary flood protection that may not perform as planned
    - degraded or missing protection features (e.g., seals)
  - For Seismic:
    - Minor anchorage issues
- NRC completed audits at some sites
- NRC has begun to issue staff assessments of the walkdown reports

Flood Hazard Reevaluations

- First set of plants submitted analyses in March 2013
- Second set of plants submitted analysis in March 2014
  - 11 extension requests
  - 14 hazard reevaluations received
  - 8 indicated interim actions
  - 9 indicated they will perform an integrated assessment
- NRC will review feasibility of interim actions
- Full NRC review of first set of reevaluations expected by Summer 2014

Seismic Hazard Reevaluations

- If new hazard exceeds old hazard, seismic risk evaluation will be conducted (3-5 additional years)
- Central & Eastern U.S. Plants
  - Submitted hazard reevaluations in March 2014
  - NRC determined which plants need to perform additional analysis and prioritized the plants
  - Many plants to perform an intermediary evaluation by the end of 2014
- Western U.S. Plants
  - Complete hazard reevaluation due March 2015

Emergency Preparedness Staffing and Communications

- Licensees assessing staffing needs and communications equipment in the event of a multiunit, prolonged SBO

- Schedule
  - Phase 1 Staffing - April 2013 (complete)
  - Phase 2* Staffing (4 months before full implementation of Orders)
  - Phase 1 Communications – October 2012 (complete)

*Completion of Phase 2 dependent upon Mitigation Strategies Order

Rulemaking Activities

- Station Blackout Mitigation Strategies (SBOMS)
  - Will make Mitigation Strategies Order a regulation (2016)
- Onsite Emergency Response Capabilities
  - Will integrate plant emergency procedures (2016)
- Filtering and Confinement Strategies
  - Will consider additional protections to limit potential release of radioactive material (2017)

Tier 2

- Spent Fuel Pool Makeup Capability*
- Emergency Preparedness*
- Reevaluation of “Other” External Hazards

- *Items addressed under Mitigation Strategies

Tier 3

- Require additional information or evaluation to support a regulatory decision
  - Example: Reactor and containment instrumentation that can withstand severe accident conditions
- Dependent on insights from implementation of Tier 1 actions
  - Example: Hydrogen control and mitigation

Near Term Actions

- Review in-house flood hazard reevaluations
- Review in-house seismic hazard reevaluations
- Review walkdown reports and issue staff assessments
- Continue rulemaking efforts
- Continue Tier 2 & 3 efforts
- Continue cooperative efforts with international community

Current Status

- Considerable progress has been made
  - Walkdowns complete
  - FLEX equipment arriving at sites
- Substantial safety enhancements by 2016
  - Mitigation Strategies fully in place
  - SFP level instrumentation installed
  - Flooding and Seismic interim actions
  - Enhanced EP Communications and Staffing in place
- Some enhancements will extend beyond 2016
  - Final flooding and seismic safety enhancements
  - Filtration strategies implementation
  - Rulemakings implementation

More Information

- Public website
  - From www.nrc.gov, find link under “Spotlight” section called “Japan Lessons Learned”

- Recent “6-Month Status Update” dated April 17, 2014 (SECY-14-0046)

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The End

Questions & Answers…..