

# **Group 3 Brainstorm Session**

## **Nuclear Safety and Innovations**

**Chair: Mr. Robert Lojk – CNSC, Canada**

**Rapporteur: Mr. Hadid Subki, IAEA**

**30 August 2012**



**IAEA**

International Atomic Energy Agency

# Acknowledgement

- A big thanks to all Group 3 participants for their excellent collaboration. Everyone made valuable contributions to the discussion.
- It was notable that current nuclear countries provided some of the technical specifics but aspiring nuclear countries provided valuable insights into societal and risk discussions.

# Members of Group 3

- Mr Koji **Sato** – JAPAN
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- Mr Kenichi **Yasuda** – JAPAN
- Mr Md. Ali **Zulquarnain** – BANGLADESH
- Mr Francisco Luiz **de Lemos** – BRAZIL
- Mr Ahmed Nagieb **El Melgy** – EGYPT
- Mr I. J. Kwame **Aboh** – GHANA
- Mr Yeong Il **Kim** – KOREA
- Mr Joon Eon **Yang** – KOREA
- Mr Mohanad **Eltayeb** – SUDAN
- Mr Pongkrit **Siripirom** – THAILAND
- Mr Martin H.P. **de Leon Carrau** – URUGUAY



# Lesson Learned

- A new approach to safety and severe accidents is required. Low probability high consequence events need to be considered including multi unit installation and common mode failures
- Need to consider irradiated fuel bay protection and cooling
- A strong, independent regulator is necessary. Must separate promotion from regulation
- Emergency management is crucial: Consider effects of concurrent cataclysmic events on response and responders.
- Have back up provisions and plans in place to cover uncertainties
- Switch from prevention to prevention and mitigation
- Require verifications from third party (e.g. IAEA, WANO)
- NPP staff should vocalize and ensure problems are fixed

# Issues on Future Developments, technical and institutional

- Different approach required to plant design and provisions:
  - Enhance the safety case and implement more robust designs
  - Greater use of passive and diversity technology
  - Gen IV considerations ( no evacuation)
  - Severe accident provisions for both new and retrofitted plants.
- More comprehensive emergency management/ response
- A system based (holistic) approach needed to ensure safety. We don't know what we don't know (unknown unknowns) and can't be sure that all synergistic effects have been considered (need to reduce interactions)
- Regulations need to be streamlined and focused on what is important

# Major Safety Issues and Considerations

- How safe is safe enough? Concept of “nuclear airbags”;
- Need to strengthen socio economic consideration in design to include stakeholders’ perception of risk;
- Design needs to include provision for long term loss of heat sink and station blackout. But for how long?
- Is passive really the future or does it need to be a hybrid solution and how do we deal with the next 40 years of existing plant operation?
- Must consider the "proximity effect" responders and decision makers must disengage from the scene and the event, in order to carry out their work and make decisions without influence and interference.

# (cont'd) Major Safety Issues and Considerations

- The Major safety issue is clearly the need to consider station blackout and long term loss of heat sinks, as well as better consider severe accidents. Clearly one must realistically consider that difficult decisions need to be made, factoring in the greater good and what society accepts. The level of safety must also be commensurate with the level of uncertainty
- Multilateral discussions should lead to insights into safety. We must think "outside the box" with respect to events and requirements. We need to talk about training and developing human resources in member states;
- IAEA roles clearly must include assistance with the development of new requirements, the review of regulatory programs and the development of human resources as well as the promotion of frank, honest and open dialogue;

# Conclusions of the session

- There are clear advantages to nuclear power as well as risks and both need to be considered;
- The risk of a nuclear accident is very low but it is real and of high consequence. More scrutiny will be demanded from regulators, from designers and operators;
- Eliminating nuclear power from the energy mix and abandoning existing fully functional plants might have greater negative societal effects than the added risk. This needs to be factored into any decision;
- While need might trump emotion, it should not compromise safety.