

International Conference on Topical Issues in Nuclear Installation Safety

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Defence in Depth: Advances and Challenges for
Nuclear Installation Safety

President's conclusions



IAEA

International Atomic Energy Agency

President's conclusions

- Although the Defence in Depth (DiD) concept remains valid after the Fukushima accident, it has to be strengthened and extensively applied in order to meet most recent safety objectives for nuclear plants, such as the ones adopted by the Contracting Parties during the extraordinary meeting of the CNS. DiD is not only relevant for the design of new installations, but should also be maintained and checked by periodic safety reviews over the entire life of installations.

President's conclusions

- Further development and guidance are required on several subjects related to DiD, such as:
 - Consistent application of design basis definitions at the international level;
 - Postulation of multiple failure in reactor design;
 - Practical elimination of sequences;
 - Assessment of independence and reliability of different levels of DiD;
 - Numerous common cause failures due to internal or external hazards;
 - Approach to be adopted for very low probability events leading to very large health and society consequences;
 - Tools to be based on already developed methodology to ensure that safety provisions are comprehensive enough to ensure DiD.

President's conclusions

- Fukushima Daiichi accident has demonstrated that extreme external hazards can result in common cause failures jeopardizing simultaneously several levels of defence; making severe accident management extremely difficult. Significant efforts are underway to further increase safety and increase robustness of installations accordingly.

- Approaches have already been developed to improve robustness of plants, taking into account the current lessons learned from the Fukushima Daiichi accident. However, such approaches still need to be matured on several subjects such as :
 - Criteria to choose between fixed and mobile equipment;
 - Design approach for equipment or “hardened safety core” of equipment ensuring fulfillment of safety functions under extreme conditions.

President's conclusions

- Hazards, as well as combination of hazards, to be taken into account in relation to DiD need further work and international guidance.
- Wider use of IAEA review services, especially those related to siting, design and emergency preparedness, should be promoted and established, contributing to the prevention of nuclear accidents, and emergency management. Peer pressure should be extended to ensure the implementation of their recommendations.
- As already highlighted and implemented by IAEA, WANO and NEA, mitigation levels of DiD should be enhanced in operational safety, while prevention should also be maintained.
- The safety of nuclear and non-nuclear industries would benefit from a closer collaboration allowing better sharing of experience feedback as well as education and training methods.



President's conclusions

- Realistic drills are essential for the effectiveness of emergency preparedness. They should involve all the key players at all levels in decision-making and communication. They should as much as possible train individuals and prepare the organizations to react in a flexible manner to unexpected situations.
- The idea was proposed that technical concept of DiD is necessary but not sufficient to ensure safety. Effective institutional systems need to be established; applying the same DiD concept and principles, involving all stakeholders (operators, regulators, industry, etc.). To address this issue, a peer-review service was suggested to be established jointly by IAEA and WANO, using expertise of NEA.
- Following the Fukushima accident, WANO adopted strategic orientation to increase its strength and its focus on nuclear safety. It improved its peer review process and expended its scope to integrate some design aspects, as well as corporate peer reviews. Overall, the peer pressure was increased in order to enhance commitment to safety of the operators worldwide.