

“Strengthening Good Practice within Nuclear Safety Post Fukushima-Daiichi”

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Outline of Presentation

***Purpose:** To present a brief overview of what the OECD/NEA members did to derive key messages on safety from the event and the areas they consider important to address to strengthen nuclear safety in the near and long term future and what may affect new build*

- The OECD/NEA tasks post Fukushima Daiichi Accident.
- Key messages on strengthening good practice from the OECD/NEA Fukushima Report
- Key conclusions on strengthening good practice from the OECD/NEA Fukushima Report
- OECD/NEA work on increasing robustness beyond the design margins

Long-Established NEA Activities to Enhance Global Nuclear Safety

- 3 Standing Committees with safety mandates
 - CNRA (Committee on Nuclear Regulatory Activities)
 - CSNI (Committee on the Safety of Nuclear Installations)
 - CRPPH (Committee on Radiation protection and Public health)
- Also a Large Portfolio of Joint Research Projects in Nuclear Safety
- Input to Multinational Design Evaluation Programme (MDEP)
- All existed prior to Fukushima Daiichi Accident
- Mature responsive infrastructure between 31 countries
- Able to respond in a measured way to the crisis
- All have developed plans for strengthening good practice

NEA Activities to Enhance Global Nuclear Safety : post-Fukushima

CNRA

- Led and overall co-ordinated the NEA integrated response from the three standing committees
- Progressed regulatory areas
- Led production of the NEA Fukushima report
- Task Group on Accident Management (TGAM) to review accident management practices in light of the Fukushima Daiichi NPP accident.

Additionally:

Direct NEA Assistance to Japan
Defence in Depth Workshop

Review of NEA Research Portfolio to identify areas of uncertainty

CSNI

- Progressed Science based areas
- ROBELSYS – ROBustness of ELectrical SYStems
- TGNEV (Task Group on Natural External Events)

New Research Projects

- Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Plant (BSAF)
- Hydrogen Mitigation Experiments for Reactor Safety (HYMERES)
- PKL3 and ATLAS (beyond Design Basis Accidents)

CRPPH

- Ensuring learning from the experience and improvement for the future.
- Assisted Japanese by involving key stakeholders in consequence management.
- Co-sponsored and participated in many meetings that aimed to make available the international experience inherent in CRPPH in improving the post-accident environment.

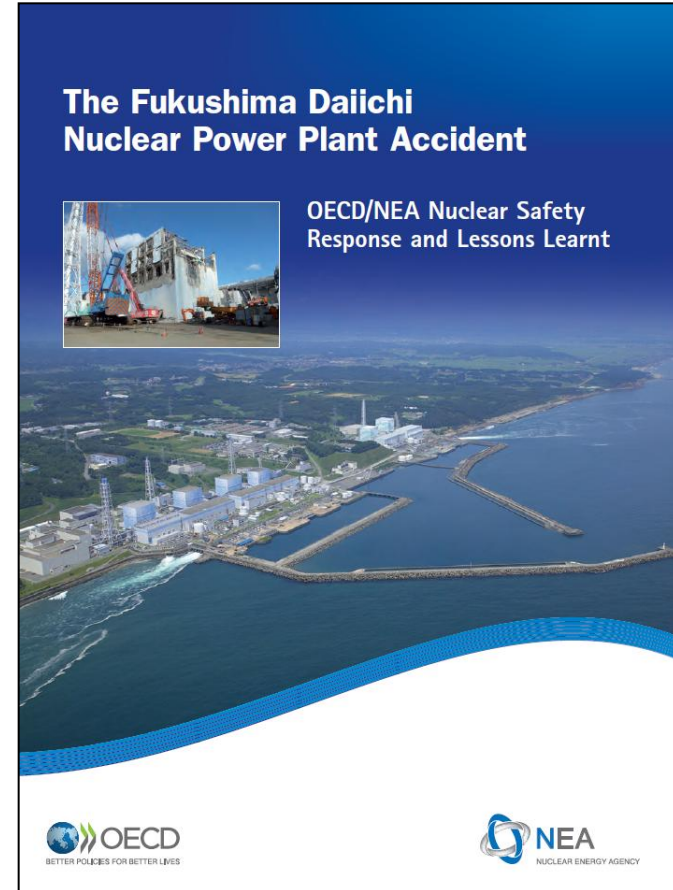
NEA Report

The Fukushima Daiichi Nuclear Power Plant Accident

OECD/NEA Nuclear Safety Response and Lessons Learnt

The work of the NEA described in this report constitutes an important contribution to the safety of both today's and tomorrow's nuclear reactors.

*Luis E. Echávarri
NEA Director-General*



<http://home.nea.fr/pub/2013/7161-fukushima2013.pdf>

Key Messages of the Report

- **Many messages within the report**
- **Focus on these areas**
 - Assurance of safety
 - Shared responsibilities
 - Human and organisational factors
 - **Defence-in-depth (DiD)**
 - Stakeholder engagement
 - Crisis communication
 - Trade and transport issues
 - **Research and development**
 - International co-operation and the NEA contribution

Key Messages on Strengthening Good Practice

- Implement safety enhancements aimed at making it extremely unlikely that accidents due to multiple failures of safety systems could occur
- “Stress in human performance and a widely damaged infrastructure” need to be considered in the planning and implementation of accident management
- Fundamental concepts of Defence in Depth (DiD) remain valid but the implementation of DiD would benefit from improvement - **especially addressing uncertainty**

Key Messages on Strengthening Good Practice

Regulators

- International co-operation is a forum in which peer regulators can actively encourage each other to remain vigilant and avoid complacency
- The following practices should be encouraged and used routinely:
 - striving to reach and maintain a high level of safety,
 - to apply the principle of continuous safety,
 - use safety reviews to identify then implement reasonably achievable enhancements

Research and development

- For many years information from the ongoing decontamination and recovery following the accident will affect **long term R&D plans**
- **Research is ongoing** to develop enhanced analysis methods for those areas of safety analysis that were found not to be as mature (e.g. external hazard assessments).

NEA Joint Research Projects that were Ongoing through the Fukushima Report period

- Behaviour of Iodine Project (BIP-2) (project period: 2011-2014);
- CABRI Water Loop Project (project period: 2005-2015); **(water cooled formerly sodium cooled)**
- Fire Propagation in Elementary, Multi-room Scenarios (PRISME-2) Project (project period: 2011-2016);- **relevant to all reactor systems**
- Halden Reactor Project (current project period: 2012-2014);
- **Loss of Forced Cooling (LOFC) Project (project period: 2011-2014); - Advanced HTTR Reactor**
- Primary Coolant Loop Test Facility (PKL-3) Project (project period: 2011-2015);
- Rig-of-safety Assessment (ROSA-2) Project (project period: 2009-2013);
- Sandia Fuel Project (SFP) (project period: 2009-2013);
- Source Term Evaluation and Mitigation (STEM) Project (project period: 2011-2015);
- Studsvik Cladding Integrity Project (SCIP-2) (project period: 2009-2014);
- Thermal-hydraulics, Hydrogen, Aerosols and Iodine (THAI-2) Project (project period: 2011-2014).

Also a number of database projects dealing with collation of member country events and experience including fire and failure

Key Conclusions on Strengthening Good Practice

- Current safety level is sufficient but **robustness** to extreme situations should be increased **beyond the existing safety margins** with reassessment on a periodic basis
- Provisions should be identified to prevent and mitigate the potential for severe accidents with long-term, offsite consequences
- A consistent international effort is necessary to perform the considerable amount of work to be completed from the Fukushima Daiichi accident

- **Both research and development are required to deliver the above**
- **Research underpins safety assessments and explores the boundaries**

Work on Increasing Robustness beyond Design Margins

Methodology and Exploring Gaps in Existing Knowledge

➤ Task Group on Accident Management (TGAM) -

Enhancement of the original accident management into a comprehensive approach, from initiation through mitigation to a long-term safe stable state

Detailed identification of additional safety research after Fukushima

➤ ROBESYS – ROBustness of ELectrical SYStems –

Task Group examining all aspects of electrical systems to establish how to improve robustness

➤ TGNEV – Task Group on Natural External Events –

Examining how member countries manage natural external events that are low-frequency, but high-consequence in safety analyses

Work on Increasing Robustness beyond Design Margins (2)

Exploring Gaps in Existing Knowledge

- 4 Joint Nuclear Safety Research Projects
 - BSAF – assesses the ability to predict the accident progression with current tools and identifies improvements
 - HYMERES – examines hydrogen explosion and suppression
 - PKL3 & ATLAS – examine the thermal hydraulics of severe beyond design basis accidents
- Current research projects are exploring future work and a number of research projects are also being formulated within:
 - the working groups
 - the review of current research knowledge
 - directly from Japan

Conclusions

- This presentation is a summary of those NEA international programme of activities to bring its members together in those areas they highlighted to deliver enhancement in the understanding and implementation of strengthening good practice.
- NEA has initiated significant on-going activities related to strengthening good practice that have been drawn out of its three main work streams.
- The research work stream is a fundamental building block of nuclear safety.
- Overall further work is on-going to devise enhancements to existing work or identify clear new work programmes on strengthening good practice.

<http://www.oecd-nea.org/>

Thank you for your attention

