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Nuclear Knowledge

Report by the Director General

1. In September 2003, in resolution GC(47)/RES/10.B, the General Conference recognized that preserving and enhancing nuclear knowledge and ensuring the availability of qualified manpower are vital to the continued and expanded safe and secure utilization of all nuclear technologies for peaceful purposes. The General Conference urged the Secretariat to continue to strengthen, subject to the availability of resources, its current and planned efforts in this area, recognizing the need for a focused and consolidated approach, and requested the Secretariat to assist Member States, particularly developing ones, in their efforts to ensure the preservation of nuclear education and training in all areas of nuclear technology for peaceful purposes. The General Conference further encouraged Member States to promote the networking of institutions for such nuclear education and training and requested the Director General to note the continuing high level of interest of Member States in the range of issues associated with nuclear knowledge in the process of preparing the Agency's programme.

2. The General Conference further requested the Director General to report on progress made in the implementation of this resolution to the Board of Governors and to the General Conference at its forty-eighth (2004) session. This document is a summary of the developments since the 47th session of the General Conference in 2003.

A.1. Managing Nuclear Knowledge and Information

3. Many activities in the Agency's programmes relate to nuclear knowledge and nuclear information management and are reported to the Board of Governors and the General Conference through the Annual Report¹, the Nuclear Technology Review², the Nuclear Safety Review³, and the Technical Cooperation Report⁴. A "one house" approach to knowledge management has become the principal task of an Agency crosscutting Knowledge Management Liaison Group, which includes

¹ See document GC(48)/3

² See document GC(48)/INF/6

³ See document GC(48)/INF/3

⁴ See document GC(48)/INF/4

representatives from all Major Programmes. This crosscutting group serves also as an internal forum of the Secretariat for addressing knowledge management issues, for the exchange of information and experience and for introducing knowledge management strategies, approaches and tools.

4. In 2004, the focus of Agency's nuclear knowledge management activities has been on developing methodology, guidance and tools, on strengthening training and education for capacity building and on preserving knowledge and information. A second direction was to facilitate the development of new partnerships between government, industry, and academia (research and educational institutions) for the advancement of nuclear knowledge. Additional resources have been made available for the dedicated sub-programme C.3 on Nuclear Knowledge Management, which serves as a focal point for nuclear knowledge management activities of all the other technical programmes. This has been achieved mainly through enhancing synergy with sub-programme C4, INIS, but also by adding new resources in the frame of the budget increase agreed by Member States in 2003.

5. In line with operative paragraph 6 of GC/(47)/RES/10.B, the preparations for an International Conference on Nuclear Knowledge Management Strategies, Information Management and Human Resource Development have been completed and the conference will convene in Saclay, France from 7 to 10 September 2004 as a forum for professionals and decision makers in the nuclear community, as well as professionals in the knowledge management and information technology sectors to discuss and share experience in nuclear knowledge management, information management and human resource development. It is expected that the results of the conference will help chart the Agency strategy in developing effective nuclear knowledge management activities.

6. Preparations are in process for a Workshop on Managing Nuclear Knowledge, to be organized with and hosted by the International Centre for Theoretical Physics (ICTP) in Trieste, Italy, in November 2004, in cooperation with the World Nuclear University.

7. The International Nuclear Information System (INIS), which currently has 129 members, is in the process of redefining its mission to become the nuclear knowledge management tool of the Member States. In 2003, INIS had its best annual production in 10 years, with 87 822 bibliographic records added — an increase of 23% over 2002. At the end of the first quarter of 2004, 203 universities worldwide had registered for the INIS programme allowing universities free access to the database. A new INIS membership agreement is currently being developed. The new agreement will strengthen the interaction between the INIS secretariat and INIS members while at the same time providing more flexibility for further development. A National INIS and Knowledge Preservation Seminar was conducted in Cairo, Egypt, in December 2003, in cooperation with the Egyptian Atomic Energy Authority. Two projects on the digitisation of microfiche collections in Member States were started in 2003: the digitisation of microfiche collections of the French Atomic Energy Commission (CEA) in December 2003, and the digitisation of the INIS microfiche archive of non-conventional literature together with the Russian INIS Centre in November 2003. The Agency continued its cooperative arrangement with the OECD/NEA Data Bank. The implementation of a computer-assisted indexing system acquired at the end of 2003 is expected to enhance the efficiency of future INIS development.

8. The Net Enabled Waste Management Database (see <http://www-newmdb.iaea.org>) is the Agency's main tool for promoting the harmonization of radioactive waste management information at the international level, which in turn can support initiatives such as multinational waste management facilities and information transfer to future generations. In June 2004, a Technical Meeting on Preservation and Transfer to Future Generations of Information Important to the Safety of Waste Disposal Facilities was held to investigate mechanisms for passing information to future generations. In 2004, the Agency prepared a Technical Document on *Records for Radioactive Waste Management up to Repository Closure: Managing the Primary Level Information (PLI) Set* (TecDoc 1398).

9. The Agency's Fast Reactor Data Retrieval and Knowledge Preservation Initiative seeks to establish a comprehensive, international inventory of fast reactor data and knowledge that would be sufficient to form the basis for fast reactor development 20 to 40 years from now. In 2003, the initiative focused on retrieval and archiving of data and information related to the German experimental fast reactor KNK-II. Some 500 documents from various KNK archives have been quality-checked, 268 documents were digitalized and preserved. Work also started on the Fast Reactor Knowledge Portal and taxonomy for the classification of fast reactor data and knowledge has been established.

10. An Integrated Safety Approach (ISA) has been developed, which recognizes the vital importance of effective management of the knowledge base, building on the integration between the Agency's safety standards and all aspects of the provision for their application, including lessons learned. Knowledge management tools are being used to develop process flows, map safety knowledge and promote knowledge sharing with Member States. Licences for the use of document management software have been made available to Member States participating in these activities. A pilot project has been completed consolidating safety knowledge on ageing and the long term operation of nuclear power plants. The product is being made available by the Agency on a CD-ROM.

11. The Agency is promoting and facilitating the establishment of regional nuclear and radiation safety networks to share and create new knowledge in these fields. Prominent examples are the Asian Nuclear Safety Network (ANSN) established in the frame of the extra budgetary programme on the safety of nuclear installations in South East Asian, Pacific and Far East Asian countries, and the Ibero-American Radiation Safety Network in the frame of the Ibero-American Forum of Nuclear Regulators.

12. In the frame of the Agency's nuclear security activities, a new information management system has been developed and implemented for effective programme delivery. It facilitates the analysis and reporting of programme outputs and achievements and the management of existing and new knowledge.

13. With Agency safeguards, the management of relevant information necessitates new techniques and technology, new skills and new methods of work⁵. Current activities seek: to develop or adopt pertinent information collection, processing and evaluation techniques, tools and infrastructure; to ensure that safeguards relevant information is processed, analysed and evaluated to turn it into 'knowledge'; to capture, preserve, learn from and add to the knowledge and expertise accumulated in the Agency and the relevant States over decades; to record, analyse and learn from more recent experience, especially in additional protocol implementation; and to ensure that staff involved in implementing strengthened safeguards, whether within the Agency or in States, receive the guidance and training required. Looking to the future, an important objective is to further develop, maintain and add to accumulated knowledge as an ongoing and appropriately structured activity.

14. Knowledge management tools including the Agency's public website and IAEA databases continue to be enhanced to support information exchange and knowledge distribution. New tools for supporting nuclear knowledge management have been developed or initiated, including an Agency-wide document management system and a Web based "Nuclear Knowledge Portal".

⁵ Before the inception of the State evaluation process in 1997, safeguards were implemented and safeguards conclusions drawn at the nuclear facility level rather than at the level of 'the State as a whole'.

15. The Agency also continued its interaction and close cooperation with the OECD Nuclear Energy Agency (NEA) on nuclear knowledge management issues. Further detailed information is available on the Agency's knowledge management website (<http://www.iaea.org/km>).

A.2. Strengthening Education and Training for Capacity Building

16. Through the implementation of activities planned under sub-programme C.3 on Nuclear Knowledge Management, the Agency interacted with, contributed to and supported national and international networks and conferences in education and training, in particular the European Nuclear Education Network (ENEN), the Annual Pavia Seminar on Nuclear Education in Italy in December 2003 (in cooperation with Major Programme 2), the German Alliance for Competence in Nuclear Technology, the conference on Knowledge Management in a Scientific Environment in Belgium in March 2004, the sixth meeting of the Commission of CIS states on the Peaceful Use of Atomic Energy in the Russian Federation in April 2004, the International Youth Nuclear Congress (IYNC) in Canada in May 2004 and the International Workshop on "Education and Knowledge Preservation in the Balkan Countries" in June 2004.

17. The Agency was a founding supporter of the World Nuclear University (WNU), together with the OECD/Nuclear Energy Agency, the World Association of Nuclear Operators (WANO) and the World Nuclear Association (WNA), the latter leading the preparations for founding the WNU in September 2003 in London, United Kingdom. In June 2004, the Agency convened a Technical Meeting on Planning Support Activities to the World Nuclear University. At the meeting, stakeholders in the WNU process reviewed the overall status of WNU activities and their implementation, and prepared an action plan for 2004–2005 for implementation by WNU. The first deliverable of the WNU was agreed to be a WNU Summer Institute in 2005.

18. The Asian Network for Higher Education in Nuclear Technology (ANENT) was established through an Agency Technical Meeting in February 2004 in Malaysia. It is stated in the approved terms of reference for ANENT that "ANENT is set up to promote, manage and preserve nuclear knowledge and to ensure the continued availability of talented and qualified manpower in the nuclear field in the Asian region and to enhance the quality of the human resources for the sustainability of nuclear technology." An action plan for ANENT was approved and activities are under way in five distinct areas: exchange of information and materials for education and training; exchange of students, teachers and researchers; distance learning; establishment of reference curricula and facilitating mutual recognition of degrees; and for liaising with other networks.

19. Human resource and succession planning issues for operating installations have been addressed through Technical Document 1399 on *The nuclear power industry's ageing workforce: Transfer of knowledge to the next generation*, prepared in 2004 based on experience gained in operating nuclear power plants in Member States.

20. Several training courses on nuclear applications have been supported in developing countries in collaboration with the Department of Technical Cooperation, by designing and preparing curricula and providing lecturers in the fields of human health, environmental monitoring and protection, new radiation-based manufacturing processes, use of nuclear methods in art and historical heritage studies, food and agriculture, and management of water resources. Distance-learning modules have been developed in the fields of nuclear medicine, food and agriculture and selected aspects of radiochemistry. A systematic approach was initiated to archive and make available on CD the training material related to all training courses supported by the Agency held on the various nuclear applications.

21. In response to the need of Member States to develop and maintain up to date sustainable education and training programmes, a large volume of standard training modules in nuclear, radiation, transport and waste safety has been prepared and made available. The Agency safety standards have been used as a basis for the development. Training has also been provided to instruct trainers on the use of these modules. This is particularly important to ensure that the material is properly used and that feedback on its utilization is reported back to the Agency for updating and improvement of the training services and material. Details of the work carried out are reported in Note by the Secretariat 2004/Note 8, *Providing for the Application of the Agency's Safety Standards: Activities during 2003*, which supports the *Nuclear Safety Review for the Year 2003*.

22. An important part of the transfer of nuclear technology and knowledge to Member States is undertaken through the technical cooperation (TC) programme. In 2003, the programme disbursed a total of \$73 million, of which over \$20 million was spent on human resources development, particularly on education and training with the highest emphasis on human health; food and agriculture; nuclear, radiation, and waste safety management; and physical and chemical applications. In addition, some 155 training courses were organized under the TC regional programme providing specialized training to nearly 2100 participants. The topics of these targeted training courses were carefully selected in consultation with Member States and the technical Departments of the Agency to address specific deficiencies and for solving their priority problems. Another 1400 professionals were trained as fellows or scientific visitors through national or regional projects in targeted areas. This combined approach made an important contribution to the effective training of human resources and also helped to give recognition to new institutions in each region for training purposes, thus contributing to the promotion of nuclear knowledge management and knowledge preservation in Member States.