International Conference on Radioecology and Environmental Radioactivity

15 – 20 June 2008, Bergen

This conference was organized by the Norwegian Radiation Protection Authority (NRPA) and the French Institute for Radiation Protection and Nuclear Safety (IRSN) in cooperation with IAEA, WHO, OECD/NEA, the International Union of Radioecology (IUR), the International Commission on Radiological Protection (ICRP) and the Journal of Environmental Radioactivity (JER). This conference has evolved from the merging of the series of conferences by ECORAD and of the International Conferences on Radioactivity in the Environment. It was attended by 370 participants from 48 countries and international organizations.

The primary objective of the conference was to review all scientific themes related to the study of environmental radioactivity and to identify new societal needs and requirements for regulatory bodies and industry. All sources of radiation, from industrial discharges in planned exposure situations through to sources in existing and emergency exposure situations, were included in the scope of the conference. Both normal and potential exposures were considered. Provision of support in the development of legislative and regulatory documents on radiation protection for people and the environment as well as the design of appropriate emergency response measures were important focus areas of the conference.

The Bergen Fjord

The conference was organized into sessions covering the following topics: Environmental Protection; Risk Assessment; Emergency Preparedness and Rehabilitation; NORM; Radioactive Waste; and Radiation and Society.

The conference confirmed needs to maintain and enhance competences in radioecology, to fill the knowledge gap and to reduce uncertainties, to look to new challenges but keep the competence of the past. The conference highlighted needs in the further elaboration and harmonization of approaches and methodologies for the radiation protection of people and the environment.

CSS endorses the road map for the long term structure of safety standards

After completing the Action Plan for the Development and Implementation of Safety Standards approved by the Board of Governors in March 2004, the IAEA is now developing a long term structure for the safety standards. This structure is being established in close consultation with the Commission on Safety Standards and the four safety standards committees.

The intention is to take advantage of the unified Fundamental Safety Principles and to use a top-down approach for the identification of the most efficient and effective structure for the set of Safety Requirements needed to ensure the application of the safety principles. The long term structure would keep the current hierarchy with three levels (Fundamentals, Requirements and Guides) and would take into account the need for regulatory stability. The intention is to establish a General Safety Requirements integrating requirements for all thematic areas into a stable, coherent and harmonized set, complemented by a series of facilities and activities specific Safety Requirements. Safety measures and security measures must be designed and implemented in an integrated manner.

The future collection of safety standards should be a manageable number of publications, each being as concise as possible and addressing essential safety issues.

IAEA International Atomic Energy Agency

NS Update
No. 7, July 2008

08-26711

Wagramer Strasse 5, P.O. Box 100,
1400 Vienna, Austria

The NS Update is prepared quarterly by the Department of Nuclear Safety and Security.

Printed by the IAEA in Austria, September 2008.

IAEA International Atomic Energy Agency

NS Update

Issue No. 7, July 2008

Current safety and security activities and developments taking place in the Department of Nuclear Safety and Security

http://www.iaea.org/OurWork/ST/NS

The Ibero American Forum of Nuclear and Radiation Safety and Security Regulatory Agencies

The Ibero American Forum of Nuclear and Radiation Safety and Security Regulatory Agencies (the FORO) was created in 1997 with the objective of promoting nuclear safety and security to the highest level in the Ibero American region.

The FORO is composed of the nuclear regulatory agencies of Argentina, Brazil, Chile, Cuba, Mexico, Spain and Uruguay and will incorporate new members as its organizational and institutional structure is consolidated.

The FORO is managed by a plenary, composed of the heads of the respective agencies. The presidency rotates among its members and is supported by a secretary in Buenos Aires, Argentina. For the 2008/2009 term, Argentina holds the presidency.

To achieve its objectives, the FORO has established a programme aimed at exchanging experience and conduct of joint activities related to common problems that will strengthen competencies in member countries.

The IAEA nuclear safety programme is the scientific reference for the FORO technical work programme. The formulation and implementation of the technical programme is within the framework of an IAEA extrabudgetary programme and is focused on areas considered priorities for the region. A steering committee composed of senior representatives of the FORO countries and the IAEA coordinates the implementation of the programme.

Specific projects completed and under way include a probabilistic safety assessment (PSA) for radiotherapy treatments with accelerators, using lessons learned from accidental exposures and PSAs to provide safety recommendations for radiotherapy treatments at any hospital and the continuous improvement of regulatory control of medical exposures. A new project has also been initiated addressing ageing and licensing of life extension for nuclear power plants.

The Ibero Amercian Network home page.

To ensure an effective mechanism for capturing, analysing and sharing knowledge and experience of regulatory interest, the FORO has developed a network called the Ibero American Nuclear and Radiation Safety Network (http://www.foroiberam.org/). The state-of-the-art information technology tool that supports the Network operation is hosted in Brazil.

The network is composed of key components that facilitate the management of institutional information, knowledge and technical activities. The network components work in concert to provide a forum for meetings to share news, experience and lessons learned; a platform for sharing relevant regulatory documents and for providing education and training; and a working environment for exchanging technical information and reports from projects and activities.

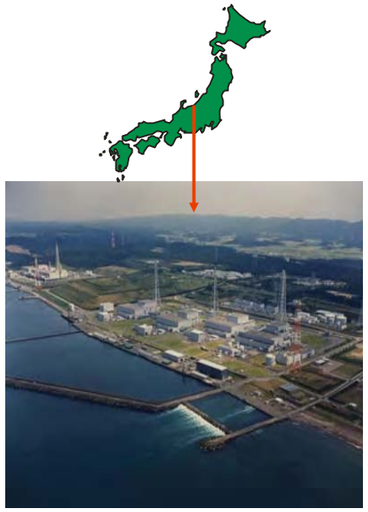
The network and results of the various projects under the FORO will be presented at the 12th World Congress of the International Radiation Protection Association in October 2008 in Buenos Aries, Argentina.

NS Update, No. 7, July 2008

Kashiwazaki-Kariwa Nuclear Power Plant in the Earthquake

What Happened?

On 16 July 2007, the strong Niigataken Chuetsu-Oki earthquake with a moment magnitude of 6.6 (M_{JMA}=6.8 according to the Japanese Meteorological Agency) occurred at 10:13 local time with its epicentre about 16 km north of the site of the Kashiwazaki-Kariwa nuclear power plant and its hypocentre below the seabed of the Jo-chuetsu area in Niigata prefecture. The earthquake caused extensive damage in the surrounding region.



The Kashiwazaki-Kariwa plant is the largest nuclear power plant in the world. It is operated by Tokyo Electric Power Company (TEPCO). The site has seven units with a total of 7965 MW net installed capacity. Five reactors are of the boiling water reactor (BWR) type with a net installed capacity of 1067 MW each. Two reactors are of the advanced boiling water reactor (ABWR) type with 1315 MW net installed capacity each. The five BWR units entered commercial operation between 1985 and 1994 and the two ABWRs in 1996 and 1997 respectively.

Plant Response and Effects

At the time of the earthquake, four reactors were in operation: Units 2, 3 and 4 (BWRs) and Unit 7 (ABWR). Unit 2 was in start up condition but was not connected to the grid. The other three reactors were in shutdown conditions for planned outages: Units 1 and 5 (BWRs) and Unit 6 (ABWR).

Although it appeared that the Niigataken Chuetsu-Oki earthquake significantly exceeded the design basis ground motion as indicated by the response spectra comparison at the level of the foundation mat in all units, all of the units behaved in a safe manner, during and after the earthquake.

Owing to proper functioning of the automatic seismic scram system, the units in operation and the unit in start up condition were all shut down safely when the earthquake occurred. The earthquake resulted in other effects at the site such as a fire in the in-house electrical transformer of Unit 3, a release of a very limited amount of radioactive material to the sea and the air, and damage to non safety related structures, systems and components of the plant as well as to outdoor facilities.

IAEA Expert Mission

Following this event, the Government of Japan through the Nuclear and Industrial Safety Agency (NISA) invited the IAEA to carry out a fact finding mission with the main purpose of identifying preliminary findings and lessons learned from this event in order to share them with the international nuclear community. The mission took place from 6 to 10 August 2007.

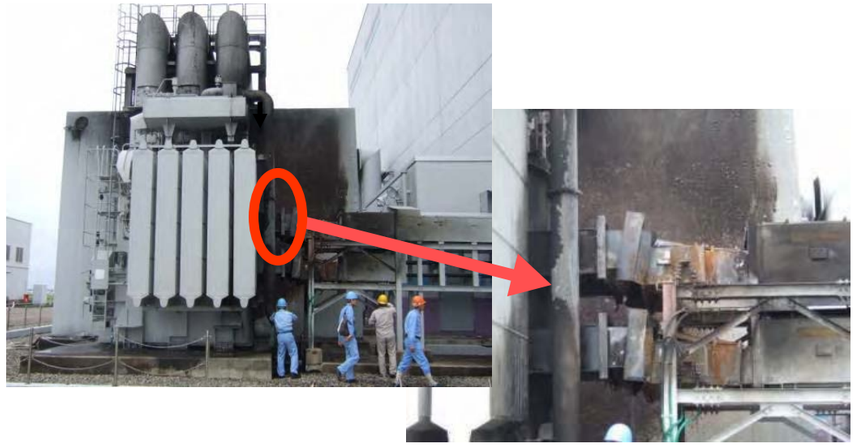
The mission objectives, as agreed with the Japanese counterpart organization, were to conduct a fact finding mission in relation to the current conditions at the nuclear power plant and to identify preliminary lessons learned from the event that might have implications for the international nuclear safety regime.

The mission complemented the safety evaluations of the incident that were being performed by Japan's Nuclear and Industrial Safety Agency, Japan's Nuclear Safety Commission and the plant operator, the Tokyo Electric Power Company. The IAEA team examined the performance of the nuclear power plant units during and after the earthquake and in particular, the fulfilment of the fundamental safety functions which are required to be maintained at a nuclear power plant immediately following such an event. The scope of the mission was limited to three subject areas: 1) seismic design, 2) plant behaviour and 3) operational safety management.

Since the occurrence of the Niigataken Chuetsu-oki earthquake on 16 July 2007, numerous studies, investigations and analyses for assessing the seismic safety of the site and the plant have been carried out by Japanese organizations. NISA invited the IAEA to conduct another mission from 28 January to 1 February 2008. The purpose of the second IAEA mission was to conduct a follow-up of the preliminary findings of the August 2007 mission on the basis of the results available in January 2008 of the related studies and investigations undertaken since the first mission.

Main Findings and Lessons Learned

The consequences of the earthquake at the plant were unique in the sense that the levels of seismic ground motion estimated in the design process were very significantly exceeded by the event. For example, one of



the observed maximum accelerations at the Unit 1 foundation mat was determined to be 680 cm/s^2 in comparison with the design value of 273 cm/s^2. Based on the reports from TEPCO experts and the in-plant walkdowns and visual observations performed by IAEA experts, safety related structures, systems and components of the plant seemed to be in a general condition much better than expected for such a strong earthquake, with no visible damage. This was probably due to the conservatisms introduced at different stages of the design process. The combined effects of these conservatisms were apparently sufficient to compensate for uncertainties in the data available and the methods applied at the time of the design of the plant and consequent underestimation in the original design basis ground motions. Furthermore, good construction quality and plant layout helped to minimize seismic systems interaction issues.

Details regarding main findings and lessons learned are documented in the associated mission reports.[1] Specific areas discussed include: exceedance of the design basis ground motion, re-evaluation of the seismic hazard, off-site power, common-cause failures, fire safety, seismic systems interaction, soil failures, anchorage failures, operational safety management and releases.

Ongoing and Future Activities

In addition to the reporting on the impact of the earthquake by Japan at the Senior Regulators' Meeting during the 51st IAEA General Conference in September 2007, Japan also hosted an IAEA international workshop on this matter from 19 to 21 June 2008, in Kashiwazaki, to share recent technical knowledge and information on research developments, as well as the experience and good practices relating to the occurrences and effects of strong earthquakes on nuclear power plant sites, focusing on the challenges posed by the Kashiwazaki-Kariwa case. The workshop was attended by over 300 participants.

The results of the evaluations and review processes presently in progress will indicate changes that will be implemented in Japanese regulatory guidance and standards. It is also likely that, eventually, there will be an influence on the approaches to the seismic safety of nuclear power plants worldwide. For this reason, it is essential that findings and lessons learned are well identified and are communicated to the international scientific and technical nuclear community.

It has been agreed between the IAEA and NISA that other follow-up missions will be conducted in the future to consider additional developments from the ongoing safety integrity evaluation process.

IAEA has contributed significantly to assisting Member States on seismic safety for more than 20 years. IAEA safety standards based on current knowledge in this area will be updated to reflect lessons learned from recent events such as the strong Niigataken Chuetsu-Oki earthquake and its effects on the Kashiwazaki-Kariwa nuclear power plant.

Additionally, the IAEA is proposing to create an International Seismic Safety Centre (ISSC) to consolidate all the experience and expertise that has been gathered throughout the last decades in the area of seismic safety and to share that information with the international community.

[1] http://www.iaea.org/NewsCenter/News/PDF/kashiwazaki060807_vol1.pdf; http://www.iaea.org/NewsCenter/News/PDF/kashiwazaki060807_vol2.pdf; http://www.iaea.org/NewsCenter/News/PDF/kashiwazaki280108_vol1.pdf