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SAFETY

Safety Convention finds widespread agreement on post-Fukushima actions

THE SECOND EXTRAORDINARY Meeting on the Convention on Nuclear Safety (CNS) achieved some unexpected results, as well as a considerable amount of agreement on actions to be taken by countries to improve safety. The meeting, whose purpose was to review the lessons of the Fukushima Daiichi accident and to consider its potential impact on the convention's effectiveness, was held August 27–31 at the headquarters of the International Atomic Energy Agency in Vienna. The president of the meeting was Li Ganjie, vice minister in China's Ministry of Environment Protection and the head of China's National Nuclear Safety Administration. In his opening remarks, he noted that the accident "provided an opportunity for all contracting parties to think and reflect, and to identify areas for improvement that will be beneficial for us in the future."

The meeting's vice presidents were William Borchardt, of the U.S. Nuclear Regulatory Commission, and Patrick Majerus, of Luxembourg's Department of Radiation Protection.

One major achievement of the meeting was the development and approval of a revision of the main guidance documents used in preparing the national safety reports required under the convention and in conducting the review meetings that take place

Meeting participants discussed a range of nuclear safety-related topics, including severe accident management and recovery, reactor design, and emergency preparedness and response.

every three years. The revisions of the guidelines are expected to make national reports more comprehensive and to enhance the effectiveness of the peer review process, which is considered vital to improving nuclear safety. Also discussed were proposed amendments to the text of the convention, a process that will require further rounds of discussion and negotiation before any agreement is likely to be achieved.

At the opening plenary session, IAEA Director General Yukiya Amano noted that one year after the IAEA Action Plan on Nuclear Safety was adopted (at last year's IAEA General Conference), the agency has made significant progress in several key areas, including the assessment of safety vulnerabilities of nuclear power plants, the strengthening of IAEA peer review services, improvements in emergency preparedness and response capabilities, and the review of IAEA safety standards. Amano also stressed the need to "maintain our sense of urgency and our commitment to

implementing the Action Plan in full. Much work remains to be done, and we must not relax our guard."

A presentation on the current conditions at Fukushima Daiichi and the associated activities undertaken in Japan was also given at the opening plenary by Shinichi Kuroki, deputy director general for nuclear power at Japan's Nuclear and Industrial Safety Agency.

Summary of results

The official summary report of the meeting describes key actions taken and challenges faced by many countries in the wake of the Fukushima accident, based on discussions held in six working sessions covering external events, design issues, severe accident management and recovery (on site), national organizations, emergency preparedness and response and post-accident management (off site), and international cooperation.

The report also provides a summary of

the discussions on ways to enhance the effectiveness of the convention, which should serve to improve the functioning of national nuclear safety programs. In this regard, the meeting decided to establish an “effectiveness and transparency” working group to produce a list of actions to strengthen the convention and proposals to amend it. These will be presented at the next CNS review meeting.

The summary notes that while most countries have conducted targeted safety reviews of their nuclear power plants and have taken specific actions to enhance their protection from extreme natural hazards, many of their reviews reached very similar conclusions, and many of the safety enhancements implemented were also the same.

Besides the need for prompt action to ensure the continued safety of existing and planned nuclear power plants, the Fukushima Daiichi accident has raised issues particularly important to power reactor design, including those related to natural and human-induced external events. The displacement of people and the contamination of land after the accident also focused the attention of national regulators on the need to identify ways to prevent and mitigate the potential for severe accidents with off-site consequences. The report emphasizes that nuclear power plants should be designed, constructed, and operated to meet these objectives.

Addressing Fukushima issues

The summary also provides a list of significant activities and actions that have been or are being taken in countries in response to the weaknesses in the design, construction, and operation of the Fukushima plants that were exposed by the accident. These include the following:

- Reevaluating the hazards posed by external events, such as earthquakes, floods, and extreme weather conditions, for each nuclear power plant site through targeted reassessment of safety.
- Upgrading safety systems or installing additional equipment and instrumentation to enhance the ability of each nuclear power plant to withstand an unexpected natural event without access to the electrical power grid for an extended period of time, including for an external event affecting multiple units.
- Installing additional equipment and instrumentation in spent fuel pools to ensure that cooling can be maintained or restored in all circumstances.
- Performing an evaluation of the guidance that is to be used by operators to manage emergency situations that result from severe accidents caused by extreme natural phenomena at nuclear power plants, including for low-power and shutdown states. These guidance documents include emergency operating procedures to prevent core

damage, severe accident management guidelines to prevent containment failure, and extensive damage mitigation guidelines to address accidents that result in fires or explosions affecting a large portion of a nuclear power plant.

- Developing probabilistic safety assessments to identify changes in radiation protection measures for workers on the site or additional accident management measures that might be needed to perform necessary activities in the event of a severe accident.
- Reviewing and updating national, regional, provincial, municipal, and local emergency plans and conducting exercises to encourage greater coordination among

the various organizations.

- Improving radiation monitoring and communications capabilities and enhancing public communications, such as via dedicated public Web sites.
- Upgrading regional, off-site, and on-site emergency response centers.
- Undertaking review and revision of the country’s legislative framework and making changes to the functions and responsibilities of its regulatory body.

The summary also highlights the importance of international cooperation, noting the value of bilateral and regional collaboration and international peer review missions, as well as participation in IAEA Ac-

tion Plan activities and implementation of the recommendations of the World Association of Nuclear Operators' Fukushima Commission. It also notes that the networks of operators, regulatory bodies, international organizations, and technical support organizations were encouraged to cooperate in identifying and implementing safety improvements based on the lessons of the accident.

National reports

The summary also lists significant safety improvements and other actions reflecting the lessons from Fukushima that should be covered in the national reports that are submitted to the CNS review meetings. These could include, for example, the following:

- For existing nuclear power plants, the results of reassessments of external events and of peer reviews, and any follow-up actions.
- For new nuclear power plants, added safety features and other improvements to address external hazards, prevent accidents, and mitigate their effects.
- Upgrading of accident management measures for extreme natural events, including measures to ensure core and spent fuel pool cooling, the provision of alternate water sources and electrical power supplies, and filtration strategies and hydrogen management in the containment. The development of probabilistic safety assessments to identify additional accident management measures should also be considered as a possible future activity.
- Measures taken or planned to ensure the effective independence of the regulatory body from undue influence.
- Enhancements of emergency preparedness and response measures, such as new approaches and methods of estimating source terms and remediation initiatives.

Safety culture and human and organizational factors were also identified as cross-cutting issues that affect all important areas, including external events, design, severe-accident management, the functioning of national organizations, and emergency preparedness and response.

Setting out objectives

Attached to the summary report is a set of "action-oriented" objectives for strengthening nuclear safety, whose primary importance had been highlighted by the first lessons learned from the Fukushima accident. These include the use of IAEA safety standards, the enhancement of transparency, and the use of international peer review missions. Several also concern regulatory effectiveness—in particular, ensuring that the regulator is effectively independent and that it is provided with adequate legal authority, competent staff and other resources, access to external expertise, and access to international cooperation for fulfilling its responsibilities for the safety of nuclear installations.