

Symposium on

One Year after the Fukushima Nuclear Accident – the Way Forward with Safety and Risk Engineering

10 March 2012

Organized by Hong Kong Nuclear Society and
Department of Mechanical and Biomedical Engineering, City University of Hong Kong



Since the nuclear power plant accident took place at Fukushima last year, it has drawn public concerns on nuclear safety and risk management. As it is almost one year past the accident, the Hong Kong Nuclear Society organizes this symposium to invite local and overseas experts to share with their views on these issues.

Date: Saturday, 10 March 2012

Time: 13:30 to 18:00

Venue: Room 2505, 2/F, Academic 2 Building, City University of Hong Kong,
Kowloon Tong, Kowloon, Hong Kong

Registration Fees:

- General registration: HK\$300
- Organizer and supporting organisation members: Free

Registration (Deadline: 7 March, 2012):

1. For organizer and supporting organization members, please register at
<http://www.hkarms.org/Registration/EventRegister.php?Event=42>
2. For general registration, please fill in the following Registration Form and prepare cheque, payable to
Hong Kong Nuclear Society, sign and send by postal with the completed Registration Form to **Dr. Louis Liu, SEEM Department, City University of Hong Kong, Kowloon, Hong Kong**.

Registration Form

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Enquiry: Please send email to hkns2012@gmail.com or call at (852)34429536.

Program

Time	Session
13:00 ~ 13:45	Registration, and Greetings to Speakers and Guests
13:45 ~ 14:00	Opening and Welcome Note
14:00 ~ 14:10	Welcome Speech by Guest of Honour
14:10 ~ 14:50	Guest Speech #1: Crossroad of Severe Accident in the Fukushima Dai-ichi NPP Accident, by Prof. Akira Yamaguchi by Prof. Akira Yamauchi, Osaka University, Japan
14:50 ~ 15:20	Guest Speech #2: Sensors Needs for Design Basis and Beyond Design Basis Harsh Environments, by Dr. Bruce Hallbert, Idaho National Laboratory, U.S.A.
15:20 ~ 15:40	Coffee/Refreshment Break
15:40 ~ 16:10	Guest Speech #3: Taiwan's Response and R&D Changes to Fukushima Daiichi NPP Accident in Japan, by Dr. Tsu-Mu Kao, Institute of Nuclear Energy Research, Taiwan
16:10 ~ 16:40	Guest Speech #4: One year after : An Overview of the Consequences of Fukushima Daiichi Accident in France, by Dr. Jean-Christophe Gariel, the Environment Department, IRSN, Paris, France
16:40 ~ 17:10	Guest Speech #5: Insights, Thoughts and Effects of the Fukushima Accident, by Dr. Ren Jun Sheng (任俊生博士), National Nuclear Safety Administration (國家環保部核安全專家委員會委員)
17:10 ~ 17:40	Forum chaired by Ms Christine Loh
17:40 ~ 17:50	Closing Remark

Guest Speech #1: Title: Crossroad of Severe Accident in the Fukushima Dai-ichi NPP Accident, by Prof. Akira Yamaguchi

March 11 of 2011 is the day that should be engraved in the heart of nuclear societies. The 2011 earthquake off the Pacific coast of Tohoku occurred at 14:46 Japan Standard Time on March 11. All the nuclear power plants in the Eastern Japan along with the Pacific Ocean coastline have successfully shutdown according to the earthquake ground motion. In 40 minutes, the first tsunami struck the Fukushima Dai-ichi Nuclear Power Station. The tsunami height was 15 m at maximum which was far beyond the design tsunami height. It caused the submergence in seawater of the emergency power supply and seawater systems. It results in the station black out and loss of ultimate heat sink in the units 1-4 of the Fukushima Dai-ichi Nuclear Power Station. To make the matter worse, hydrogen explosion in the reactor building took place, which has every effort for recovery all fail. Consequently the reactor cores were seriously damaged and the nuclear fuel melted which lead to the radioactive material release to the environment. Evidences currently available indicate no seismic structural failure of safety systems and components. The tsunami and the station blackout gave intense impact on the nuclear system resulting in the radioactive material release.

Fundamental concept of the nuclear safety is the defence-in-depth. It consists of three fundamental approaches for prevention, mitigation and emergency preparedness. Other nuclear power plant such as Fukushima Dai-ni and Onagawa sustained serious influence from the earthquake and tsunami. The crossroad in the accident progression is discussed and

essential lessons-learned are identified. It seems the success or failure of the individual defense line depends significantly on the practical and efficient usage of the probabilistic risk assessment and accident

Speaker's bios: Prof. Akira Yamaguchi, PhD, Osaka University, Department of Energy and Environment, Japan. Prof. Yamaguchi holds BS (1979) and MS (1981) degrees in Nuclear Engineering from the University of Tokyo, Japan. He continued his research on the nuclear safety and he received his Ph.D degree in the field of Fluid-Structure Interaction in Nuclear System from the University of Tokyo in 1984. He joined Power Reactor and Nuclear Fuel Development Corporation (PNC) which is the national research institute for nuclear fuel cycle and fast breeder reactor development project. Since 2006, he is Professor of Osaka University, Department of Energy and Environment.

He has more than 30 year experience in the nuclear engineering and safety. He is currently a member of special committees of the Nuclear Safety Committee, New Nuclear Policy-planning Council of Atomic Energy Commission in Japan and other committees of Japanese Nuclear Regulatory Body. He is the Chair of Risk Technology Committee for PRA standards development in the Atomic Energy Society of Japan.

Guest Speech #2: Title: Sensors Needs for Design Basis and Beyond Design Basis Harsh Environments, by Dr. Bruce Hallbert

Existing sensors used in nuclear power plants are or may be insufficient: 1) to withstand with assurance the environmental conditions and harsh environments, 2) to cover the range of conditions that may be encountered - would fail before doing so and 3) to measure parameters needed for accident management and long-term plant recovery efforts. In this talk, advances in I&C technologies needed to address post accident management and long term recovery issues will be discussed. Also, enabling technologies such as materials, sensors, robotics, communications, and radiation hardened electronics which are needed to enhance operational awareness will be addressed.

Speaker's bios: Dr. Bruce Hallbert is the Director of Nuclear Science Enabling Technologies at the Idaho National Laboratory, a U.S. Department of Energy National Laboratory located in Idaho Falls, Idaho. He has a broad background in the international nuclear industry having worked over 25 years with national and international agencies on issues that include: nuclear plant instrumentation & control technologies, probabilistic risk assessment; human reliability analysis; advanced reactor control room design and staffing; advanced alarm systems; emergency operating procedures, accident management; management and organizational factors; safety culture and the risk impact of operational accidents. He is the research pathway lead of Instrumentation, Information, & Control Systems research for the DOE-sponsored Light Water Reactor Sustainability Program (LWRS) and the national technical director of Advanced Sensors and Instrumentation research for the DOE-sponsored Nuclear Energy Enabling Technologies program. He currently serves as the President of the International Association of Probabilistic Safety Assessment and Management and is the US representative to the International Atomic Energy Agency (IAEA) for nuclear power plant instrumentation and controls. He serves as a member of the board of external advisors to the Ohio State University and the University of Tennessee departments of Nuclear Engineering. He received his doctorate (Ph.D.) in Interdisciplinary Engineering from Vanderbilt University in Nashville, Tennessee.

Guest Speech #3: Title: Taiwan's Response and R&D Changes to Fukushima Daiichi NPP Accident in Japan, by Dr. Tsu-Mu Kao

A State of Emergency was declared on March 11, 2011 by Japan's nuclear regulator, NISA (Nuclear and Industrial Safety Agency), on the Fukushima Daiichi nuclear plant after a serious earthquake and subsequent tsunami struck and crippled the plant, causing reactors in a devastated conditions and radioactivity releases. On April 12, the NISA upgraded the severity of the Fukushima Daiichi accident to highest INES (International Nuclear and Radiological Event Scale) Level 7.

As a neighborhood of Japan, Taiwan's AEC (Atomic Energy Council) formed a special taskforce to monitor the daily situation at Fukushima by various channels and post the plant conditions on the website. Several press conferences were held since the accident occurred. Taiwan's AEC also cooperates with other government agencies to take a series of actions such as: monitoring the environment radiation level, sampling import goods from Japan, and surveying contamination of travelers from Japan, etc.

For the plant examinations, AEC requested the TPC (Taiwan Power Company) to verify the capability of NPPs (Nuclear Power Plants) to respond both the DBA (Design Basis Accident) and beyond-DBA accident. That includes 11 near-term and 1 mid-term actions. Those actions will be introduced in detail. The changes of Taiwan's nuclear R&D to Fukushima Daiichi NPP Accident will be addressed. The AEC/INER (Institute of Nuclear Energy Research) will continuously collect and monitor the most current plant conditions at Japan and will review TPC's countermeasures and perform necessary inspections for all NPPs in Taiwan to ensure plant safety. Taiwan, as part of global nuclear community, hopes to participate in the international forum to discuss and share lessons learned from Fukushima Daiichi Accident.

Speaker's bios: Dr. Tsu-Mu Kao, PhD, Deputy Director of Nuclear Safety Technology Center, Institute of Nuclear Energy Research, Taiwan. Dr. Kao holds BS (1980) and MS (1982) degrees in Nuclear Engineering from National Tsing-Hua University, Taiwan. He received his Ph.D. degree in the field of Probabilistic Risk Assessment (PRA) from the Massachusetts Institute of Technology (MIT), USA in 1998. Currently, he serves as the Deputy Director of the Nuclear Safety Technology, Institute of Nuclear Energy Research (INER), Atomic Energy Council. He is also a certified professional engineer of Radiation Protection and a certified BWR-6 (Boiling Water Reactor, model 6) Senior Reactor Operator.

He has more than 29-year working experiences in the nuclear industry (6 years in Maanshan Nuclear Power Station (MNPS, a PWR (Pressurized Water Reactor)), Taiwan Power Company), nuclear regulation (3 years as BWR & PWR Regulatory Resident Inspector, Atomic Energy Council), and nuclear and non-nuclear R&D (over 20 years for INER). Dr. Kao was elected as a member of Board of Directors of International Association for PSAM (Probabilistic Safety Assessment and Management) in 2006 (to 2014).

Guest Speech #4: One year after : An Overview of the Consequences of Fukushima Daiichi Accident in France, by Dr. Jean-Christophe Gariel

The French Institute for Radiological Protection and Nuclear safety (IRSN) is a Technical Safety Organisation (TSO) in charge of assessing nuclear and radiological risks. The presentation will focus on the actions that were performed by IRSN during and following the Fukushima Dai-Ichi accident. In a first part, we will focus on the technical assessment that IRSN produced during the first months of the crisis. A particular focus will be made on the aspects related to the assessment of the consequences of the atmospheric and marine releases. In a second part, a description of the consequences of the Fukushima Daiichi accident on the nuclear industry in France will be presented. In particular, the main conclusions of the Complementary Safety Assessments (CSA) requested by the government to the nuclear operators will be discussed.

Speaker's bios: Dr. Jean-Christophe Gariel received his PhD in Geophysics from Grenoble University (France) in 1988. From 1988 to 1990, he was an associate researcher at Columbia University (USA), Lamont Doherty Geological Observatory. His research topic was "Seismic hazard assessment for New York City". From 1990 to 1991, he was an associate researcher at Kyoto University (Japan), and his research topic was "Prevision of ground motion for giant earthquakes off Japan coasts (Nankai and Tonankai areas)". From 1991 to 1996, he was a researcher at French Nuclear Safety Institute (IPSN). He was in charge of the evaluation of seismic hazard for nuclear installations in France. From 1996 to 1999, he was the head of a laboratory in charge of the evaluation of seismic hazard for nuclear installations in France (IPSN, Paris, France). From 1999 to 2003, he was the head of a division in charge of the study of the transfer of radionuclides in the environment (IPSN, Cadarache, France). From 2003 to 2007, he was the head of a division in charge of the study of the transfer and effects of radionuclides in the environment that belonged to Institute for Radiological Protection and Nuclear Safety. (IRSN, Cadarache, France). For 2007 to 2011, he was the Deputy Director of the Environment and Emergency operations

Department (IRSN; Paris, France). He is currently the Director in charge of the Environment Department (IRSN, Paris, France). Besides, Dr. Gariel is a member of the French Association for Earthquake Engineering, Member of the French Society for Radiological Protection.

**Guest Speech #5: Insights, Thoughts and Effects of the Fukushima Accident, by Dr. Ren Jun Sheng (任俊生博士),
National Nuclear Safety Administration (國家環保部核安全專家委員會委員)**

The presentation will offer insights from the Fukushima accident. It will also highlight issues in nuclear safety to be focused upon, including the topic of ultimate safety and its consideration, and provide a general view on the current nuclear safety status in China.

Speaker's bios: Dr Ren Junsheng, Member of the Nuclear Safety Expert Commission of the State Ministry of Environmental Protection. He completed Ph D study in Nuclear Power Engineering and Safety. He was engaged in the regulatory authority in nuclear safety in China before 2002, and held positions as Deputy Director and Chief Engineer of the Nuclear Safety Centre of the State Ministry of Environmental Protection, being responsible for the safety assessment and monitoring of a number of nuclear power stations. He took up responsibilities at the China Guangdong Nuclear Power Holding Company (CGNPC) since 2002, taking up positions as the Deputy President and Chief Engineer of the CGN Design Company, Chief Engineer of the China Guangdong Nuclear Power Engineering Company, Safety Director of the Daya Bay Nuclear Power Operations & Management Company, and the Deputy Chief Engineer of CGNPC. He served in the nuclear industry for nearly 30 years, in areas including design, engineering, operation and nuclear safety regulation.



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