The OECD/NEA Perspectives on the Maintenance of Competence: Future Challenges for Nuclear Infrastructures

Mr. Takanori Tanaka
Deputy Director for Safety and Regulation
OECD Nuclear Energy Agency

The OECD/NEA Membership

- NEA, a forum for 28 member countries from:
  - 18 countries from the European Union.
  - Iceland, Norway, Switzerland and Turkey.
  - Canada, Mexico and the USA.
  - Australia, Japan and the Republic of Korea.
- Close collaboration with the IAEA and the European Commission.

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

The NEA Mission

- To assist its member countries
  - in maintaining and further developing,
  - through international co-operation, the scientific, technological and legal bases
    - required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes.

- To provide authoritative assessments,

  to forge common understandings on key issues, as input to government decisions on nuclear energy policy, and

  to broader OECD policy analyses in areas such as energy and sustainable development.

Agence pour l'énergie nucléaire
Nuclear Energy Agency

OECD

NEA Concern for the Maintenance of Competence

- Committee on Radiological Protection (CRPPH)
  - Radiation Protection Today and Tomorrow (1994)
  - Survey of University-Level Education Programmes in Radiation Protection (1996, 2001, 2005)

- Committee on Nuclear Development (NDC)
  - Report on Nuclear Education and Training: Cause for Concern (2000)

- Committees on Safety and Regulation (CSNI & CNRA)
  - Assuring Future Nuclear Safety Competencies: Specific Actions (2001)
  - Collective Statement Concerning Nuclear Safety Research (2004)
  - Strategic Plan for Nuclear Safety and Regulation (2005).

Challenges identified by the CSNI and CNRA

- **Shrinking nuclear infrastructure (1st challenge)**
  - Fewer suppliers of nuclear facilities and nuclear specific equipment and services.
  - Fewer experts with high level experience and knowledge in nuclear safety.
  - Less education in nuclear field.
  - Less financing for nuclear safety research.
- Increased public expectations on safety in use of nuclear energy.
- Industry initiatives to improve economics and safety performance in production of nuclear power.
- Necessity to ensure safety over plant life cycle.
- New reactors and new technology.

Challenges identified by the NDC

- Decreasing number of nuclear programmes.
  - The number of universities with nuclear programmes
    144 in 1990 ⇒ 134 in 1998
- Decreasing number of students.
  - Undergraduate degrees: 1861 in 1990 ⇒ 1679 in 1998 (-10%)
- A significant fraction (20-40%) of nuclear graduates do not enter the nuclear industry.
- Lack of young faculty.

Age Distribution (% of total)						Average Age
21-30	31-40	41-50	51-60	61-70	71+	
7	18	29	33	13	1	48

- Ageing teaching and training facilities.
  - Most university reactors and facilities are over 25 years old.

Approaches suggested by the NDC

- The strategic role of governments.
  - Strategies including education, manpower and infrastructure.
  - Support to young students and to nuclear R&D programmes.
  - Development of educational networks.
- The challenge of revitalising nuclear education.
  - Basic and attractive educational university programmes.
  - Early and often interaction with potential students.
- Maintaining high-quality training.
  - Rigorous training programmes by industry to meet its specific needs.
  - Development of exciting research projects by research institute.
- Collaboration and sharing of best practices
  - Industry, research institutes and universities need to work together to co-ordinate efforts better to encourage the younger generation, etc.

Challenges in RP Survey (Trends in USA)

Slight decline in the number of universities offering RP Degrees

Degree \ Year	1996	2001	2003
BS	12	12	11
MS	26	21	18
PhD	18	16	16

Decline in enrollment

Degree \ Year	1996	2001	2003
BS	173	111	294
MS	361	148	156
PhD	156	103	59

Decline in diplomas awarded but a change is taking place…

Degree \ Year	1994	1995	1999	2000	2001	2002
BS	56	62	28	22	33	39
MS	151	172	60	53	39	47
PhD	32	22	15	19	23	20

Emerging Challenge for the RP Specialists

- Role and responsibilities of the radiation protection (RP) specialists in the past.
  - Focused on science aspects.
  - Socially trusted partners.
- Stakeholder involvement in decision-making process.
  - Stakeholder: individuals, groups, national/local government, risk-causing facility/process operator.
  - Question about the role of science/specialist and the function of the authorities.
  - Demand for accountability.

New Roles for RP Professionals

- To use radiation protection science to clarify results, implications and nuances of various protection options.
  - To bring state-of-the-art RP science to bear on the question.
  - To disseminate results in a comprehensive manner.
- To interact and communicate with stakeholder.
  - To provide technical information appropriately to stakeholder in forms that address stakeholder needs and concerns.
  - To communicate in both technical and non-technical fashions.

Needs to Maintain Competence in RP

- Need to develop new training programmes to address emerging new role of RP specialists.
- Need for more efforts in research activities.
  - Scientific challenges from radiation biology.
  - Such as:
    - Concept of dose as a measure for health detriment.
    - Foundation of the LNT (Linear Non-Threshold) hypothesis.
    - Eventual genetic-susceptibility of individuals to radiation induced cancer.
- The NEA will continue its work in all these areas.