INFORMATION SYSTEM ON OCCUPATIONAL EXPOSURE (ISOE)

INTERNATIONAL WORKSHOP ON OCCUPATIONAL RADIATION PROTECTION IN SEVERE ACCIDENT MANAGEMENT *"SHARING PRACTICES AND EXPERIENCES"*

17-18 JUNE 2014
WASHINGTON DC, USA

Abstract Proceedings

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SCIENTIFIC PROGRAMME

TUESDAY, 17 June 2014

07:30 – 08:30	**SERVISE AREA OPEN** Registration of the participants
08:30	**OPENING SESSION**
	Session chaired by **Willie O.HARRIS** - ***ISOE & Workshop Chair (Exelon Nuclear, US)***
08:35/0.01	**NEA WELCOME AND REMARKS** Kazuo SHIMOMURA, NEA Deputy Director
08:45/0.02	**IAEA WELCOME AND REMARKS** Pil-Soo HAHN, IAEA NSRW Director
08:55/0.03	**NEI WELCOME AND REMARKS** Ralph ANDERSEN, NEI Senior Director
09:05/0.04	**ISOE WORKSHOP BACKGROUND, OBJECTIVES, SCOPE, GOALS & LOGISTICS** Ellen P. ANDERSON, NEI – EGSAM Chairperson
Plenary Session 1	**GLOBAL VIEW ON OCCUPATIONAL RADIATION PROTECTION IN SEVERE ACCIDENT MANAGEMENT**
09: 20	Session chaired by ***Kazuo SHIMOMURA (NEA)***
09:25/1.01	**ICRP RECOMMENDATIONS FOR OCCUPATIONAL RADIATION PROTECTION IN AN EMERGENCY** Donald COOL *(USNRC, US)- ICRP Committee 4*
09:45/1.02	**PROTECTION OF EMERGENCY WORKERS AND HELPERS: RECENT DEVELOPMENTS IN INTERNATIONAL STANDARDS IN EMERGENCY PREPAREDNESS AND RESPONSE** Svetlana NESTOROSKA MADJUNAROVA *(IAEA IEC)*
10:05/1.03	**CNSC RESPONSE TO FUKUSHIMA AND ENHANCEMENTS TO THE REGULATORY FRAMEWORK FOR THE PROTECTION OF WORKERS** Terry JAMIESON *(CNSC, Canada)*
10:25/1.04	**LESSONS LEARNED FROM TMI AND HOW IT CHANGED THE REGULATORY FRAMEWORK IN THE US** Roger PEDERSEN *(USNRC, US)*
10:45	***Networking Break***

Plenary Session 2	**ISOE EXPERT GROUP INTERIM REPORT**
11: 15	Session chaired by **Ellen P. Anderson (NEI), EG-SAM Chair**
11:20/2.01	**RADIATION PROTECTION MANAGEMENT AND ORGANISATION** Willie O. HARRIS *(Exelon Nuclear, US)*
11:30/2.02	**RADIATION PROTECTION TRAINING AND EXERCISES RELATED TO SEVERE ACCIDENT MANAGEMENT** Salah DJEFFAL *(CNSC, Canada)* - EGSAM Vice-Chair
11:40/2.03	**FACILITY CONFIGURATION AND READINESS** James P. TARZIA *(RSCS, US)*
11:50/2.04	**OVERALL APPROACH ON THE PROTECTION OF WORKERS** Claudia SCHMIDT *(GRS, Germany)*
12:00/2.05	**MONITORING AND MANAGING THE RADIOACTIVE MATERIALS RELEASES AND CONTAMINATION** Karin FRITIOFF *(Vattenfall AB, Sweden)*
12:10/2.06	**KEY LESSONS LEARNED FROM PAST ACCIDENTS** Caroline SCHIEBER *(CEPN, France)*
12:30	***Lunch Break***

Plenary Session 3	**EXPERIENCES, VIEWS AND APPROACHES – UTILITY PERSPECTIVES**
13: 30	Session chaired by **Caroline SCHIEBER (CEPN)**
13:35/3.01	**RADIATION PROTECTION MANAGEMENT IN FUKUSHIMA DAIICHI NPS AND POST-ACCIDENT MEASURES** Shiro TAKAHIRA *(TEPCO, Japan)*
13:55/3.02	**POST-FUKUSHIMA IMPROVEMENT OF THE EMERGENCY PLAN FOR THE ELECTRABEL NUCLEAR POWER PLANTS – FOCUS ON THE RADIOLOGICAL ASPECT** Benoit LANCE *(Electrabel, Belgium)*
14:15/3.03	**EDF FARN (FAST ACTION FORCE IN CASE OF NUCLEAR ACCIDENT) - FOCUS ON RADIATION PROTECTION OF WORKERS** Bernard LE GUEN *(EDF, France)*
14:35/3.04	**SEVERE ACCIDENT MANAGEMENT: RADIATION DOSE CONTROL, FUKUSHIMA DAIICHI AND TMI-2 NUCLEAR PLANT ACCIDENTS** Roger SHAW *(Shaw Partners LLC, US)*
14:55/3.05	**ONTARIO POWER GENERATION FUKUSHIMA EMERGENCY RESPONSE DRILL STRENGTHENS AND LESSONS LEARNED** David MILLER *(NATC, Cook NPP, US)* - EGSAM Vice-Chair
15:30	***Networking Break***

16:00 – 17:30	**BREAKOUT SESSIONS**
	BREAKOUT SESSION 1: RADIATION PROTECTION MANAGEMENT AND ORGANISATION **Rapporteur:** David MILLER *(Cook NPP, US)* - EGSAM Vice-Chair **Co-Rapporteur:** Ellen ANDERSON *(NEI, US)* **BREAKOUT SESSION 2: RADIATION PROTECTION TRAINING AND EXERCISES RELATED TO SEVERE ACCIDENT MANAGEMENT** **Rapporteur:** Albert WILEY *(ORAU,REAC/TS, US)* **Co-Rapporteur:** Derek HAGEMEYER *(ORAU, US)* **BREAKOUT SESSION 3: FACILITY CONFIGURATION AND READINESS** **Rapporteur:** James P. TARZIA *(RSCS, US)* **Co-Rapporteur:** Terry BROCK *(NRC, US)*
17:30	**Closure of 1st day**

WEDNESDAY, 18 June 2014

Plenary Session 4	**VIEWS AND APPROACHES – REGULATORY AUTHORITY PERSPECTIVES**
08: 30	Session chaired by **Marie-Line PERRIN (ASN)**
08:35/4.01	**CNSC EOC TECHNICAL ASSESSMENT AND EVALUATION INITIATIVES** Christopher COLE *(CNSC, Canada)*
08:55/4.02	**FRENCH REGULATORY REQUIREMENTS FOR THE OCCUPATIONAL RADIATION PROTECTION IN SEVERE ACCIDENT SITUATIONS AND POST ACCIDENT RECOVERY** Olivier COUASNON *(ASN, France)*
09:15/4.03	**SEVERE ACCIDENT MANAGEMENT GUIDELINES** Jennifer UHLE *(NRC, US)*
09:35/4.04	**RADIATION PROTECTION ISSUES RAISED IN KOREA SINCE FUKUSHIMA ACCIDENT** Byeongsoo KIM *(KINS, Republic of Korea)*
09:55/4.05	**FINNISH EXPERIENCE ON EMERGENCY PREPAREDNESS CO-OPERATION WORK AND RESULTS** Jukka SOVIJARVI *(STUK, Finland)* - EGSAM Vice-Chair
10:30	***Networking Break***
11:00 – 12:30	**BREAKOUT SESSIONS (Cont'd)**
	BREAKOUT SESSION 4: OVERALL APPROACH ON THE PROTECTION OF WORKERS **Rapporteur:** Rick DOTY *(NATC, US)* **Co-Rapporteur:** Jerry HIATT *(NEI, US)*
	BREAKOUT SESSION 5: MONITORING AND MANAGING THE RADIOACTIVE MATERIALS RELEASES AND CONTAMINATION **Rapporteur:** Karin FRITIOFF *(Vattenfall AB, Sweden)* **Co-Rapporteur:** Caroline SCHIEBER *(CEPN, France)*
12:30	***Lunch Break***

Plenary Session 5	**BREAKOUT SESSIONS SUMMARY REPORTS**
13: 30	Session chaired by **H. Burçin OKYAR (NEA)**
13:35/5.01	**Breakout session 1 Report** David MILLER *(Cook NPP, US)*
13:55/5.02	**Breakout session 2 Report** Albert WILEY *(ORAU, US)*
14:15/5.03	**Breakout session 3 Report** James P. TARZIA *(RSCS, US)*
14:35/5.04	**Breakout session 4 Report** Rick DOTY *(NATC, US)*
14:55/5.05	**Breakout session 5 Report** Karin FRITIOFF *(Vattenfall AB, Sweden)*
15:30	***Networking Break***
16:00	**CONCLUDING SESSION**
	Session chaired by **Ellen P. ANDERSON (NEI), EG-SAM Chair** and co-chaired by **Patricia JONES (Exelon Corp)**
16:05	**DIRECTION FORWARD FOR THE FINALIZATION OF THE EXPERT GROUP REPORT** H. Burçin OKYAR *(NEA)*
16:25	**OPEN DISCUSSION, COMMENTS AND RECOMMENDATIONS**
17:30	***Closure of the Workshop***

GLOBAL VIEW ON OCCUPATIONAL RADIATION PROTECTION IN SEVERE ACCIDENT MANAGEMENT

Plenary Session 1

Chairperson

Kazuo SHIMOMURA
OECD Nuclear Energy Agency

ICRP RECOMMENDATIONS FOR OCCUPATIONAL RADIATION PROTECTION IN AN EMERGENCY

Donald COOL
Nuclear Regulatory Commission
ICRP Committee 4
United States

The International Commission on Radiological Protection (ICRP) developed recommendations for the protection of people in Emergency Exposure Situations in ICRP Publication 109. Following the events at the Fukushima Daiichi, ICRP has initiated a Task Group to examine how this publication, and the related ICRP Publication 111 on Protection of People Living in Long-term Contaminated Areas after a Nuclear Accident or a Radiation Emergency, can be updated and elaborated.

The Task Group will be considering a number of issues, including the justification for and optimization of emergency decisions, characterization of the radiological situation, protection of emergency and recovery responders, and emergency and recovery preparedness.

The presentation will address the ongoing work and preliminary considerations of the Task Group, and plans for further developments.

PROTECTION OF EMERGENCY WORKERS AND HELPERS: RECENT DEVELOPMENTS IN INTERNATIONAL STANDARDS IN EMERGENCY PREPAREDNESS AND RESPONSE

Svetlana NESTOROSKA MADJUNAROVA
International Atomic Energy Agency
Austria

IAEA safety requirements in preparedness and response for a nuclear or radiological emergency, Safety Standards Series No. GS-R-2, were endorsed in 2002 in a joint sponsorship of seven international intergovernmental organizations. Building on experience from responses to actual emergencies, these safety requirements set common goals to be achieved and the common concepts and approaches to be taken for an adequate preparedness to effectively respond to a nuclear or radiological emergency irrespective of the cause. Ensuring an adequate protection of emergency workers is an important aspect of emergency arrangements considered in this publication.

In 2011, a revision of these safety requirements was initiated in order to take into account past experience and developments since 2002 with due consideration (but not limited to) the experience gained in the emergency response to the Fukushima Daiichi Nuclear Power Plant accident. Protection of emergency workers got particular attention during this revision in the light of the lessons identified in past emergencies resulting in strengthened and more comprehensive, yet simple, system for protection of emergency workers of different organizations and services. The revised safety requirements are expected to be published in 2015 as Part 7 of the General Safety Requirements (GSR Part 7) within the IAEA Safety Standards Series.

In this presentation, the latest updates and developments with regard to emergency workers in the light of the revision of the Safety Standards Series No. GS-R-2 are presented. Issues such as who are to be considered as emergency workers, the importance of their designation prior to an emergency, how to deal during an emergency response with those emergency workers not recognized as such at preparedness stage, protection aspects to be considered for all emergency workers and dose criteria to be used for restricting their further exposures in an emergency response are addressed. The specifics associated with the protection of female emergency workers are also highlighted. Moreover, the approach to dealing and protecting helpers on the part of the public willing to contribute to the emergency response on a voluntarily basis is covered in this presentation too.

CNSC RESPONSE TO FUKUSHIMA AND ENHANCEMENTS TO THE REGULATORY FRAMEWORK FOR THE PROTECTION OF WORKERS

Terry JAMIESON
Canadian Nuclear Safety Commission
Canada

The Canadian Nuclear Safety Commission (CNSC) responded immediately to the accident at Fukushima Daiichi with several actions including the establishment of a multidisciplinary CNSC Fukushima Task Force with the objective of reviewing all major nuclear facilities in Canada, including Canadian nuclear power plants (NPPs). The review, led by the Task Force, confirmed the facilities' ability to withstand and respond to credible external events, such as earthquakes.

In response to Task Force recommendations and following extensive consultation activities, the CNSC established an integrated action plan to further strengthen the safety of NPPs and other major nuclear facilities. The CNSC Integrated Action Plan also includes measures to enhance communication and public education.

Both the Task Force Report and the Action Plan were subject to several rounds of public consultation, as well as two independent evaluations, which confirmed that the CNSC response to the events in Fukushima was prompt, appropriate and comprehensive.

This presentation outlines several enhancements to the CNSC regulatory framework for the protection of emergency workers, members of the public and the environment as a result of Task Force Recommendations and the CNSC Integrated Action Plan on lessons learned from the Fukushima Daiichi accident, including:

- Amendments to the Radiation Protection Regulations to ensure consistency with international guidance and to describe the regulatory requirements needed to address radiological hazards during the phases of an emergency in greater detail.
- Strengthening Federal and Provincial nuclear emergency planning through the establishment of a formal, transparent, national-level oversight process for offsite nuclear emergency plans, programs and performance, and through the scheduling of regularly planned full-scale exercises.
- Upgrading onsite emergency facilities and equipment at Canadian NPPs.
- Updating Probabilistic Safety Assessment (PSA) of NPPs to take credit of the Fukushima driven enhancements (Emergency Mitigating Equipment).
- Evaluating the habitability of control facilities under accident conditions and implementing control facility upgrades where required.
- Implementation of severe accident management guidelines (SAMG) at Canadian NPPs.

LESSONS LEARNED FROM TMI AND HOW IT CHANGED THE REGULATORY FRAMEWORK IN THE US

Roger PEDERSEN
Nuclear Regulatory Commission
United States

A brief description of the Three Mile Island accident with an emphasis on the in-plant radiological challenges that impacted occupational radiation protection is presented. Several official investigations into the accident identified many deficiencies and weaknesses in plant design, operations, and management; internal and external communications; human performance, and the facilities' overall preparedness to respond to the accident.

The Lessons Learned and the resulting NRC Action Plan items related to occupational radiation protection are reviewed. The role of the plant's radiation protection program (and the core competencies of plant staff) during normal operations are discussed, with respect to their impact on adequate worker radiation protection during unanticipated off-normal events.

ISOE EXPERT GROUP
INTERIM REPORT

Plenary Session 2

Chairperson

Ellen P. ANDERSON
Nuclear Energy Institute

During this session, chapters of the EG-SAM interim report will be presented. For the interim report, please refer e-report available at http://www.oecd-nea.org/rp/docs/2014/crpph-isoe2014-3.pdf.

EXPERIENCES, VIEWS AND APPROACHES – UTILITY PERSPECTIVES

Plenary Session 3

Chairperson

Caroline SCHIEBER
Centre d'étude sur l'Evaluation de la Protection dans le domaine Nucléaire

RADIATION PROTECTION MANAGEMENT IN FUKUSHIMA DAIICHI NPS AND POST-ACCIDENT MEASURES

Shiro TAKAHIRA
Tokyo Electric Power Company
Japan

Fukushima Daiichi Nuclear Power Station (1F) was hit by the big earthquake and tsunami, which caused the station black out and subsequent loss of cooling functions for reactor and spent fuel pools (SFPs). Consequently the fuels were damaged, hydrogen explosion blew off top of the reactor buildings and radioactive materials were released to the atmosphere and the ocean.

Tsunami and power loss caused many difficulties of monitoring, dose management, and radiation protection of workers. For example, the radiation management system was down and about 5,000 Alarm Pocket Dosimeters (APDs) and their battery chargers could not be used. Due to the insufficient number of APDs, one representative of each working team had a dosimeter under the limited conditions.

Through the accident, we got following lessons learned;

(1) Reinforcing monitoring posts,

(2) Preparing more radiation protection equipment,

(3) Establishing emergency access control centre, and

(4) Education and training in radiation protection.

POST-FUKUSHIMA IMPROVEMENT OF THE EMERGENCY PLAN FOR THE ELECTRABEL NUCLEAR POWER PLANTS – FOCUS ON THE RADIOLOGICAL ASPECT

Benoit LANCE
Electrabel (GDF-SUEZ)
Belgium

As a reaction to the accident at the Fukushima nuclear power plant (NPP) in Japan on 11th March 2011, all country members of the European Union having a nuclear power plant were required to perform an assessment of the robustness of their plant, according to the main guidelines issued from WENRA. Such an assessment is better known under the word “stress test” and consists in an assessment of the safety margins against extreme hazards leading the plant to a severe accident.

In Belgium, nuclear power plants are owned and operated by the company Electrabel (GDF-Suez). There are 7 reactors distributed at two sites, Doel and Tihange. Electrabel (GDF-Suez) did perform the “stress test” assessment, delivering two reports (one per site) addressing seism, flooding, extreme natural hazards, loss of heat sink, loss of external electrical power and management of severe accidents. The reports reflect an overall positive situation, highlighting a satisfactory robustness of the Belgian plants, while several improvement actions were identified and submitted to the national and European Safety Authorities.

The presentation focuses on the safety improvements mainly identified in the field of management of severe accidents, and more precisely focuses on the improvements proposed for the management of emergency situations characterized by a very large release of radioactive contaminants.

In general, for the Electrabel plants, it was stated that a lot of existing measures were already in place, but that those existing measures deserved further improvement, taking into account the lessons learnt from the Fukushima accident:

- very large release of radioactive contaminants, combined with large damage to the site structure, make the site “inhabitable” for the emergency workers, from the radiological viewpoint. In Japan, recovery missions were organized from a rear base called “J-village”, with shuttles to and from the contaminated site ;
- the radiation protection (RP) measurement equipment available on site can become non effective as a consequence of radioactive contaminants fall-out and/or large infrastructure damage. This evidences that enough RP equipment must be available at locations not affected by the radioactive releases ;
- the plant operator must be capable of measuring the radiological situation on the site and surrounding areas, as a support to the emergency workers. Such a support is a tool of the ALARA management of the restoring interventions, etc.

EDF FARN (FAST ACTION FORCE IN CASE OF NUCLEAR ACCIDENT) - FOCUS ON RADIATION PROTECTION OF WORKERS

Bernard LE GUEN
Électricité de France
France

As part of the operation of its nuclear power plants, EDF set up in the 80s an emergency response organisation together with the French public authorities aimed at managing the consequences, especially radiological of any events. This is based on the setting up of emergency plans involving both the operator and the public authorities, at local and national level, with both parties assessing the consequences of a radiological accident in the environment constantly enhanced as part of the continuous improvement process.

As the Fukushima accident especially highlighted the relevance of having a response system available off site, this emergency response organisation has been strengthened both with equipment and human resources so as to be able to respond to major accidents further to external hazards (such as, earthquake and flood exceeding design basis of the hazards factored into plant design). These resources have been designed to factor in a high level of radiological risk.

1. Emergency response organisation
The functions and responsibilities are clearly defined for any event occurring at a nuclear power plant. The operator shall be accountable for the actions to be taken on site concerning technical plant management, worker protection and rescue of casualties. The public authorities shall be accountable for all the measures to be taken off site, especially protection of the local population and environmental monitoring.

The EDF emergency response organisation is based on enhanced equipment and human resources at site and corporate level (shift crews on site, activation of the on-site emergency plan, support from the corporate experts with diagnostics and prognostics of the event and induction of the public authorities and deployment of the EDF nuclear rapid response taskforce (known as the FARN) – in, or further to, extreme situations – supplemented with EDF corporate and non-EDF resources.

The EDF emergency plan covers the situation where all the site units are affected.

The decision to set up the nuclear rapid response taskforce was taken further to the FUKUSHIMA accident in 2011 and it has been operational since 2012. Integrated in the emergency response organisation, its main aim is to be capable of responding in less than 12 hours to reinstate water, electricity and air supply at the nuclear power plant where the accident has occurred. It is fully operational in an autonomous manner within 24 hours.

2. Design basis of emergency RP equipment
Within this emergency response context, the radiological risk for the public, incorporated in the ability to reinstate the environmental measurement networks if they have been destroyed (integration of potential extreme situations) is factored into design, mainly with construction of the new emergency response management centre (ventilation designed to withstand release into the atmosphere and provision of dedicated protection and measuring equipment (RP equipment kept in protected rooms in the immediate vicinity of the teams, etc.).

In addition to the site equipment and human resources, the FARN has personnel trained in RP and stress management in emergency situations, personnel specialised in radiation protection in the

field, an RP expert who coordinates response actions in radiation protection terms (ALARA approach) and a site doctor.

Concerning equipment resources, EDF has opted for robust RP equipment common to all its personnel, factoring in Fukushima operating experience, both for worker protection and monitoring and for equipment and procedures appropriate to a high level of background noise. In order to reinstate environmental measurements, modular equipment enables the networks to be increasingly set up as and when the external emergency services arrive (especially the FARN).

3. Enhanced RP equipment in emergency situations
The principle of radiological risk management is based on progressive scheduled enhancement of the different items of RP equipment provided for monitoring and optimum protection of the public and all the emergency response teams, right from the very start and throughout response. The shift crews present on site thus take the first radiation protection actions: worker protection, partial reinstatement of the radiation monitoring network providing the public authorities with information so that they can fulfil their remit of public protection. This approach is supplemented with assessment of release into the atmosphere and analysis of radiological impact using predictive tools (dedicated computers) at corporate level.

Deployment of the FARN with additional input of equipment enables a complete environmental monitoring network to be reinstated within 24 hours, if need be, and additional radiological monitoring equipment to be deployed. Lastly, strengthening of the system with the input of additional national resources (inter-operator and public authority solidarity, etc) ensures sustainable radiological risk management within the more general framework of the recent governmental plan for response to major nuclear accident (resulting from nuclear emergency planning published at the start of the year).

4. Development of innovative solutions
Although the current organisation and measures already set up fulfil the requirements for radiological risk management, EDF with its Research and Development Entity deploys the continuous improvement initiative with the research and development of innovative solutions aimed at strengthening worker protection. The areas being developed are:

- Preparation of the team for emergency response management in realistic situations of stress --> development of training programmes and simulations
- Communication in the buildings in the event of loss of power --> development of equipment
- System of assistance for the participants so that they can understand their environment and ensure their own safety in an autonomous manner --> development of equipment
- Remote measurement acquisition and supervision system for response

To sum up, the analysis work conducted by EDF further to the Fukushima accident has demonstrated robustness of the existing arrangements for emergency response management and worker protection. However, EDF has initiated an extensive action and development plan to improve risk prevention in emergency response management, thus factoring in the lessons to be learned from the accident. This action plan focuses on organisational arrangements internal to EDF or related to the public authorities and is based on robustness of existing equipment, a new emergency response management centre, setting up of the FARN and research actions.

SEVERE ACCIDENT MANAGEMENT: RADIATION DOSE CONTROL, FUKUSHIMA DAIICHI AND TMI-2 NUCLEAR PLANT ACCIDENTS

Roger SHAW
Shaw Partners LLC
United States

This presentation presents valuable dose information related to the Fukushima Daiichi and Three Mile Island Unit 2 (TMI-2) Nuclear Plant accidents. Dose information is provided for what is well known for TMI-2, and what is available for Fukushima Daiichi. Particular emphasis is placed on the difference between the type of reactors involved, overarching plant damage issues, and radiation worker dose outcomes. For TMI-2, more in depth dose data is available for the accident and the subsequent recovery efforts. The comparisons demonstrate the need to understand the wide variation in potential dose management measures and outcomes for severe reactor accidents.

ONTARIO POWER GENERATION FUKUSHIMA EMERGENCY RESPONSE DRILL STRENGTHENS AND LESSONS LEARNED

David W. Miller
North American Technical Centre
United States

Japan's Fukushima Daiichi severe nuclear accident in March 2011 has resulted in a reassessment of nuclear emergency response and preparedness in Canada. On May 26, 27 & 28, 2014 Ontario Power Generation (OPG) conducted the first North American full scale nuclear emergency response exercise designed to include regional, provincial and federal bodies as well as the utility. This paper describes the radiological aspects of the OPG Exercise Unified Response (ExUR) with emphasis on deployment of new Fukushima equipment on the Darlington site, management of emergency workers deplored in the vicinity of Darlington to collect environmental samples and radiation measurements, performance of dose calculations, communication of dose projections and protective actions to local, provincial and federal agencies and conduct of vehicle, truck and personnel monitoring and decontamination facilities.

The ExUR involved more than 1000 personnel from local, provincial and federal bodies. Also, 200 OPG employees participated in the off-site emergency response duties. The objective of the ExUR was to test and enhance the preparedness of the utility (OPG), government and non-government agencies and communities to respond to a nuclear emergency. The types of radiological instrumentation and mobile facilities employed are highlighted in the presentation. The establishment of temporary emergency rooms with 8 beds and treatment facilities to manage potentially contaminated injuries from the nuclear emergency is also described.

VIEWS AND APPROACHES – REGULATORY AUTHORITY PERSPECTIVES

Plenary Session 4

Chairperson

Marie-Line PERRIN
Autorité de Sûreté Nucléaire

CNSC EOC TECHNICAL ASSESSMENT AND EVALUATION INITIATIVES

Christopher COLE
Canadian Nuclear Safety Commission
Canada

In Canada, multiple layers of government respond to a nuclear emergency. Although the licensee is responsible for all on-site mitigating actions, the Provincial and Municipal governments take responsibility for all off-site decisions such evacuation and the distribution of Potassium Iodide pills. The Federal Government provides support for the Provincial Government as required or requested. The CNSC forms part of the Federal Government and has the unique capability of fully understanding the phenomena of a nuclear accident. As such, the CNSC plays a key role at the federal level, the provincial level, and with the licensee if a nuclear emergency were to unfold.

The Emergency Operations Centre (EOC) at the Canadian Nuclear Safety Commission (CNSC) in Ottawa is activated for all events which are leading or could lead to significant on-site or off-site consequences, and where the consequences of the event will be strongly affected by the operator's actions. During a nuclear emergency the CNSC's regulatory role is to provide assurance that appropriate actions are taken to limit the risk to health, safety, security and the environment.

A key component to the EOC is the Technical Assessment Section (TAS). The TAS is primarily responsible for diagnosing the state of the accident and providing a prognosis for the accident progression. The section provides a predictive source term and dispersion calculation for both the diagnosis and the prognosis. The associated dose to public and site staff is assessed. The potential dose to safety workers, on-site staff and the public is compared against assessments made by the provincial authorities to confirm that adequate protective measures are implemented.

In order to meet this mandate, steps have been taken to put in place both procedures and tools for the TAS. These include in-house developed codes such as the NPP Accident Handbook and VETA as well as the industry standard dispersion and dose code Emergency Response Projection (ERP). International codes, such as the US NRC developed dispersion code RASCAL are also employed to assist in dispersion and dose projections. This paper outlines the architecture of the TAS along with a brief description of the Sections' present tool set. Although the Section is now considered fully functional, plans are being developed to further improve its ability to diagnose accidents in an efficient and timely manner. A high-level outline of the future of the TAS is also presented.

FRENCH REGULATORY REQUIREMENTS FOR THE OCCUPATIONAL RADIATION PROTECTION IN SEVERE ACCIDENT SITUATIONS AND POST ACCIDENT RECOVERY

Olivier COUASNON
Autorité de Sûreté Nucléaire
France

1. Regulatory provisions in case of emergency situations

Workers of the concerned company and other persons and teams called “intervention personnel” (specialized firemen, first aider, etc.) are to be involved in radiological emergency situations. Radiation protection provisions for workers and for intervention personnel complement one another because they cover persons with different statutes (workers under the responsibility of an employer and persons acting within the framework of agreements with the public authorities or within the framework of the requisitions).

Work or operations exposing workers to ionizing radiation in radiological emergency situations can be assigned only to workers satisfying all of the following conditions: classification in category A worker; free of any medical unfitness; on a list drawn up in advance for this purpose; having received appropriate information on the risks and the precautions to take during the work or the operation; not having received, during the preceding twelve months, a dose greater than one of the annual limit values for exposures subject to special authorization. In addition, the worker must be a volunteer to carry out the work or the operations concerned in radiological emergency situations and have individual dosimetry means appropriate for the situation.

Intervention personnel are possibly composed of personnel from responding organizations, such as police officers, fire-fighters, medical personnel, drivers and crews of evacuation vehicles, or of workers employed by the head of the damaged plant. In order to determine their selection, training and medical and radiological monitoring conditions, intervention personnel are classified into two groups : personnel forming the special technical, medical and health intervention teams readied in advance to deal with radiological emergency situations and persons not belonging to special teams but intervening as part of the tasks within the scope of their competence.

2/Regulatory provisions in the case of post-accident situations

In case of an existing exposure situation (post-accident), intervention personnel receive radiation protection granted to exposed workers.

3/ Future developments relating to regulatory provisions

ASN will have to take into account two major sources of implementation of the occupational radiation protection during an emergency situation: the transposition of Council Directive 2013/59/EURATOM of 5 December 2013 and the requirements following the complementary safety assessments of the nuclear power plants in the light of the accident that occurred on the nuclear power plant at Fukushima Daiichi. Indeed, member States shall bring into force the laws, regulations and administrative provisions necessary to comply with the Directive. For example, in the French regulation, the end of the emergency situation and the transition from emergency phase to the recovery phase are not mentioned and will have to be integrated in the French legal framework. Concerning the complementary safety assessments, they require a “hard core” of material and organizational measures designed to ensure control of basic safety functions in extreme situations (comprising operational dosimetry resources for workers) and in addition that the operator (EDF) gradually deploy its proposed national "Nuclear rapid response force (FARN)" comprising specialist crews and equipment able to take over from the personnel on a site affected by an accident.

SEVERE ACCIDENT MANAGEMENT GUIDELINES

Jennifer UHLE
Nuclear Regulatory Commission
United States

The events at Fukushima Daiichi have highlighted the importance of Severe Accident Management Guidelines (SAMGs). As the world has learned from the catastrophe and countries are considering changes to their nuclear regulatory programs, the content of SAMGs and their regulatory control are being evaluated. This presentation highlights several factors that are being addressed in the United States as rulemaking is underway pertaining to SAMGs. The question of how to be prepared for the unexpected is discussed with specific insights gleaned from Fukushima.

RADIATION PROTECTION ISSUES RAISED IN KOREA SINCE FUKUSHIMA ACCIDENT

Byeongsoo KIM
Korea Institute of Nuclear Safety
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For the past 3 years since Fukushima accident, various issues related to nuclear safety and radiation safety were raised in Korea. This presentation focuses radiation protection (RP) issues among the various issues and has the purpose to share experiences and lessons-learned related to the RP issues.

Special safety inspections on NPPs in Korea were performed immediately after Fukushima accident and 50 follow-up measures were established in May, 2011 to improve the nuclear safety. Some of them were related to radiation protection and emergency responses. Recently, in March, 2014, additional follow-up measures were decided to be taken in additionally strengthening safety-related equipment and emergency response organization.

The 50 Fukushima-accident-follow-up measures include radiation protection for members of the public in emergency responses. Based on the follow-up measures, expansion of emergency planning zone (EPZ) is to be made according to the approval of legislation by National Assembly on May 2, 2014.

For the past 3 years, the degree of the public concerns on radiation risk has been the highest. Spontaneous activities for radiation monitoring happened in the public. Some members of the public found some contaminated paved roads in November, 2011 and a contaminated kitchen ware in January, 2012. These findings suggest the importance of the management of recycled metal scraps imported from other countries.

Fukushima accident gave much impact on Korean society all. The public gets very sensitive to issues about nuclear safety and radiation safety. Most parts of RP issues raised are related to the public. The lessons-learned are that as an issue is raised, it has a chance to be solved. However, RP issues related to radiation workers in accident conditions in NPPs are difficult to be raised enough to confirm and improve the robustness of radiation protection programs in accident conditions. It is necessary to share RP issues raised in each country as well as experiences and lessons-learned. Then, the shared information could help to enhance RP programs in each country in different conditions.

FINNISH EXPERIENCE ON EMERGENCY PREPAREDNESS CO-OPERATION WORK AND RESULTS

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According to the “Security Strategy for Society” the responsibilities are shared across society and the normal division of duties shall be maintained unchanged as far as possible in all situations. While the competent authority is always in charge of making decisions other administrative sectors may be co-operation partners. This applies to the representatives of business community and organization as well.

The first regional co-operation group for NPP emergency preparedness consisting of the representatives of regional rescue service, NPP licensee and STUK was established in 2008 to develop the external rescue plan, arrange training etc. Today co-operation groups are working for both Finnish emergency planning zones. Examples of the co-operation results are discussed in the presentation.