

Summary of Side-event to the 6th Review Meeting of the Convention on Nuclear Safety, 1 April 2014, Boardroom A, Building M, Vienna International Centre.

‘Implementation of Safety Upgrades Following the Assessment of Vulnerabilities of Nuclear Power Plants’

Deputy Director-General introduced a side-event to this Review Meeting, that was open to all Member States (MS) of the Agency. Its purpose was to review the changes that had been made around the world in various regional groups, technology groups and by the nuclear power industry. There were seven presentations:

- by those Member States that operate CANDU reactors,
- by the European regulatory groups WENRA and ENSREG
- by the Ibero-American forum of Regulators
- by the Asian Nuclear Safety Network
- by the WWER regulators forum
- and by WANO.

These were followed by a Question and Answer session; the titles of the presentations are given in Annex A.

Common themes from the presentations were some form of ‘stress test’ focussed safety assessment had been performed by the industry, regulator or both, resulting in the following kinds of safety upgrades being made:

- 1- Additional means to withstand prolonged loss of power and cooling
 - a. Mobile emergency mitigating equipment
 - b. Water makeup connections to primary and secondary systems and emergency core cooling system
 - c. Provision to open relief valves after station blackout
- 2- Upgrades of power systems to improve reliability
 - a. Extended battery availability
 - b. Improved load shedding to extend battery life
 - c. Improved electric power backup for critical loads
- 3- Re-evaluation of site-specific external natural hazards
 - a. Seismic
 - b. High winds (hurricane, tornado, sand storm)
 - c. Flooding by storm surges/tsunamis
 - d. Search for cliff-edge effects
- 4- Maintain containment integrity
 - a. Filtered containment vents
 - b. Passive autocatalytic hydrogen recombiners
 - c. Hydrogen measurement in containment
- 5- Ability of operators to respond
 - a. Control Room habitability (main plus secondary)
 - b. Severe accident management guidelines
 - c. Instrument survivability
 - d. Plant accessibility and habitability

- 6- Assessment of multi-unit events and effects
 - a. One unit on another
 - b. Common-mode events
 - c. Other facilities onsite.
- 7- Spent fuel pools
 - a. Structural integrity in design-basis events and beyond
 - b. Piping for water addition
 - c. Instrumentation to measure water level and temperature
- 8- Emergency preparedness and responses
 - a. Training for severe accidents
 - b. Improvement of Abnormal Operating Procedures
 - c. Onsite emergency management facilities able to withstand extreme events
 - d. National-level engagement, oversight and participation in exercises
 - e. Multi-unit accidents considered.
- 9- Commitment to Periodic Safety Reviews
 - a. Natural hazards re-assessed and plant response re-evaluated

The Question and Answer session highlighted certain aspects of the seven presentations. Some key points were:

- How to improve the quality of peer reviews and how to engage the CEOs of the operating companies?
- How difficult is it proving to involve the highest levels of Government in emergency drills and exercises?
- How can operators be better prepared to handle severe accidents, including improving the leadership of their supervisors/managers?
- How is WANO developing the concept of overall nuclear safety risk that it now proposes to estimate for each station that it reviews?
- How was the post-peer review organized for national reports?

Annex A – Presentations by regional groups, technology groups and the nuclear power industry:

- a) *CANDU Regulators – Greg Rzentkowski; PHWR Group of Countries: Implementation of lessons-learned from Fukushima Accident in CANDU Technology.*
- b) *Western European Nuclear Regulators' Association (WENRA) – Hans Wanner; Improvement of Nuclear Safety Through Self-Commitment of Regulators.*
- c) *European Nuclear Safety Regulators' Group (ENSREG) – Gerald Hennenhofer; ENSREG Activities after the European Stress Test: Follow-up implementation of safety improvements.*
- d) *Ibero-American Forum of Regulators(FORO) – Ruben Navarro; Actions taken as stress tests results in the NPPs belonging to the FORO member countries.*
- e) *Asian Nuclear Safety Network (ANSN) – Seon Ho Song; Implementation of safety upgrades in Korea following the assessment of vulnerabilities of Nuclear Power Plants.*
- f) *WWER Regulators Forum – Mikhail Lankin; Safety enhancement of nuclear power plants with WWER-type reactors in response to Fukushima Daiichi accident.*
- g) *WANO – Wade Green; WANO's Post-Fukushima Projects*