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# Looking Forward:

## *Fukushima Daiichi and Beyond*

### *International Radiation Protection Association 13th Congress*

*William D. Magwood, IV*
*Commissioner*
*May 18, 2012*

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# Nuclear Regulatory Commission
## *Who We Are*

- The Energy Reorganization Act of 1974 divided the Atomic Energy Commission into a “promotional” technology development agency – the Department of Energy – and a regulatory agency – the NRC.

- NRC is 4000 people dedicated to assuring the safe and secure use of nuclear materials in the United States in order to protect and safety of the American people.

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# NRC in 2011
## *Prepared for the Unexpected*


***Clockwise:*** **Flooding at Ft. Calhoun; NRC EOC Staff Tracking Hurricane Irene; National News Coverage of East Coast Quake**

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# Fukushima Daiichi

## *March 11, 2011 and Continuing*

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# Fukushima Daiichi on March 11
## *A Bad Day At the Plant*

- Magnitude 9.0 earthquake followed by 15 meter tsunami at the plant
- Extended Station Blackout
- Batteries depleted and subsequent loss of all reactor cooling
- Core damage in units 1, 2, and 3
- Hydrogen explosions in reactor buildings housing units 1, 3, and 4

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# Fukushima Daiichi
## *NRC's Immediate Response*

- **Activated NRC Emergency Operations Center - staffed 24/7 for 9 weeks**
- **Dispatched expert advisors to Tokyo**
- **Conducted special inspections at U.S. Nuclear Power Plants to verify:**
  - ***Preparedness for beyond design basis events***
  - ***Compliance with requirements regarding mitigating strategies (B.5.b)***
  - ***Implementation of severe accident management guidelines (SAMGs)***

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# U.S. Government Response
## *Multi-Agency Assistance*

**NRC**

- **Provided modeling and analytical support to U.S. and Japanese organizations.**
- **Deployed expert team to Japan with experience including:**
  - **BWR reactor safety systems**
  - **Dose assessment**
  - **Protective measures**

**HHS**

- Provided expert advice regarding the use of potassium iodide or the need to switch to bottled water for Americans in Japan

**DOE /NNSA**

- Provided specialized robotic equipment to Japan
- Conducted various nuclear analyses
- Provided aerial measurement systems
- Conducted thousands of air and field samples in Japan
- Analyzed samples at U.S. national labs

**AID**

- Coordinated overall USG relief efforts.
- Deployed a Disaster Assistance Response Team to support emergency response.
- Provided $6.3 million in humanitarian assistance, including urban search and rescue (USAR) activities.

**DoD**

- Provided $88.6 million in humanitarian assistance
- Conducted USAR operations and transport of USAR cargo
- Delivered tons of water, food and medical supplies to affected areas, as well as personnel.
- Assured safety of U.S. military personnel based in Japan.

**FEMA**

- Deployed search and rescue teams to Japan to conduct missions utilizing canines and listening devices

**U.S. Embassy Japan**

Focal point for relief efforts and information point for American citizens in Japan

**Embassy Staff Grew by 150 during the Crisis**

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# After Fukushima
## *We Must Learn the Big Lessons*

- **Understand the Risks Facing Each Plant**
- **We Can't Predict Every Event**
- **Recovering from Disaster is At Least as Important as Preparing for Disaster**

- **Potential for Common Cause Failure of On-Site and Off-Site AC Power**

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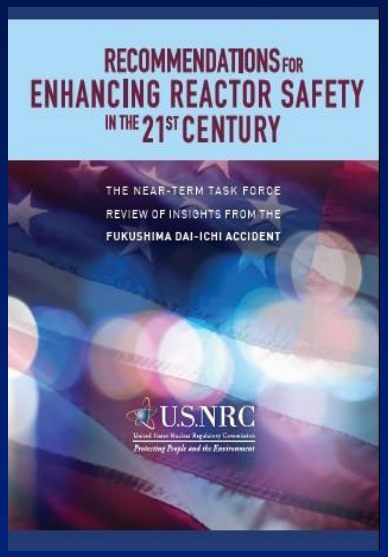
# NRC Near-Term Task Force

## *Bottom Line: U.S. Plants Are Safe*

- **No imminent risk from continued nuclear power plant operation and licensing activities.**
- **Similar events in the U.S. very unlikely.**
- **Mitigation measures already in place could reduce the likelihood of core damage and radiological releases.**
- **12 Technical recommendations to further enhance U.S. nuclear safety.**



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# Enhancements to Nuclear Safety
## *"Tier One" Actions Approved*

- **Reevaluation of All External Hazards for Each Plant**
- **Enhanced Station Black Out Rulemaking**
- **Mitigating Strategies for Beyond Design Basis Events**
- **Installation of Reliable Hardened Vents for BWR Mark I and Mark II Containments**
- **New Spent Fuel Pool Instrumentation Requirements**
- **Integration of Emergency Procedures**
- **Staffing and Communications for Multiunit Events**

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# Enhancements to Nuclear Safety
## *Lower-Tier Issues To Be Addressed*

- **Review of other containments (ice condenser plants, *etc*.)**
- **Consideration of vent filters to mitigate land contamination**
- **Consideration of every-10-year reconfirmation of seismic and flooding hazards**
- **Enhancements to prevent or mitigate seismically induced fires and floods**
- **Hydrogen control and mitigation in containment**
- **Additional emergency preparedness enhancements to address prolonged station blackout and multiunit events**

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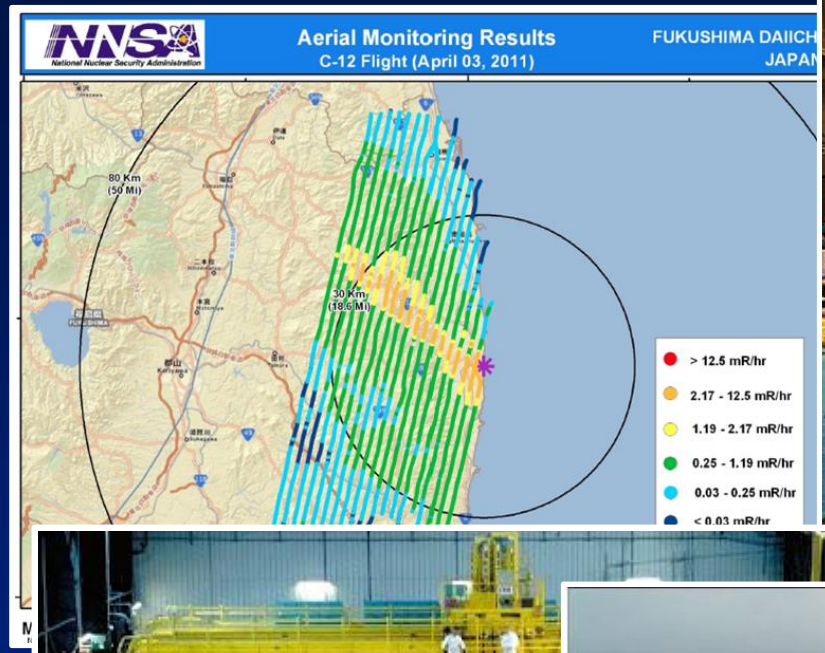
# Fukushima Teaches
## *The Public Listens*

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# What's Next?
## *Major Policy Questions Facing NRC*

- **Should We Further Revise our Approach to Emergency Planning?**
- **Should more Spent Fuel be Removed from Pools and Placed in Dry Storage?**
- **Do We Need a New Regulatory Regime to Address Beyond Design Basis Events?**
- **Do We Need to Revise Our Regulatory Approach to Look Beyond Safety and Address Large Socio-economic Disruptions?**

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# What's Next?
## *More Questions after Fukushima*

- **Should we review our regulation and policy for environmental restoration following a major radiological release?**
  - Optimization *vs*. set numerical value for cleanup
  - Re-entry criteria
  - Role of affected community in cleanup decision
- **International framework for Disaster Cooperation**

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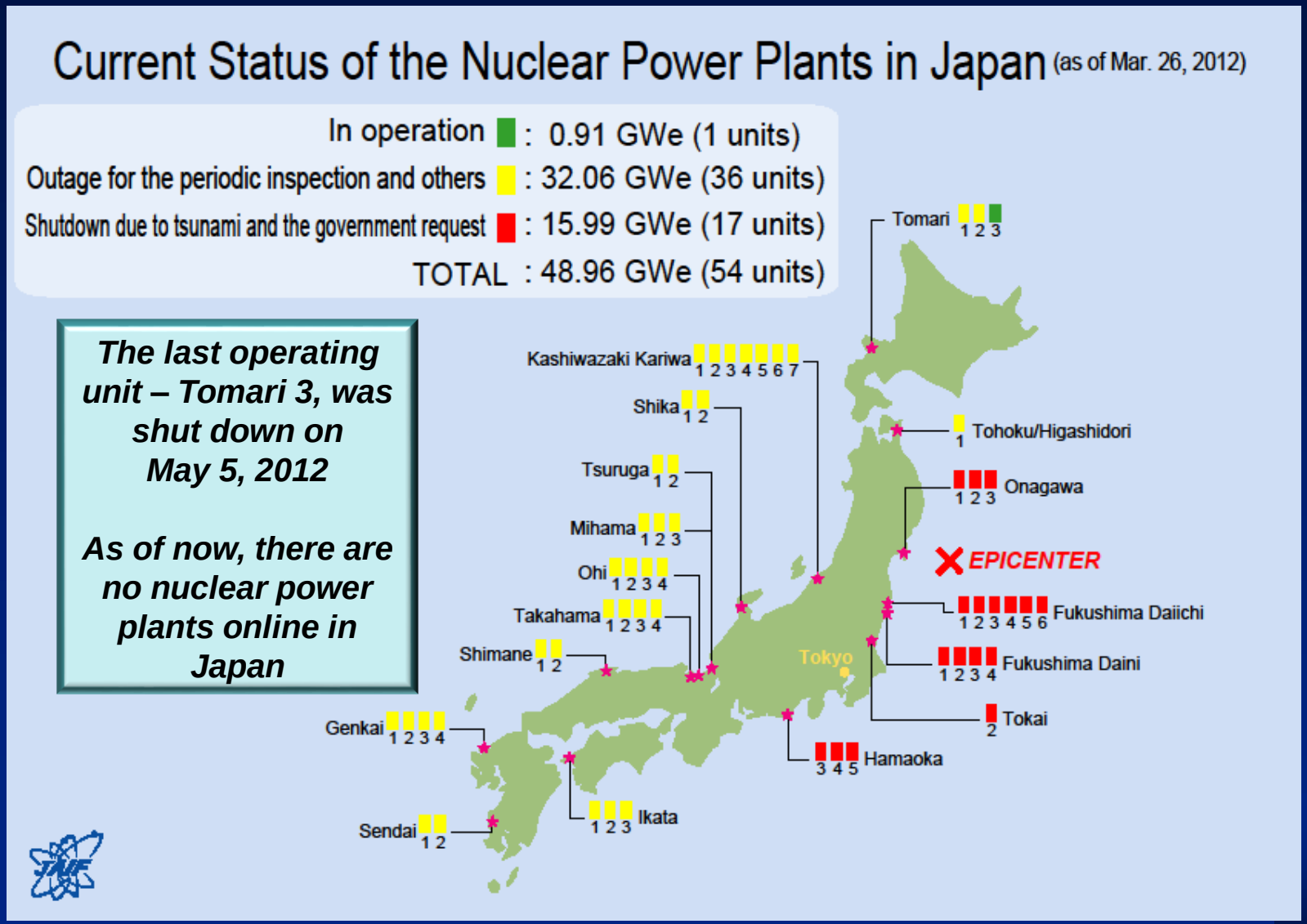
# What's Next?
## *Impacts on Japanese Nuclear Power*



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# What's Next?

## *In the U.S. - The Work Continues*

Georgia Power has initiated full scale construction of Vogtle units 3 and 4 after receipt of a combined Construction and Operating License from the NRC

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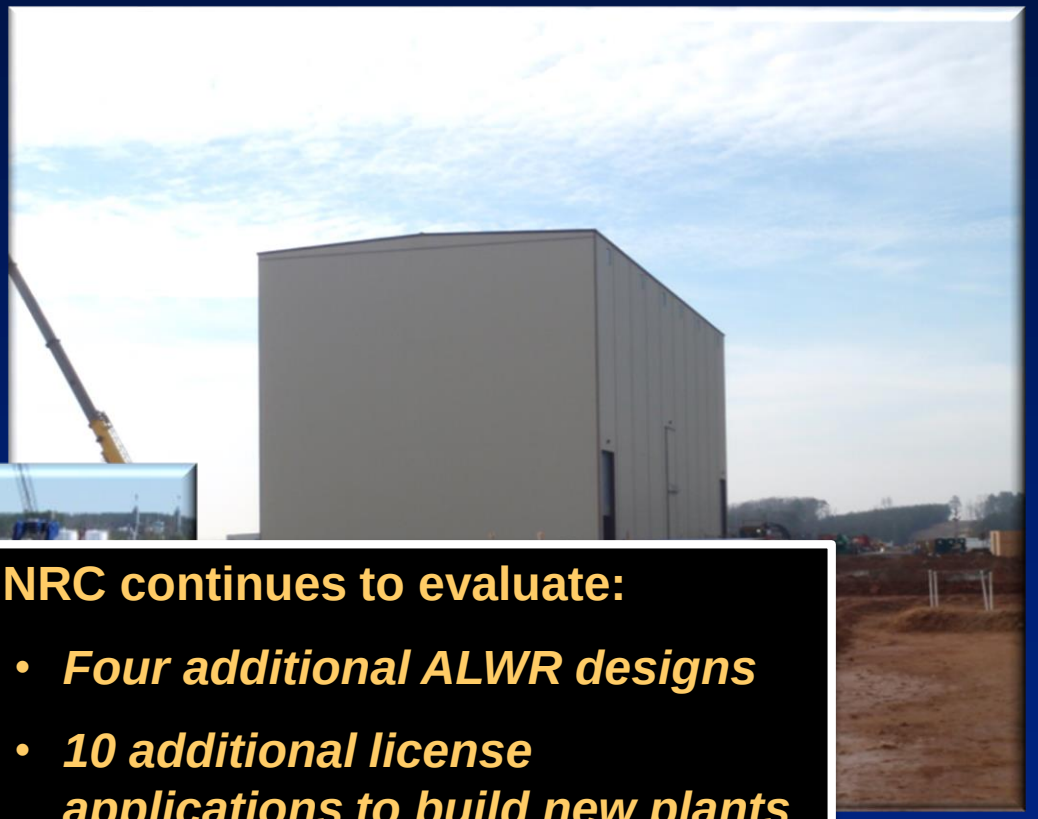
# What's Next?
## *The Work Continues*

SCANA is the latest power company to receive a license to build and operate a Generation III+ nuclear plant. Work is now underway at the V.C. Summer site in South Carolina to construct two AP1000 reactors



**NRC continues to evaluate:**

- ***Four additional ALWR designs***
- ***10 additional license applications to build new plants***
- ***Power uprates***
- ***License renewals***

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# What's Next?
## *Revise Radiation Protection Regulations*

- **Respond to ICRP 103 Recommendations**
  - *Update to assure consistency with current understanding of radiation risk*
  - *Increase alignment with international radiation protection recommendations*
- **Further the use of International Systems Units**
  - *Enhance consistency with the international community*
- **Monitor International Efforts to Develop an Environmental Protection Framework**
  - *No changes to US regulations needed*

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# What's Next?
## *U.S. Nuclear Power After Fukushima*

- **Public consciousness increased, but views of existing plants and new projects generally remain positive**
- **Limited impact on U.S. nuclear power projects after Fukushima**
  - *Low natural gas prices likely to have a much larger impact on power company plans*
- **NRC Will Enhance the U.S. Regulatory Framework**
  - *Enhanced focus on beyond design basis events*
  - *Update US Radiation Protection Regulation*

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