



# NRC Perspectives on Defense in Depth and International Initiatives

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## **History of DiD in the U.S.**

- Concept in use since the 1960s
- General Design Criteria address prevention and mitigation
- Multiple barriers: fuel, coolant systems, containment, emergency preparedness

## **Interface with Probabilistic Risk Assessment**

- PRA provides an added dimension to Defense in Depth
- PRA Policy Statement (1995): PRA complements the deterministic approach and supports the NRC's traditional DiD philosophy
- Functional considerations:
  - Likelihood
  - Dependencies
  - Event progression
  - Failure states
  - Emergency preparedness effectiveness

# International Perspectives

- INSAG-10 (1996) – 5 levels of DiD
- INSAG-25 (2011) – DiD and risk insights in decision-making
- IAEA Safety Standard SSR 2/1 (2012)
- TECDOC on SSR 2/1 (in draft)
- NEA/CNRA workshop (2013)

# CNRA Green Book Development

- Purpose: Provide guidance to regulators in re-considering and clarifying DiD using the lessons of the Fukushima accident.
- Scope:
  - Structure and levels of DiD
  - Independence
  - Practical elimination
  - New and operating reactor considerations
  - Multi-plant sites
  - Other nuclear facilities
  - Emergency arrangements offsite

# CNRA Green Book - continued

- Conclusions
  - Fukushima accident reinforced fundamental importance of DiD.
  - Greater harmonization of DiD implementation is desirable
- Issues for clarification
  - Degree of independence among the levels
  - “Practical elimination”
  - New designs vs. operating reactors
  - Role of PRA
  - Design extension condition