

MAIN RESULTS OF THE PEER REVIEW

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Content

- **Global conclusions of the Peer Review**
- Main areas of safety improvement
- Future actions

General conclusion over Europe

- Significant steps taken in all countries to improve safety of plants
- Varying degrees of practical implementation
 - Regulatory systems
 - Extent of programs

Consistency of approaches in European countries

- Global consistency over Europe in identification of:
 - Strong features
 - Weaknesses
 - Measures to increase robustness

Measures to increase robustness of plants

- Significant measures to increase robustness already decided or considered, such as:
 - Additional mobile equipment
 - Hardened fixed equipment
 - Improved severe accident management with appropriate staff training
- Details available in Country Reports and Main Report

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- Global conclusions of the Peer Review
- **Main areas of safety improvement**
 - Assessment of natural hazards and margins
 - Periodic safety review
 - Containment integrity
 - Prevention of accidents resulting from natural hazards and limiting their consequences
- Future actions

Assessment of natural hazards and margins (1)



Assessment of natural hazards and margins (2)



Assessment of natural hazards and margins (3)

- The peer review Board recommends that WENRA, involving the best available expertise from Europe, develop guidance on natural hazards assessments, including earthquake, flooding and extreme weather conditions, as well as corresponding guidance on the assessment of margins beyond the design basis and cliff-edge effects.

Periodic safety review (1)

- Peer review demonstrated effectiveness of periodic safety reviews
 - Maintain and improve safety and robustness of plants
 - Specially relevant, in the context of the peer review, for protection of installations against external hazards

Periodic safety review (2)

- The peer review recommends that ENSREG underline the importance of periodic safety review. In particular, ENSREG should highlight the necessity to re-evaluate natural hazards and relevant plant provisions as often as appropriate, but at least every 10 years.

Containment integrity (1)



Containment integrity (2)

- Fukushima disaster highlighted once again the importance of the containment function
- Last barrier to protect people and the environment against radioactive releases
- Issue already considered as follow-up of previous accidents and possible improvement already identified

Containment integrity (3)

- Urgent implementation of the recognized measures to prevent containment integrity is a finding of the peer review that national regulators should consider

Containment integrity (4)

- Measures vary depending upon the design of the plants
- For water cooled reactor, they include equipment, procedure and accident management guidelines to:
 - Depressurize primary circuit to prevent high pressure core melt
 - Prevent hydrogen explosions
 - Prevent containment overpressure

Prevention of accidents resulting from natural hazards and limiting their consequences (1)



Prevention of accidents resulting from natural hazards and limiting their consequences (2)

- Preliminary lessons learned from Fukushima: Necessary increase of defense in depth to take into account severe accidents resulting from extreme natural hazards exceeding design basis or current safety requirements applicable to plants

Prevention of accidents resulting from natural hazards and limiting their consequences (3)

- Such situation can result in:
 - Devastation and isolation of site
 - Event of long duration
 - Unavailability of numerous safety systems
 - Simultaneous accidents in several plants, including their spent fuel pools
 - Radioactive releases

Prevention of accidents resulting from natural hazards and limiting their consequences (4)

- Necessary implementation of measure allowing prevention of accidents and limitation of their consequences in case of extreme natural hazards is a finding of the peer review that national regulators should consider

Prevention of accidents resulting from natural hazards and limiting their consequences (5)

- Typical measures:
 - Bunkered equipment including instrumentation and communication means
 - Mobile equipment protected against extreme natural hazards
 - Emergency response centers protected against extreme natural hazards and radioactive releases
 - Rescue teams and equipment rapidly available to support local operators

Prevention of accidents resulting from natural hazards and limiting their consequences (6)



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- **Future actions**

Follow-up

- Peer review demonstrated benefit of sharing results of stress tests and ideas for strengthening safety and robustness of plants
- Follow-up of future actions resulting from stress tests as well as additional assessments would be beneficial
- Should be organized in the frame of existing arrangements rather than creating new ones

Off-site emergency preparedness

- Strong demand resulting from public interaction
- Not part of the mandate of the peer review
- Peer review Board recognizes the importance of dealing with off-site emergency preparedness in Europe, as a follow-up of Fukushima disaster

Peer review

- Was a challenge
- Required very significant resources
- To be considered as an exceptional exercise
- Judged very positive by most participants

Expected to contribute to enhancing safety in Europe and in each European country