

***A Commissioner's Perspective on  
Nuclear Safety Research and NRC's  
Response to  
Nuclear Events in Japan***

NRC Commissioner William C. Ostendorff

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National Nuclear Security Administration  
Washington, DC

# Agenda

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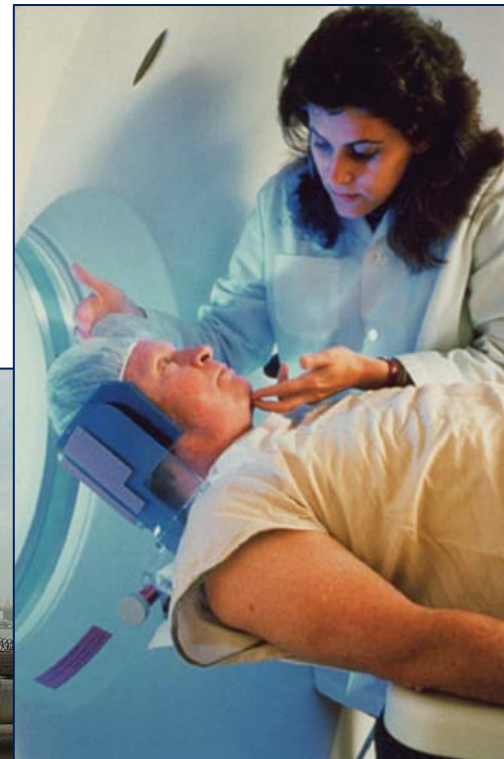
- About the NRC
- NRC actions on Fukushima
- NRC research activities and example related to Fukushima

# What we regulate

## Reactors



## Materials



## Waste



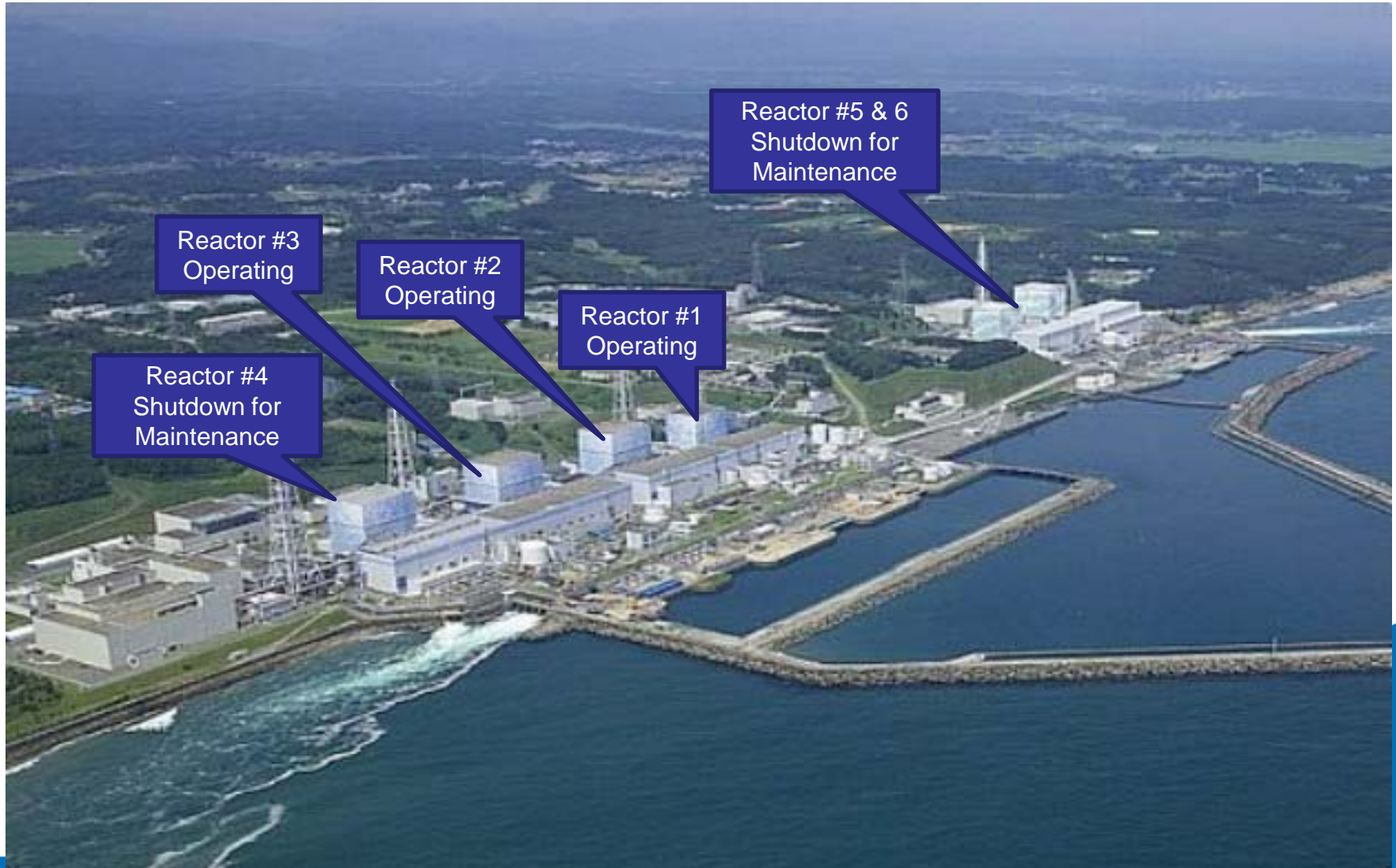
# Fukushima Daiichi

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- Event background
- NRC actions
- Areas of related NRC research
- Next steps



# Fukushima Daiichi NPP



# Sequence of Events

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Friday, March 11, 2:36 pm local time:

- Magnitude 9.0 earthquake 231 miles northeast of Tokyo
  - One of the five most powerful earthquakes since 1900
- 15-meter tsunami at plant
  - Much higher in other locations in northern Japan

# Sequence – continued

- Three operating units shutdown at time of earthquake
- Offsite power lost; emergency diesels supply power
- Tsunami strikes site and wipes-out emergency power
- Extended station blackout – loss of all AC power
- DC batteries deplete and subsequent loss of reactor cooling
- Late injection of seawater using fire trucks
- Significant core damage at units 1, 2, and 3
- Hydrogen generated from metal water reaction in cores
- Hydrogen explosions in Units 1, 3, and 4 reactor buildings

Tsunami exceeded the design assumption that led to extensive plant damage and extended station blackout





Reactor #3

Reactor #4

Water Spray Boom to Spent Fuel Pool



# Near Term Review

- Evaluate Fukushima Daiichi accident
- US operating reactors and spent fuel pools
  - External events
  - Station blackout
  - Severe accident mitigation
  - Combustible gas control
  - Emergency preparedness
- Near term review due in 90 days (mid July)

# Longer Term Review

- Based on near term review and additional insights from Fukushima accident
- Identify potential technical and policy issues
  - Research activities
  - Generic issues
  - Reactor Oversight Process
  - Regulatory framework
  - Interagency emergency preparedness

# NRC's Office of Nuclear Regulatory Research

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- Mandated by Congress
- About 260 staff
- Engineers, scientists, analysts
- \$61M funding
- Located at 21 Church St., Rockville, Maryland

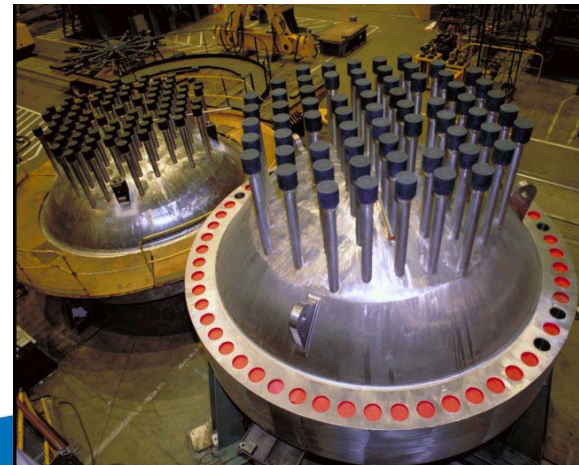


# Why Perform Research?

- Support regulatory decisions on nuclear reactors, nuclear materials, and radioactive waste
- Identify and resolve safety issues for current and new designs and technologies
- We accomplish this through:
  - Testing
  - Code and data development
  - Analyses
  - National and international collaboration



Cladding



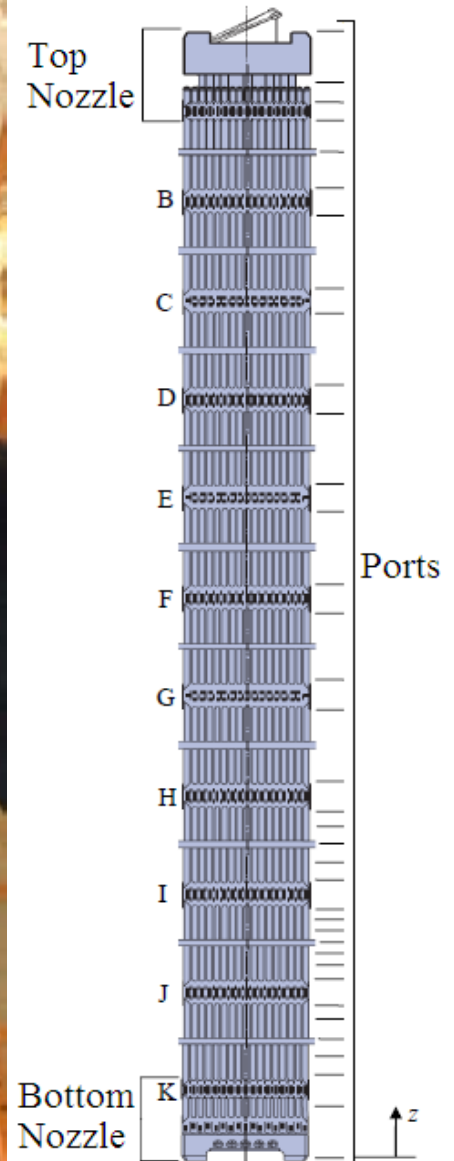
Reactor Pressure Vessel  
Head

# Principal Areas of Research

- Materials science
- Digital instrumentation & control and electrical
- Nuclear fuel behavior under accident conditions
- Health physics
- Environmental transport
- Structural engineering
- Seismic & geotechnical
- Accident sequence precursor analyses
- New and advanced reactors infrastructure development
- Thermal-hydraulics, severe accidents, reactor physics, and safety analyses
- Probabilistic risk assessment
- Human factors and reliability
- Fire research
- Analysis of operating experience

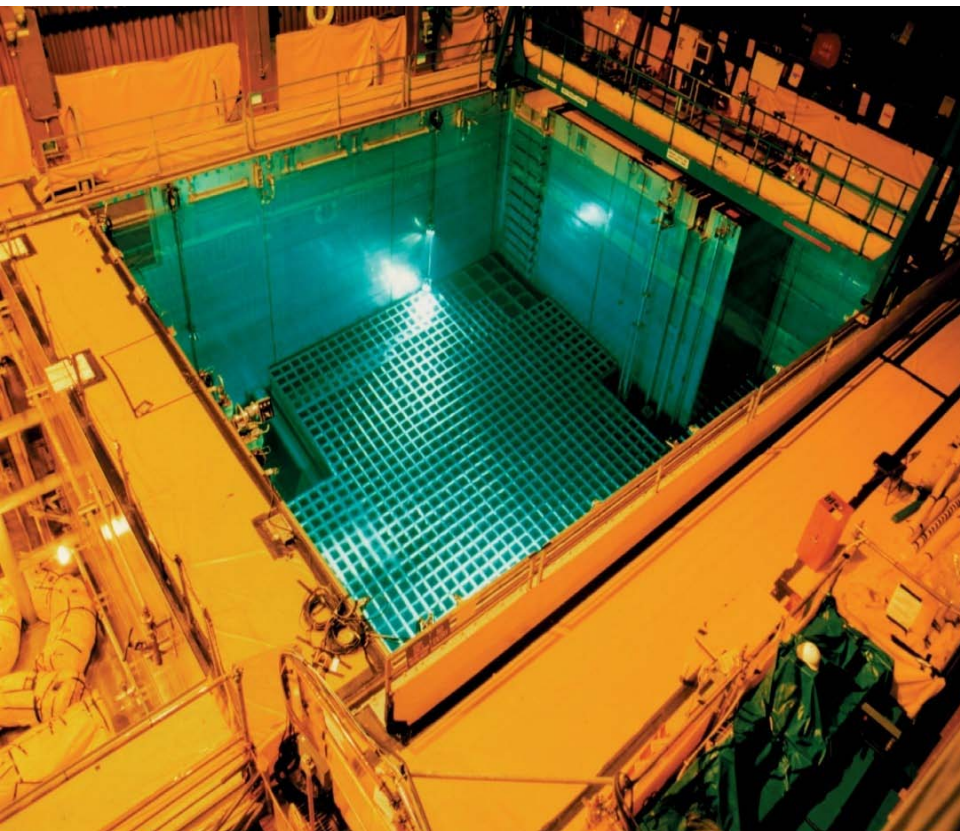
# Key Fukushima Related Research Areas

- Tsunami Hazards
- Level III Probabilistic Risk Assessment Modeling
- Spent Fuel Storage





# Spent Fuel Storage



Spent Fuel Pool



Dry Casks

# Spent Fuel Safety and Security

- Primary risk associated with draining of the SFP
- Additional SFP enhancements made after 9/11
- SFP risk is low due to the low frequency of events (large seismic, cask drop) that could damage the pool
- SFP potential consequences driven by:
  - “Zirconium fire” concern
  - Large inventory of Cesium-137
- Dry storage risk is very low

# Comparative Consequence Study for SFP

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- An updated SFP study initiated
- Objective is to estimate the change in accident consequences associated with removing older fuel from the SFP and placing it in dry storage
- Realistic analysis using expedient but technically-defensible methods and analysis



# Thank You

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***Questions***

***Comments***

***Discussion***