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ISOE Management Board Meeting

The 20th annual meeting of the ISOE Management Board held on 15 November 2010 in Cambridge (UK) was attended by participants from nuclear electricity utilities and national regulatory authorities from twelve countries. The meeting was chaired by Mr.G.Abela (ISOE Chair-elect) from EDF (France).

The Management Board reviewed the current ISOE programme. Key outcomes included approvals to:

- establishment of ad-hoc expert groups on decommissioning, water chemistry and events,
- investigate proposal for sharing the technology and science for assessment measurement of deposited corrosion products in PWR NPPs by using CZT gamma spectroscopy technology,
- distribute the draft of the Non-binding Memorandum of Understanding which requires co-operation with the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) concerning provision of selected ISOE data for inclusion in the UNSCEAR data system and reports of global levels and trends of occupational exposure to the ISOE Technical Centres for comments.

Proposal for removing restrictions on ISOE participating authorities was reviewed in detail by the Management Board and it was agreed that data access restrictions, as in the Terms and Conditions (2008-2011), should be maintained without any change.

2010 ISOE International Symposium

The 2010 ISOE International Symposium organised by the European Technical Centre held at Fitzwilliam College in Cambridge (UK) between 17-19 November 2010 was attended by 160 participants from nuclear electricity utilities, related industries or institutions and national regulatory authorities from twenty four countries. The symposium covered all aspects of radiation protection (RP) issues and it was preceded by two separate meetings of utility RP Managers and Regulatory Authority representatives. These meetings reports are briefly included in this edition.

The main topics of the symposium were:

- RP at design stage of nuclear power plants (NPPs)
- RP management
- Dosimetry and measurement materials
- Source-term management
- Job specific experience
- Learning from events in RP field
- RP and decommissioning

All relevant documents including presentations can be downloaded from the ISOE Network website (http://www.isoe-network.net/index.php?option=com_docman&task=cat_view&gid=450&Itemid=122).

Presentation on UK Generic Design Assessment

The keynote speaker of the first session was Mr.Kevin Allars who is the Director of Nuclear New Built Programme of Health and Safety Executive (HSE) Directorate. As it is mentioned in detail during his speech, HSE and Environmental Agency (EA) are performing Generic Design Assessment (GDA). This is a new process of regulating new nuclear build which has been well prepared and managed.

It was also indicated that regulators must consider three key elements: reactor design acceptability, site, and operating organisation. A meaningful GDA should be useful to governments, vendors, potential operators, regulators and the public. The aim in UK is to have complete transparency of the process and its outcomes. These will reduce regulatory risk for potential operators and improve confidence for the public in nuclear safety, environment and security issues.

Mr. Allars presented related findings of GDA and the issues to date. For example, some of the findings/issues are: early progress on key technical issues and necessary design changes (e.g. C&I architecture), international collaboration in design harmonisation, managing a parallel GDA and Licence Application/Permitting process, and delivery of project metrics. Two vendors are in the assessment procedure, Areva (EPR) and Westinghouse (AP1000). It was mentioned also that the current EA issue is on decommissioning and spent fuel disposability. Quarterly reports are regularly available. More information on GDA is accessible at www.hse.gov.uk/newreactors.

As regulators, HSE and EA are independent of government and industry. The common aim is that new stations generating from 2018 are safe, secure and properly protect environment.

Presentation on Occupational Radiation Protection (ORP) Criteria for New Design

A new publication on Occupational Radiation Protection Principles and Criteria for Designing New NPPs was presented by Ms.Emmanuelle Gaillard-Lecanu (EDF, France) who chaired the working group of this case in the framework of the OECD/NEA. The group was composed of representatives from national regulatory bodies and industries. ISOE technical centres and utilities from Bulgaria, France, Japan, Slovenia, Sweden, and USA provided their experts for the topics of this publication.

The presented work is based on experience and lessons learned from the existing fleet of reactors. It introduces a policy and technical framework for the integration of occupational radiation protection into the design phase of new build. It is directed to executive management of nuclear power plants, designers, manufacturers, contractors and authorities responsible for regulating occupational radiation exposure. It is also aimed at assisting the design and license assessment of 3rd generation nuclear power plants, providing example of actual tools such as ALARA committees and the use of ALARA checklists.

The major issues that are considered are:

- Occupational RP principles at the design stage.
- Lessons learned, knowledge management, education and training.
- Integrating occupational RP criteria during the design phase.
- Evaluation and integration of occupational RP cost in the design process.

The publication has also practical appendixes based on regulatory or industry good practices and they include:

- ALARA design check-list.
- ALARA engineering design principles.
- Application of ALARA to facility system design.
- Application for construction and/or operating licenses for nuclear power plants – design aspects related to ORP.

This publication can be ordered in hard copy or downloaded from the OECD/NEA web site (http://www.oecd-nea.org/rp/reports/2010/nea6975-criteria-new-plants.pdf**.**

Three Distinguished Papers of the Symposium

1. Gamma Imaging System

Gamma imaging system, or gamma camera, is a new radioprotection tool foreseen for nuclear dismantling activities or radioactive source search. Mr.Frederick Carrel (CEA, LIST/France) presented significant improvements of gamma camera. The research group of CEA and AREVA have constructed a new generation of very compact gamma camera called GAMPIX. Its weight is about 1 kg and the camera components are:

- Pixellated chip, developed by the CERN; it is hybridized with a 1 mm thick CdTe substrate.
- Coded mask, multi-pinhole collimator.
- USB interface for the computer.

This device enables the superimposition of a gamma image with a visible image, which is of help to locate radioactive hot spots in a given area. The best results in terms of sensitivity are obtained for ^{241}Am because of the low energy gamma-rays emitted by this radionuclide. Hence, this camera can be of great interest in order to detect plutonium, with high ^{241}Am concentrations. The detection of high-energy gamma-ray emitters, like ^{137}Cs or ^{60}Co, requires thicker masks. Several solutions were introduced for further improvements.

2. A new software for RP in Slovakia

Slovenské elektrarne (SE), a subsidiary of Enel, owns and operates four VVER 440/213 reactors at Bohunice and Mochovce. These plants have historically used processes and IT solutions developed internally over many years.

A nuclear business improvement group was established in 2006 to evaluate the performance of the SE nuclear facilities in relation to the industry top deciles performers. The result of the group evaluations showed opportunities for improvement in multiple key process areas.

The presentation of Mr. Francesco Putignano was about a need to provide an integrated IT platform to support the implementation of the improved processes. The design criteria used for the review and update of the current processes was based on the Institute of Nuclear Plant Operations (INPO) Standard Nuclear Process Model.

Later on a decision was made to also integrate the multiple radiation protection, chemistry, environmental monitoring and metrology programs into a new integrated software solution.

RP, dosimetry, environmental releases and counting evidence, radioactive waste and sources management, radiation controlled area (RCA) access, RP metrology, and radioactive material shipments were integrated using a combination of different standard modules (commercially available SAP) and management software.

State of the art is RCA access control. The application is used to manage all data and features of access to RCA and even to the change rooms. It assigns and tracks permanent and temporary lockers and shelves in the “hot” and “cold” change rooms and registers the issuance of personal protective equipment. A consistent hardware investment was made to guarantee the automation of the process, as the keys to the lockers are distributed by dedicated dispensers that recognize employees through the badge and check their permit validity. New hardware and info panels were installed at the RCA boundaries to support the new software and process.

Among other things, also a completely new work management process in compliance with INPO AP-928 was established at SE, and as a result the overall management of radiation work permits was improved.

Due to very complex overall data bases and many data inputs, the project management follows up operational experiences, and is open for further improvements. The published paper of the group of authors describes project organization in detail and its IT solutions.

3. Steam Generator Replacement of the Belgian Doel 1 Unit

It was reported that, after previous six steam generator replacements (SGR) at the Belgian nuclear power plants, Electrabel (EBL) also committed Tractebel Engineering (TE) with the seventh one. Time had come for the Doel 1 (392 MWe) after 35 years of operation. It was decided to replace the SGs during the months of November and December 2009.

Ms. Bénédicte Walschaerts presented the preparation of the TE for this project, follow up and site dosimetry results. The collective dose of 0.244 manSv was an excellent achievement for this replacement. Comparison of collective doses to some other SG replacements was presented at the end.

ALARA working group

For the steam generator replacement project, EBL and TE composed a working group with the contribution of specialists in radiation protection and implementation of the ALARA principle. This group was entrusted with the implementation of nuclear safety and radiation protection (including ALARA) applicable at Doel and Tihange sites. This group had two tasks:

- During the pre-study phase, this group defined and verified the possibilities to implement an ALARA policy. They started studying the dose rates, different possibilities for shielding materials, adapting the water configurations of the primary circuit to the outage works, estimating the effective dose, preparing the follow-up of the dosimetry, defining the objectives, etc.
- During the SGR outage, the group assured the dosimetric follow-up and analyzed the dosimetric condition on the work floor. They regularly verified the radiological status of the unit and controlled the shielding. A daily control of the collective and individual doses was carried out to obtain a view on the dosimetric evolution of the doses to detect anomalies compared to the estimates. Adaptations of the estimates were done when important changes in planning were assumed.

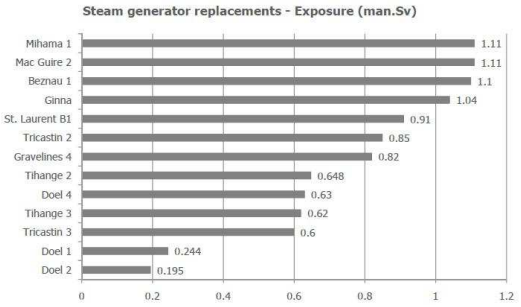
ALARA preparation for the SGR

The project was divided into dosimetric phases. A dosimetric phase is a time period during which the state of the unit stays stable: no change or movement of the existing sources is considered. The phases were defined depending on the emptying of certain circuits, the presence of lead shielding and the configurations of the old and new steam generators. Subsequently, the work places were defined. Every planned activity was linked to certain work places needed to achieve the goal of the activity, and it was coupled to a task number.

At the work places that were critical for this project, SG measurement points were defined. After multiple measurement campaigns, spread over 2 outages, in different configuration states of the steam generators and the follow-up of dose rates at specific points, a large set of practical data was acquired.

Dosimetric results

The experiences and good ALARA project preparation are important for the final dosimetric result. Still the Doel 1 result is higher than the one of Doel 2. Reasons are the following: Doel 1 dose rates were 30% higher and some of significant higher dose rates were also registered.
Another difficulty was a large scale asbestos insulation removal. Such a job was never carried out before. Special preparation was necessary also for diverse weather conditions to protect the top of the containment where the SGs were lifted out and in.



Dedicated Meetings of the Symposium

The 2010 ISOE international Symposium was preceded by two dedicated meetings devoted to specific audience: the Radiation Protection Managers meeting and the Regulatory Body Representatives meeting.

Radiation Protection Managers meeting

The Radiation Protection Manager's meeting is open to RP practitioners from Nuclear Power Plants, Corporate Offices and Contract organisations. The RPM Meeting was attended by more than 40 persons, from 18 countries and 25 separate organisations. Participants from every continent that host commercial Nuclear Power Plants were represented.

Presentations were delivered by the majority of NPP representatives, outlining their recent performance, successes and challenges. Invited presentations were made to promote discussions about recent industry events and to share good practices.

The discussions showed that in most cases radiation doses are well-controlled although, perhaps inevitably, further significant reductions in collective radiation exposure are not achievable, given the performance improvements gained in recent years. Effective management of individual doses is being demonstrated. A number of plants reported RP challenges due to lifetime management issues or unexpected plant defects. A number of RPMs expressed concerns about the loss of experienced personnel which could be regarded as a leading indicator to declining RP programme performance.

The afternoon session began with presentations on recent industry events. Discussions about the causes of events identified some common themes: inadequate risk analysis, ineffective use of operating experience and limited RP and/or management oversight of high risk work. The experiences presented also highlighted that some events can present novel challenges in terms of dose assessment and worker counselling.

The RPM session also featured presentations on good practices. Two presentations from North America demonstrated the effectiveness of systematic programme evaluation and the benefits of a strong focus on the fundamentals of contamination control. The concluding presentation outlined how a structured ALARA programme can be aligned to support an NPP's operation.

Regulatory Body Representatives meeting

The meeting was attended by 14 representatives from eight different Regulatory Authorities/Bodies: Canada, France, Germany, Sweden, Slovenia, Spain, Switzerland and the USA.
In the following is a brief history of the Regulatory Body Representatives Meeting:

- The idea of organizing this meeting was born at a steering committee in 2003 (Vienna, Austria);
- In 2004 (Lyon , France), the meeting was dedicated to the exchange of general information about supervision by regulators;
- In 2006 (Essen, Germany), the meeting dealt with the exchange of information on inspection approaches;
- In 2008 (Turku, Finland), the meeting looked at the contamination events;
- In 2010 (Cambridge, UK), the goal of the meeting is the exchange of information/experience about feedback from radiological events.

The meeting informally discussed the exchange of information about the event feedback management focusing on good practices/ideas. The regulatory requirements about reporting radiological events have been also discussed. As a result, the meeting came to the following conclusions/recommendations:

- A compilation of lessons learned from reportable and non-reportable events and findings should be made available as instruction tools for new RP technicians and also for continuing education of RP staff / Managers.
- The form of the report should be determined by a new ad-hoc group developing the terms of reference for the report.
- The ad-hoc working group should be primarily comprised of utility representatives/participants.
- The compilation might be similar to the green book "*Work Management to Optimize Radiological Protection at Nuclear Power Plants*" (published by the OECD/NEA in 2009). Especially knowing that, on behalf of the Asian Technical Centre Mr.Mizumachi (Past ISOE Chair, 2007-2008) has gathered nearly 140 information events and is proposing to create a "Red" or a "Beige" book to document "lessons learned from radiological events". The work is to be done within the ISOE programme.

Learning from Events

Learning from events in the RP field was also included as one of the ISOE Symposium sessions. There were given three excellent presentations:

- Lessons Learned from Radiological events in Switzerland – S.G. Jahn (ENSI)
- Radiation Protection Management and ALARA Lessons Learned during TMI refuelling outage – W.Harris (Exelon Nuclear) – Distinguished Paper, Fort Lauderdale 2010 Symposium
- Spread of contamination through goods taken from RCA – S. Hennigor (Forsmark NPP)

The ISOE Symposium and the initial meetings of RPMs and regulatory body representatives illustrate that Radiological Protection Specialists are a global community, with well-aligned ambitions and common challenges. We strengthen our chances of further success by networking effectively and by sharing our experiences.

Photo from Congress Dinner at Imperial War Museum

Schedule of Meetings for 2011

- 10-12 Jan 2011: 2011 North American ISOE ALARA Symposium (Fort Lauderdale, USA)
- 23 May 2011: ISOE Bureau/TC meeting (OECD, Paris)
- 24-26 May 2011: WGDA (OECD, Paris)
- Sept-Oct 2011: 2011 Asian ISOE ALARA Symposium (Japan)
- 7-8 Nov 2011: WGDA (OECD, Paris)
- 8 Nov 2011: (afternoon) ISOE Bureau/TC meeting (OECD, Paris)
- 9-10 Nov 2011: ISOE Management Board (OECD, Paris)

For further information, please visit the ISOE Network: *www.isoe-network.net*