Topics of the New Regulations in Japan

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Shigeki Shiba
Division of Research for Reactor System Safety
Nuclear Regulation Authority
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Safety measures against External Hazards
- Examples of Tsunami Provisions -

Strengthening of the first layer: “prevention”

✓ Define “Design Basis Tsunami” that exceeds the largest in the historical records

✓ More stringent SSCs: Breakwater Wall, Protective wall, Watertightness of doors / hatches

✓ The highest class of aseismatic design is applied to SSCs for tsunami protective measures

Examples of tsunami measures (multiple protective measures)
- Breakwater Wall (prevent inundation to the site)
- Watertight Door (Tsunami Gate) (prevent water penetration into the building)
Safety measures against **External Hazards** - Large-scale natural disasters -

✓ Make much account of “**diversity**” and “**independence**”, shifting from “**redundancy centered**”.

• **Use of mobile equipment** such as power supplies, pumps, heat exchangers etc.

• **Diversity in location/elevation**, ...
Safety measures against Intentional Large Aircraft Crash

✓ Specialized Safety Facility and Mobile equipment are required to be equipped with adequate measures for preventing containment vessel failure.

✓ Use of “seismic base isolation”, “active vibration control”...

For example, 100m
Safety measures against External Hazards
- Measures against dispersion of radioactive materials -

- Large water cannons and pumping trucks are deployed to spray into failed area to reduce the release of radioactive materials.

- To enable prompt response to an accident, wheel loaders etc. are provided to remove rubble as voluntary actions.

* Excerpt from Shikoku Electric Power Company’s data
** Excerpt from Kyushu Electric Power Company’s data
ii. Safety measures for Spent Fuel Pool
New regulatory requirements for Spent Fuel Pool

(Ⅰ) Measures for **cooling**, **shielding** and **sub-criticality** against lowering of water level caused by loss of coolant, leakage and the others

(Ⅱ) Measures for **mitigation of significant fuel degradation** and **sub-criticality** against abnormal lowering of water level caused by large leakage of coolant and the others

Plant States Considered in the Design

(Ⅲ) Measures for monitoring all possible ranges for **water level**, **temperature of coolant** and **air dose rate** above SFP
Examples: Safety measures for Spent Fuel Pool

(I) Measures for **cooling**, **shielding** and **sub-criticality** against lowering of water level in SFP

- Reinforce coolability of spent fuel storage area in addition to the existing cooling systems
- Removal of decay heat from irradiated fuel and Radiation shielding
  
  Ex. Large Pumping trucks (M), Diesel pumps (M) etc.
- Evaluation of sub-criticality of fuel
  
  Ex. **Criticality safety analysis for SFP**
Examples: Safety measures for Spent Fuel Pool

(Ⅱ) Measures for mitigation of significant fuel degradation and sub-criticality against abnormal lowering of water level

- Mitigation for degradation of fuel
  
  Ex. Small water cannons, Diesel Pump trucks(M), Motor driven pumps(M), Large Water cannons(M), Large pumping trucks(M) etc.

- Prevention of criticality of fuel

  *Excerpt from Shikoku Electric Power Company’s data

Water sources (Sea Water, Reservoir …)

Motor driven low feed pumps

Large pumping trucks

Large water cannon

Small water cannons

Diesel pump trucks

Water sources (Sea Water, Reservoir …)
Examples: Safety measures for *Spent Fuel Pool*

(Ⅲ) Measures for monitoring spent fuel Pool

- Reinforce monitoring capabilities of spent fuel storage area in addition to the existing monitoring equipment
- To monitor all possible ranges for *water level, temperature* and *air dose rate* above SFP
  - Ex. *Microwave level gauge, Thermometer* (Resistance temperature detector), *Radiation detector(M), Float type water level gauge etc.*
- To prepare for power supplies for monitoring
  - Ex. *Emergency diesel generators(M), Air-cooled emergency generators(M)* etc.
- Visual monitoring equipment
  - Ex. *Infrared Cameras etc.*
Examples: Safety measures for **Spent Fuel Pool**

- Common Basic Requirements for monitoring equipment:
  - Environment and load conditions, operability, capacity, changeover, prohibition of shared use with other units etc.

*Excerpt from Kansai Electric Power Company’s data*
iii. Summary

- Multiple protective measures against “Design Basis Tsunami” that exceeds the largest in the historical records
- Make much account of “diversity” against large scale disasters
- Measures against Intentional Large Aircraft Crash
- Measures against dispersion of radioactive materials
- Reinforce coolability and monitoring of spent fuel storage area