The Fukushima Accident and Nuclear Safety in the United States

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Safety is our most important priority.
Nuclear Energy in Japan

- 54 operating nuclear reactors (49 gigawatts)
- Two nuclear plants under construction
- Tokyo Electric Power Co. produces 27% of Japan’s electricity
- 12,000 MW of nuclear energy capacity shut down
Fukushima Daiichi
Before the Accident

At the time of the earthquake
Reactors 1, 2 and 3 operating
Reactors 4, 5 and 6 shutdown for maintenance, inspection, refueling
Fukushima
Key events timeline

March 11

– 14:46 – Earthquake occurred 110 miles offshore – magnitude 9.0
– Units 1-3 operating, Units 4-6 shutdown for refueling
– Units 1-3 auto scram on earthquake
– 15:23 – Tsunami overwhelms station
  • Actual was 46 feet, design was 18 feet
  • Grade floor of units is 32.8 feet above sea level
– 15:41 – Lost all AC power, utilizing station batteries
Fukushima Daini just prior to tsunami
Fukushima Daini during the tsunami
Fukushima Daiichi Key Events Timeline
Fukushima Daiichi Inundation

Blue areas inundated by tsunami
Fukushima Event
Fukushima Daiichi
After the Accident

Unit 1
Unit 2
Unit 3
Unit 4
Boiling Water Reactor Design
U.S. Government Response

Multi-agency task force (Nuclear Regulatory Commission, Department of Energy, Department of Defense) supporting Japan recovery efforts

President Obama directed the NRC to perform a comprehensive review of U.S. reactors

NRC established agency task force to develop lessons learned from Fukushima Daiichi accident to provide short-term and long-term analysis of the events
Industry Actions
NRC Task Force Review

- External Events (seismic, flooding, fires, etc.)
- Station blackout
- Severe accident measures
- B.5.b. guidance to mitigate loss of large areas of plant
- Emergency Preparedness
Implications to Current U.S. Fleet

Short-term
• Review readiness to manage extreme events
• Re-verify capabilities
• NRC inspections/recommendations

Long-term
• Industry working group
• Careful analysis of Japanese event
• Incorporate lessons learned
• Continuous commitment to improvements
• Consider expansion of beyond design basis enhancements
U.S. Nuclear Power Plants

- Designed for maximum credible earthquake and floods
- Post 9-11 enhancements
- Loss of on-site and off-site power
- Industry preparation and training exceeds NRC requirements
- Long history of continuous learning
- Expect the unexpected and protect with redundant safety features
United States Design Improvements

1979 – Fire Protection
1980 – Control Room TMI
1980 – Strengthened Torus
1988 – Station Black Out
1992 – Containment Vent
2002 Spare Diesel powered pump
Advanced Safety Features of AP1000

AP1000 Passive Containment Cooling System

- Natural convection air discharge
- PCCS gravity drain water tank
- Water film evaporation
- Outside cooling air intake
- Steel Containment Vessel
- Internal condensation and natural recirculation
- Air Baffle
“Our nuclear power plants have undergone exhaustive study, and have been declared safe for any number of extreme contingencies.”
President Barack Obama
March 17, 2011

“All the plants in the United States are designed to deal with a wide range of natural disasters, whether it’s earthquakes, tornados, tsunamis, other seismic events. We require all of them to deal with those.”
NRC Chairman Gregory Jaczko
March 17, 2011

“The American people should have full confidence that the United States has rigorous safety regulations in place to ensure that our nuclear power is generated safely and responsibly.”
Secretary Chu
March 15, 2011
Questions?