NEA Activities to Enhance the Nuclear Regulatory Framework

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Presentation Outline

• Introduction to the NEA
• NEA activities to enhance safety
• NEA report on activities after the Fukushima Daiichi nuclear power plant accident
• Summary
OECD/NEA Membership

- Australia
- Austria
- Belgium
- Canada
- Chile
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Iceland

- Ireland
- Israel
- Italy
- Japan
- Korea
- Luxembourg
- Mexico
- Netherlands
- New Zealand
- Norway
- Poland
- Portugal
- Russia
- Slovak Republic

- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey
- United Kingdom
- United States

OECD and NEA member
OECD member, not NEA
NEA member, not OECD
The NEA Mission

- To assist its member countries in maintaining and further developing, through **international co-operation**, the **scientific, technological and legal bases** required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes.

- To provide authoritative assessments and to forge **common understandings** on key issues, as **input to government decisions on nuclear energy policy**, and to broader OECD policy analyses in areas such as energy and sustainable development.
NEA Committees

Steering Committee for Nuclear Energy

CSNI
Committee on the Safety of Nuclear Installations

CNRA
Committee on Nuclear Regulatory Activities

RWMC
Radioactive Waste Management Committee

CRPPH
Committee on Radiation Protection and Public Health

NSC
Nuclear Science Committee

NDC
Committee for Technical and Economic Studies on Nuclear Energy Development and the Fuel Cycle

Executive Group of the NSC (Data Bank Management Committee)

NLC
Nuclear Law Committee
Regulatory Activities (1/2)

The CNRA Task Group on Accident Management:

• **Goals**: identify measures that should be considered to enhance the regulations and regulatory guidance for operators’ accident management activities.

Defence-in-depth:

• CNRA & CSNI Joint Workshop with industry participation – June 2013 (“Challenges and Enhancements to DiD in Light of the Fukushima Daiichi Accident”).
  
  ✓ Concept of DiD is sound, even if improvements to be considered (balance between prevention and mitigation at all levels…);
  
  ✓ Further consideration: implementation of the DiD concept to rare external (and internal) events, including in combination.
Regulatory Activities (2/2)

Crisis Communication (WGPC – Public Communication):

• **Goals:** expanding previous work (include international elements of crisis communication) and taking into account the experience gained in Fukushima.

• **CNRA workshop on Crisis Communication:** “Facing the Challenges” - Madrid - May 2012 (regulatory authorities, operators and stakeholders).

• **Report:** “Crisis Communication of Nuclear Regulatory Organisations: Towards Global Thinking” (December 2012).

• **Next steps:** workshop with stakeholders (Paris, 9 April 2014).
Safety Activities (1/2)

• Technical Opinion Paper on Filtered Containment Venting:
  ✓ Output: a comprehensive summary of the current status of technology and venting strategies as well as developments required for possible improvements to filtration technologies.

• Status Report on Hydrogen Generation, Transport and Management:
  ✓ Output: a comprehensive summary of hydrogen risk management technology and strategies.

• Status Report on Spent Fuel Pools under Loss-of-Cooling Accident Conditions:
  ✓ Output: a summary of spent fuel pool accident phenomenology and mitigation measures, and a guide for further research activities.

• Metallic Component Margins under High Seismic Loads (MECOS)
  • Output: a report documenting best practices for the analysis of ageing of passive metallic components subjected to high seismic loads.
Safety Activities (2/2)

• **Human Performance and Intervention under Extreme Conditions:**
  ✓ **Output:** a summary of human and organisational factors (HOF) challenges during extreme events, good HOF practices and knowledge gaps.

• **Workshop on Natural External Events Including Earthquakes:**
  ✓ **Output:** a report on commendable practices and experience gathered on PSA methodologies for natural external events.

• **Workshop on the Robustness of Electrical Systems of NPPs in Light of the Fukushima Daiichi Accident:**
  ✓ **Output:** a report describing the technical basis of the provisions already taken or planned in each country regarding the electrical sources, the distribution systems and the loads.

• **International benchmarking project on fast-running software tools for the estimation of fission product releases during accidents at nuclear power plants:**
  ✓ **Output:** a state-of-the-art report for simple tools to estimate fission product releases, including areas for improvement.
Safety Research Activities (1/2)

- Resolve issues relevant for the nuclear community by means of research shared by many countries.
- Enhance technical exchange, co-operation and consensus-building internationally.
- Support the continued operation of unique test facilities which are of value to the OECD/NEA nuclear community.
- Help to retain OECD/NEA technical expertise and infrastructure in strategic fields of nuclear energy.
- Facilitate the above by means of cost-sharing arrangements where many countries contribute to programme funding.
Safety Research Activities (2/2)

- **Ongoing joint research projects** addressing issues from the accident to varying degrees, plus creation of an **expert group** on severe accidents, materials and other disciplines, to identify what **data** could be obtained from the decommissioning process at Fukushima Daiichi of use for **new safety research projects**.

- New project initiated following the proposal from Japan to improve severe accident codes and to determine the evolution of the accident at the three units: **BSAF - Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Station**.

  ✓ **Output**: Phase I will be a full-scope severe accident analysis for the first ~6 days of the accident scenario. Modelling results from Phase I will inform decommissioning processes and measurements, which in turn provide data for further phases of modelling and for improving severe accident codes and analysis.
Fukushima-related Research Activities

• **HYMERES: Hydrogen Mitigation Experiments for Reactor Safety**
  ✓ Hosted by Switzerland and France (PANDA/MISTRA).

• **BSAF: Benchmark Study of the Accident at the Fukushima Daiichi Nuclear Power Station**
  ✓ Eight countries participating. Hosted by Japan.

• **ATLAS: Beyond-design-basis accidents**
  ✓ Hosted by the Republic of Korea.

• **PKL-3: Accident management for PWRs**
  ✓ Hosted by Germany.
Radiological Protection Activities

• Criteria for international trade in food and goods.
• Policies on returning to evacuated areas, clean-up and waste management.
• Workshops on decontamination and stakeholder involvement.
• Emergency management communications and ICRP recommendations.
• Collecting information on management of occupational exposure in high radiation areas.
Liability and Compensation

• The Nuclear Law Committee (NLC) has received extensive presentations from Japanese experts on Japan’s implementation of its liability and compensation regime after the Fukushima Daiichi nuclear power plant accident.

• NEA Legal Affairs in co-operation with the Japanese Mission to the OECD published a report in 2012 on Japan’s Compensation System for Nuclear Damage, which included relevant legal texts and commentary from Japanese experts.

• Although Japan is not currently a member of one of the international conventions, Japan’s legislation mirrors international norms, e.g. strict liability, exclusive liability (legal channeling) and compulsory financial security.

• The Japanese experience provides lessons and good practices, e.g. in claims handling and establishing guidance for compensation payments.
Multinational Design Evaluation Programme (MDEP) members

Regulatory authorities of:

Full members:

- Canada
- China
- Finland
- France
- India
- Japan
- Republic of Korea
- Russian Federation
- South Africa
- Sweden
- United Kingdom
- United States

Associate members:

- Turkey
- United Arab Emirates

- NEA Technical Secretariat

IAEA participation in generic activities.
Multinational Design Evaluation Programme (MDEP)

**Technical Experts Subgroups**
- Digital I&C
- Accidents & Transients
- Probabilistic Safety Assessment
- Severe Accidents
- + Ad hoc expert subgroups

**Issue-Specific Working Groups: Convergence**
- EPR Working Group
- AP1000 Working Group
- APR1400 Working Group
- VVER Working Group
- ABWR Working Group

**Design-Specific Working Groups: Co-operation**
- Digital I&C Working Group
- Mechanical Codes and Standards Working Group
- Vendor Inspection Co-operation Working Group

**Steering Technical Committee**
- Policy Group

**MDEP Library**
Key Messages about MDEP

• MDEP is a key programme for new build activities, pooling an effective and efficient expert network from different countries.

• MDEP is a mid- and long-term programme, but short-term concrete results are necessary.

• Significant progress is being made: joint inspections and common protocol, common positions, convergence of mechanical codes, sharing design review activities, commissioning programmes, digital I&C.

• Convergence of regulatory practices will in time lead to convergence of regulatory requirements.

• MDEP is ensuring information dissemination.
The Fukushima Daiichi Nuclear Power Plant Accident: OECD/NEA Nuclear Safety Response and Lessons Learnt

• Executive Summary
• Introduction
• Immediate response by NEA member countries
• NEA initial considerations and approach
• NEA actions in follow-up to the Fukushima Daiichi accident
• Direct support to Japan by the NEA
• Key messages
• Conclusions
• All NEA member countries took early action.
  ✓ No technical basis for requiring the currently operating plants to shut down (except in Japan).

• All countries with nuclear facilities carried out targeted comprehensive safety reviews or “stress tests” addressing:
  ✓ Extreme external events (i.e. earthquakes and flooding hazards);
  ✓ Loss of safety functions caused by long-term loss of electrical power and/or loss of cooling water supplies;
  ✓ Accident management and defence-in-depth;
  ✓ Emergency preparedness and radiological protection;
  ✓ Post-accident recovery and clean-up;
  ✓ Crisis communication;
  ✓ Regulatory infrastructure;
  ✓ Bilateral and regional collaboration.

• Safety reviews identified safety enhancements.
Key Messages from the Report

- Assurance of safety
- Shared responsibilities
- Human and organisational factors
- Defence-in-depth (DiD)
- Stakeholder engagement
- Crisis communication
- International aspects of emergency preparedness
- Trade and transportation issues
- Research and development
- International co-operation and NEA contribution
Conclusions from the Report

• After focused safety reviews, the current safety level is sufficient and **no immediate shutdown is required**, but need to increase robustness to face extreme situations **beyond existing safety margins**.

• **Operators** have the **prime responsibility for safety**. Regulatory authorities play a **fundamental role** in ensuring such compliance.

• Since a severe accident can never be completely ruled out, the necessary provisions for dealing with and managing an emergency situation (**onsite and offsite**) must be planned, tested and regularly reviewed.

• The accident identified **significant human, organisational and cultural challenges** (including to ensure independence, technical capability and transparency of the regulatory authority).
Summary

• The NEA continues to support its member countries in enhancing the technical basis for the safe and economic use of nuclear power.
• The safety committees have initiated activities after the Fukushima Daiichi accident to further improve power plant safety and the regulatory framework.
• The NEA committees continue to play a leading role in performing and further developing safety research projects.
• The NEA safety committees provide a framework to assist member countries in the resolution of safety challenges related to the accident, and to strengthen confidence in the solutions and their implementation.
• The NEA is interacting very closely with Japanese institutions to co-operate and benefit from the broad research programme related to the Fukushima Daiichi decommissioning plan.
Thank you for your attention