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Report on the International Conference on Occupational Radiation Protection (ORP):

enhancing the protection of workers - gaps, challenges and developments

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Organised by the IAEA, co-sponsored by the ILO (International Labour Organization).

In cooperation with 15 organisations (EC, ICRU, ICRP, IRPA, ISR, ISRRT, UNSCEAR, WHO, and others).

This conference attracted around 500 participants, most of them representing countries/regulatory authorities, followed by members of the IAEA and international organisations. By profession, the vast majority were physicists and only a few were medical doctors. The representatives of the ISR and the ISRRT were likely the only representatives of their professions.

After the first International Conference on Occupational Radiation Protection (ORP) held in Geneva in 2002 this was the second such meeting, and it started with an evaluation of the impact of the **2002 Call for Action**. It was also stated that the **ICRP recommendations 103,** as well as the **new International (IAEA) and European Basic Safety Standards,** were important reasons for the 2014 conference.

The conference was organised with an introductory and a concluding session, and 12 dedicated sessions (four of these followed by a roundtable), offering roughly 100 presentations and 100 posters:

Session 1: **International recommendations and standards** on occupational radiation protection: Recent changes and the challenges in their practical implementation

Session 2: **Dose assessment** of occupational radiation exposures

Session 3: **Radiation effects and health risks** from radiation exposure at the workplace

Session 4: **Dose record management** of occupational radiation exposure

Session 5: Occupational radiation protection in **industrial and research & education facilities**

Session 6: Occupational radiation protection in **emergencies and existing (post-accident) exposure situations**

Session 7: Occupational radiation protection in the workplaces involving exposure to **naturally occurring radioactive materials and cosmic rays**

Session 8: Occupational radiation protection in the workplaces involving exposure to **radon**

Session 9: Occupational radiation protection in **medicine**

Session 10: Occupational radiation protection in **nuclear/fuel-cycle facilities**

Session 11: **Education and training** in occupational radiation protection

Session 12: **Safety culture**

As expected from the programme, the conference was dominated by general, non-medical subjects of occupational radiation exposure, covering the whole range of ORP. These general sessions often included some medical aspects. In session 3, the updated scientific knowledge was summarised by UNSCEAR and ICRP experts, whereas the rest of the conference focused on the impact of recommendations on working conditions and their implementation. **Planned exposure situations** (including medicine), **emergencies** and **existing exposure situations** (by naturally occurring radionuclides and cosmic radiation) were discussed in detail for each specific type of radiation exposure.

Some **important general points** were:

- the fact that (occupational) radiation protection combines science with social/political values and with experience
- the higher (than previously assumed) sensitivity of the **lenses** of the eye to ionising radiation has been the reason for lower annual exposure limits (radiogenic cataract is now called tissue reaction; the threshold – if it exists at all – is below 500 mSv)
- the reasons for staying with the **LNT** hypothesis (below 50-100mSv) but also the fact that it is not legitimate to estimate the risk by multiplying very large numbers of individuals by very low doses
- the fact that **effective dose** was introduced for populations, not for individuals; the ICRP & ICRU are working on a way to assess individual risks but it will take time before a new proposal will be available,
- the practical approach chosen by the ILO, IAEA and WHO for compensation purposes: the causative contribution (etiologic factor) of ionising radiation to a disease (e.g. cancer) is called '**assigned share**'
- the higher than previously assumed biological effect of **radon** and its impact on ORP as well as on building construction; the combined, much higher risk of Rn and smoking
- the experience and lessons learned from the **Chernobyl and Fukushima accidents**; a specific point was the discussion on whether dose limits or reference values should be used for emergencies, and under which conditions these might be exceeded; furthermore the difficulty of balancing individual vs. population risk was pointed out,
- the fact that air crews represent around 10% of occupationally exposed persons but receive around 75% of the total occupational dose (medicine in comparison 70% and 15%, respectively)
- **ALARA networks** and their activities/success/financial difficulties

The **medical session and roundtable** concentrated on:

- optimising ORP in medicine
- education and training of health professionals in ORP,
- ORP in **interventional** procedures
- the perspectives of the **professionals** (radiographers/ISRRT, radiologists/ISR, medical physicists), the regulators, the industry/COCIR, and the IRPA.

Both the medical session and session 12 also discussed the **safety culture**, what it includes and how it can be created through a comprehensive approach.

The **conclusions** of the whole conference referred to the role of professional organisations, such as the ISR and ISRRT. A new **Call for Action** was formulated and will direct ORP activities during the next few years, before a third conference on ORP is considered.

While for an individual radiologist the conference offered, above all, a broad survey on ORP in fields outside medicine, it was important that the ISR and other medical stakeholders were visible in this global group of experts concentrating on radiation protection, most often representing the IAEA and national regulators.

Nine areas of focus for action and follow-up

I. *Implementing the existing international safety standards* to enhance occupational protection of workers, including assisting Member States in facilitating implementation and encouraging a holistic approach for worker protection.

II. *Developing and implementing new international safety guidelines for occupational radiation protection in different exposure situations*, including advanced accelerator facilities and interventional radiology.

III. *Enhancing assistance to Member States* with less developed programmes for occupational radiation protection to support practical implementation of international safety standards.

IV. *Promoting exchange of operating experience*, particularly for industrial radiography and medical radiology, and including appropriate consideration for human factors, not just among Member States and regulatory authorities, but also among operators, radiation protection officers and vendors.

V. *Enhancing training and education* in occupational radiation protection to equip workers with the necessary knowledge, skills and competencies to implement protection measures for workers, including periodic refresher training in radiation protection and practical measures to reduce exposures.

VI. *Improving safety culture among workers* who are exposed to ionising radiation, including promotion of safety culture by regulatory authorities through outreach and education.

VII. *Developing young professionals* in the area of radiation protection, particularly for developing nations, through communication, networking, training, research, hands-on experience and participation in technical meetings and conferences.

VIII. *Applying the graded approach* of the 'IAEA Radiation Protection and the Safety of Radiation Sources: International Basic Safety Standards' (BSS) in protecting workers against exposures to elevated levels of naturally occurring radiation or radioactive materials, including flight crews, miners and other workers.

IX. *Convening an appropriate international forum to exchange additional information and analysis of worker protection in different exposure situations*, including during nuclear emergencies, to identify lessons learned, implement plans for the protection of workers and helpers, enhance worker preparedness, guide the development of measures for the rapid transition from planned exposure to emergency response, and improve radiation protection in emergencies.

The presentations can be downloaded at http://www-ns.iaea.org/tech-areas/communication-networks/orpnet/news/cn223-programme.asp#monday

ISR The International Society of Radiology

IAEA International Atomic Energy Agency Atoms for Peace

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