



## **International Experts' Meeting**

**on**

### **Strengthening Research and Development Effectiveness in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant**

Organized in cooperation with the  
Nuclear Energy Agency of the  
Organisation for Economic Co-operation and Development  
(OECD/NEA)

in connection with the implementation of the  
IAEA Action Plan on Nuclear Safety

# **PROGRAMME**

**16 – 20 February 2015**

**Vienna, Austria**

**Chairperson of the meeting:** Bismark Tyobeka (NNR, South Africa)  
**Co-Chairperson** Brian Sheron (USNRC, USA and NEA/CSNI Chair)

**Programme Committee:** Kemei Cao (SNERDI, China)  
Karim Ben Ouagrem (IRSN, France)  
Masanori Naitoh (IAE, Japan)  
Moon Hee Chang (KNS, Republic of Korea)  
Stephanie Coffin (USNRC, USA)  
Jean-Pierre Sursock (EPRI, USA)  
Neil Blundell (OECD/NEA)  
Florian Baciú (IAEA)  
Lyndon Bevington (IAEA)  
Ki-Sig Kang (IAEA)  
Irena Mele (IAEA)  
Gerhard Proehl (IAEA)  
Anthony Ulses (IAEA)  
Katsumi Yamada (IAEA)

**IAEA Secretariat:**

**Scientific Secretaries:** Katsumi Yamada and Abdallah Amri

**Meeting Organizer:** Martina Neuhold

**Meeting Venue:** International Atomic Energy Agency  
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**Working Language:** English

**Resolutions:** No resolutions may be submitted for consideration on any subject; no votes will be taken.

## **Monday, 16 February 2015**

**08:30-10:00**      **On-Site Registration, Vienna International Centre, Gate 1**

### **10:00 - 12:30**      **Opening Session**

**Chairperson:**      Bismark Tyobeka (NNR, South Africa)

**Co-Chairperson:**      Brian Sheron (USNRC, USA and NEA/CSNI Chair)

#### **(Welcome addresses by IAEA)**

Mikhail Chudakov, Deputy Director General, Department of Nuclear Energy and  
Denis Flory, Deputy Director General, Department of Nuclear Safety and Security

**(Chairpersons Remarks)** Bismark Tyobeka, (NNR, South Africa)

And Brian Sheron (USNRC, USA and NEA/CSNI Chair)

**10:30-11:00**      **(Keynote)** Gustavo Caruso, Special Coordinator, Nuclear Safety Action Team  
(IAEA): *IAEA Activities under the Nuclear Safety Action Plan*

**11:00-11:30**      **(Keynote)** Neil Blundell (OECD/NEA): *Main Benefits from half a century of NEA  
Collaborative Projects in Nuclear Safety*

**11:30-12:00**      **(Keynote)** Neil Wilmshurst (EPRI, USA): *The Case for Global Research &  
Development Following Fukushima*

**12:00-12:30**      **(Keynote)** Jacques Repussard (ETSON): *Enhancing the Science Basis of Nuclear  
Safety and Radiation Protection: A Collective Challenge*

**(Logistics)** Katsumi Yamada, Scientific Secretary (IAEA)

**12:30 – 14:00**      *Lunch Break*

### **14:00-17:50**      **Session 0: R&D Strategies after the Fukushima Accident**

**Session Chair:**      Alexandre Viktorov (CNSC, Canada)

**14:00-14:30**      **(Keynote)** Brian Sheron (USNRC, USA and NEA/CSNI Chair): *Research and  
Development Activities at OECD/NEA Following Fukushima*

**14:30-14:50**      Alexandre Viktorov (CNSC, Canada): *Regulatory Evaluation of the Research and  
Development Activities in Support of Nuclear Safety*

**14:50-15:10**      Giovanni Bruna (IRSN, France): *Post Fukushima R&D in the Framework of the  
European Union*

**15:10-15:30**      Kenjiro Aono (Secretariat of Nuclear Regulation Authority, Japan): *Safety Research  
Activities on Severe Accident Management in S/NRA/R after Fukushima Daiichi  
Nuclear Power Plant Accident*

**15:30 – 16:00**      Break

<b>16:00-16:20</b>	<b>(Invited)</b> Vincenzo Rondinella (EC-JRC): <i>Nuclear Safety Research in Light of the Fukushima Daiichi Accident at the European Commission - Joint Research Centre</i>
<b>16:20-16:40</b>	Mikhail Lankin (Scientific and Engineering Centre for Nuclear and Radiation Safety, Russia): <i>Representativeness of Beyond Design Basis Accidents List - How It can Be Reached?</i>
<b>16:40-17:00</b>	John Grubb (BWR Owners Group, USA): <i>BWROG 2015 Recommendations for Short and Long Term Research in Support of Operations</i>
<b>17:00-17:20</b>	Christophe Journeau (CEA, France): <i>CEA post Fukushima R&amp;D Programmes on PWR Severe Accidents</i>
<b>17:20-17:50</b>	<b>Discussion</b>
<b>17:50</b>	<b>Adjourn</b>
<b>18:00 – 20:00</b>	<b>Welcome Reception</b>

## **Tuesday, 17 February 2015**

### **09:00–12:30      Session 1: Measures to Protect NPPs Against External and Internal Events**

<b>Session Chair:</b>	Jean-Pierre Surssock (EPRI, USA)
<b>09:00-09:30</b>	<b>(Keynote)</b> Liisa Heikinheimo (TVO, Finland): <i>Actions to Protect NPPs Against External and Internal Events and R&amp;D Activities in Finland</i>
<b>09:30-09:50</b>	Jon Ake (USNRC, USA): <i>Current and Future Application of Seismic Research Activities at the NRC in Response to the Accident at the Fukushima Daiichi Nuclear Power Plant</i>
<b>09:50-10:10</b>	Laurence Rigollet (IRSN, France): <i>Electrical Failure During NPP Cable Fires</i>
<b>10:10-10:30</b>	Toshihiro Matsuo (TEPCO, Japan): <i>Safety Measures Taken at Kashiwazaki Kariwa NPS Based on the Fukushima Daiichi Accident</i>
<b>10:30 – 11:00</b>	<i>Break</i>
<b>11:00-11:20</b>	<b>(Invited)</b> Marina Röwekamp (GRS mbH, Germany): <i>Recent Research on Hazards PSA</i>
<b>11:20-11:40</b>	Stuart Lewis (EPRI, USA): <i>EPRI Research Plans and Priorities Related Risk Assessment of External Hazards</i>
<b>11:40-12:00</b>	Luciano Burgazzi (ENEA, Italy): <i>Implementation of External Event Modelling in Advanced PSA Studies</i>
<b>12:00-12:30</b>	<b>Discussion</b>
<b>12:30 – 14:00</b>	<i>Lunch Break</i>

**14:00 – 17:50    Session 2: Technologies to Prevent and Mitigate Severe Accidents**

**Session Chair:** Dong Hoon Lee (KINS, Republic of Korea)

**14:00-14:30**    **(Keynote)** Maria Korsnick (Exelon, USA): *Technologies to Prevent and Mitigate Severe Accidents*

**14:30-14:50**    Kemei Cao (SNERDI, China): *CAP1400 Core-Melt In-Vessel Retention Measure Design and Research*

**14:50-15:10**    Arnaldo Laborda Rami (Spain): *ASVAD: A New Element to Improve the Plant Response Against the ELAP Accident*

**15:10-15:30**    Soo Yong Park (KAERI, Republic of Korea): *Assessment of the Mitigative Strategy Using External Coolant Injection for OPR-1000 Plant*

**15:30 – 16:00**    *Break*

**16:00-16:20**    **(Invited)** Edward Fuller (USNRC, USA): *Severe Accident Mitigation Strategies Considered for U.S. Mark I Boiling Water Reactors (BWRs)*

**16:20-16:40**    Thierry Albiol (IRSN, France): *The European PASSAM Project on Severe Accident Source Term Mitigation: Halfway Status*

**16:40-17:00**    Kazuaki Kitou (Hitachi Ltd, Japan): *Development of Inherently Safe Technologies for BWRs*

**17:00-17:20**    Lovell Gilbert (Bruce Power LP, Canada): *Application of Technologies in CANDU Reactors to Prevent/ Mitigate the Consequences of a Severe Accident*

**17:20-17:50**    **Discussion**

**17:50**            **Adjourn**

## **Wednesday, 18 February 2015**

### **09:00 – 12:30 Session 3: Severe Accident Analysis**

**Session Chairs:** Didier Jacquemain (IRSN, France)  
Fumihisa Nagase (JAEA, Japan)

**09:00-09:30** **(Keynote)** Naoto Sekimura (The University of Tokyo, Japan): *Roadmap on R&D and Human Resource for Light Water Reactors Safety in Japan - Nuclear Safety Visions and Technical Basis Reconstruction after the Fukushima Accident*

**09:30-09:50** Rosa Yang (EPRI, USA): *Lessons Learned from Fukushima on Modeling of Severe Accidents and Future Research Directions for MAAP*

**09:50-10:10** Martin Sonnenkalb (GRS mbH, Germany): *Code for European Severe Accident Management (CESAM) - Overview on the EC Project on ASTEC Code Improvement and Applications*

**10:10-10:30** Masanori Naitoh (IAE, Japan): *Major Influential Phenomena on the Accident Progressions of Fukushima Daiichi NPP*

**10:30 – 11:00** *Break*

**11:00-11:20** Taisuke Yonomoto (JAEA, Japan): *The ROSA-SA Project on Containment Thermal Hydraulics*

**11:20-11:40** **(Invited)** Nicolas Trégourès (IRSN, France): *The DENOPI Project: A Research Program on SFP Under Loss-of-Cooling and Loss-of-Coolant Accident Conditions*

**11:40-12:00** Hossein Esmaili (USNRC, USA): *Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor*

**12:00-12:30** **Discussion**

**12:30 – 14:00** *Lunch Break*

### **14:00 – 17:50 Session 3: Severe Accident Analysis (continued)**

**14:00-14:30** **(Keynote)** Wenhui Zhan (SNERDI, China): *Applying PSA for CAP1400 and Additional R&D after the Fukushima Accident*

**14:30-14:50** **(Invited)** Didier Jacquemain (IRSN, France): *Recent Progress in Source Term Research and Evaluations with the ASTEC Code*

**14:50-15:10** Yu Maruyama (JAEA, Japan): *Development and Application of Methodologies for Source Term Analysis*

**15:10-15:30** Jiri Duspiva (UJV Rez, a.s., Czech Republic): *Research Needs for Improvement of Severe Accident Management Strategies at Czech NPPs*

**15:30 – 16:00** *Break*

- 16:00-16:20** Hwan Yeol Kim (KAERI, Republic of Korea): *Study on the In-Core Instrumentation Tube Ejection Failure at APR1400 Lower Reactor Vessel*
- 16:20-16:40** **(Invited)** Joan Fontanet (CIEMAT, Spain): *The Effect of Fukushima on Research Activities in CIEMAT related to Severe Accidents*
- 16:40-17:00** Pierre Le Bot (EdF, France): *Analysis of the Fukushima Daiichi Accident from a Human and Organizational Perspective*
- 17:00-17:20** Gabriel Balog (CANDU Owners Group, Canada): *Research and Development in Support of Beyond Design Basis Accidents (BDBA) Response in CANDU Nuclear Power Plants*
- 17:20-17:50** **Discussion**
- 17:50** **Adjourn**

## ***Thursday, 19 February 2015***

### **09:00 – 10:20 Session 3: Severe Accident Analysis (continued)**

**Session Chairs:** Didier Jacquemain (IRSN, France)  
Fumihisa Nagase (JAEA, Japan)

- 09:00-09:20** **(Invited)** Fumihisa Nagase (JAEA, Japan): *Fundamental Studies to Improve Analysis of Accident Progression at Fukushima Daiichi NPP*
- 09:20-09:40** Daisuke Yamauchi (TEPCO, Japan): *TEPCO's Activities on the Investigation into Unsolved Issues in the Fukushima Daiichi NPS Accident*
- 09:40-10:00** Gerhard Mayer (GRS mbH, Germany): *Analyses of the Plant Behaviour of a PWR During Severe Accidents with Multiple Failures of Safety Systems*
- 10:00-10:20** **Discussion**

### **10:20 – 11:50 Poster Session**

## **Thursday, 19 February 2015**

### **11:50 – 12:40 Session 4: Emergency Preparedness and Response (EPR)**

**Session Chair:** Ulrich Stoehlker (BfS, Germany)

**11:50-12:20** **(Keynote)** Olivier Isnard (IRSN, France): *Enhancing the Emergency Preparedness and Response Expertise with the Use of Advanced Response and Assistance Network Capabilities*

**12:20-12:40** Alexandra Ioannidou (Aristotle University of Thessaloniki, Greece): *Atmospheric Dispersion of Radionuclides From Fukushima Daiichi Nuclear Accident and Dose Assessment*

**12:40 – 14:00** *Lunch Break*

### **14:00 – 15:30 Session 4: Emergency Preparedness and Response (EPR) (continued)**

**14:00-14:20** **(Invited)** Gerhard Wotawa (WMO) *WMO Nuclear Emergency Response Activities in the Framework of the Joint Radiation Emergency Management Plan of the International Organizations – Current Status and Lessons Learned from the Fukushima Accident*

**14:20-14:40** Gayle Sugiyama (LLNL, USA): *National Atmospheric Release Advisory Center (NARAC) R&D to Improve Atmospheric Dispersion Modeling for Nuclear Power Plant Accidents*

**14:40-15:00** Ulrich Stoehlker (BfS, Germany): *Measurement and Data Analysis Concepts Combined with Data Assimilation Techniques for Source Term Reconstruction and Dose Assessment*

**15:00-15:30** **Discussion**

**15:30 – 16:00** *Break*



## **Thursday, 19 February 2015**

### **16:00 – 18:00 Session 5: Post-Accident Recovery**

**Session Chair:** Lynn Hubbard (SSM, Sweden)

**16:00-16:30** **(Keynote)** Hajimu Yamana (NDF, Japan): *Rebuilding the Strategy for the Decommissioning of the Fukushima Daiichi NPP (Recent Situation of NDF's New Approach)*

**16:30-16:50** Jean-Christophe Gariel (IRSN, France): *Post-Fukushima Environmental Research Programme Performed Within the Framework of the Franco-Japanese Collaboration*

**16:50-17:10** Supathorn Phongikaroon (Virginia Commonwealth University, USA): *Feasibility Study of Pyrochemical Treatment on Fuel Debris by Performing Uranium and Zirconium Electrochemistry in LiCl-KCl Molten Salt*

**17:10-17:30** **(Invited)** Takashi Satoh (IRID, Japan): *R&D Activities Related to the Fuel Debris Retrieval From the Fukushima Daiichi NPS*

**17:30-18:00** **Discussion**

**18:00** **Adjourn**

## **Friday, 20 February 2015**

### **10:00–12:30 Closing Session**

**10:00-11:00** **Summary of Sessions**

**Session Chair:** Bismark Tyobeka (NNR, South Africa)

**11:00–12:00** **Panel Discussion on Future R&D Activities**

**Session Chair:** Brian Sheron (USNRC, USA and NEA/CSNI Chair)

**12:00-12:30** **(Chairpersons' Summary)** Bismark Tyobeka, (NNR, South Africa)  
And Brian Sheron (USNRC, USA and NEA/CSNI Chair)  
**(Closing Remarks by IAEA and NEA)**

**12:30** **Adjourn**

## **Poster Session (Thursday, 10:20-11:50)**

- IAEA-CN-235/71 Oleg Grigoryan (Armenian NPP, Armenia):  
*Implementation of External Hazards Analysis at Armenian NPP*
- IAEA-CN-235/72 Tsolak Malakyan (Nuclear and Radiation Safety Center, Armenia):  
*ANPP Unit 2 Response to Feedwater Restoration Techniques in Case of Ultimate Heat Sink Loss*
- IAEA-CN-235/73 Mulya Juarsa (BATAN, Indonesia):  
*Preliminary Study on Passive System Experimental with Water Initial Temperature Variation in Transient Condition using NC-Queen Apparatus*
- IAEA-CN-235/74 Victor Razumovskiy (National Technical University of Ukraine, Ukraine):  
*Thermal Parameters of Elongated Heat Conductors of Evaporation-Condensation Type for Passive Emergency Cooling of Reactor Equipment*
- IAEA-CN-235/75 Mahdi Saghafi (Sharif University of Technology, Islamic Republic of Iran):  
*Introduction of a Research Project on Development of Accident Management Tool for BNPP (WWER-1000) Based on the Lessons Learned from Fukushima Accident*
- IAEA-CN-235/76 Ali Haghghi Shad (National Nuclear Safety Department, Islamic Republic of Iran):  
*Spent Fuel Pool and Release of Fission Products in Typical Fukushima Daiichi Nuclear Power Plant Accident*
- IAEA-CN-235/77 Muhamad Afzal Nagrah (PNRA, Pakistan):  
*Thermalhydraulic Analysis of Spent Fuel Pool using RELAP5 Taking Insight from Fukushima Accident*
- IAEA-CN-235/78 Garo Azarian ( AREVA, France):  
*Impact of Safety Relevant Severe Accident R&D Topics and Uncertainties on the Mitigation Feature Selection*
- IAEA-CN-235/79 Martin Sonnenkalb (GRS mbH, Germany):  
*Lessons learned from Analysis of Fukushima Accident (Units 2 and 3)*
- IAEA-CN-235/80 Faten Tawfik (NRRRA, Egypt):  
*Assess and mitigate the Early Offsite Consequences of Severe Accident for Nuclear Power Plants*
- IAEA-CN-235/81 Federico Rocchi (ENEA, Italy):  
*ENEA Activities in the Field of Emergency Preparedness and Response in the Aftermath of the Fukushima Accident*
- IAEA-CN-235/82 Scott Tumey (LLNL, USA):  
*Input of I-129 Into The Western Pacific Ocean Resulting From The Fukushima Nuclear Event*
- IAEA-CN-235/83 Jacksson Abafoni (NAEC, Nigeria):  
*An Overview of Nigeria's Preparedness for Response to Nuclear and Radiological Emergency Situations*

## **Poster Session (Thursday, 10:20-11:50) (continued)**

- IAEA-CN-235/84                      Leanid Maskalchuk (National Academy of Sciences, Belarus):  
*Radioactive Contamination of Japanese Soils and Possible ways of their Rehabilitation*
- IAEA-CN-235/85                      Toru Kitagaki (JAEA, Japan):  
*Research Approach of MCCI Products Characterization for Debris Removal*
- IAEA-CN-235/86                      Masahide Takano (JAEA, Japan):  
*Preparation and Characterization of Simulated Fuel Debris Specific to the Fukushima Accident*
- IAEA-CN-235/87                      Seiji Takeda (JAEA, Japan):  
*Establishing Criteria for Reuse of Disaster Wastes Contaminated by the Fukushima Daiichi NPP Accident*
- IAEA-CN-235/88                      Martin Listjak (VUJE, Inc., Slovakia):  
*Treatment and Radiological Characterisation of Contaminated Soil at NPP A1 Slovakia*
- IAEA-CN-235/89                      Terry Hamilton (LLNL, USA):  
*Time Evolution of Radiological Conditions in the Marshall Islands: Experiences and Lessons Learned in Relation to Fukushima*
- IAEA-CN-235/92                      Vojtech Brynych (UJV Rez, a. s., Czech Republic):  
*Design of Treatment Procedure for Reprocessing of Large Volume of Highly Radioactive Liquid Waste After Severe Accident on VVER Reactor*
- IAEA-CN-235/93                      Cristian Gentea (Institute for Nuclear Research Pitesti, Romania):  
*Activity Developed in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant*