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REPORT ON THE INTERNATIONAL CONFERENCE ON THE NUCLEAR POWER OPTION

1. About 150 participants from 37 countries and six international organizations attended a conference at the Headquarters of the International Atomic Energy Agency (IAEA) in Vienna from 5 to 8 September 1994 to discuss the nuclear power option and its prospects worldwide.

2. The conference participants reviewed plans for electricity production involving nuclear power in IAEA Member States and also regional trends. In addition, they took stock of what has been learnt over 40 years of operation at the 430 nuclear power plants currently existing in the world and representing 7200 accumulated reactor-years of operating experience.

3. Papers were presented regarding areas where problems may delay the adoption of the nuclear power option - such as public acceptance, irradiated fuel and radioactive waste management, safety, economics, the environment and legal liability. Papers were also presented on the prerequisites for a good nuclear power programme, including the necessary human resources, training, research, government oversight and clear energy strategies.

4. Participants from most Member States considered that nuclear power has an important role to play in conjunction with other energy sources. The demand for electricity will continue to grow, even with energy conservation programmes, improved efficiency and increasing prices. The growth will be driven by the recovery from the current recession in the industrial world, including the former Soviet Union, by rapid population growth in other regions and by the universal desire for improved living standards coupled with increasing concern for the environment. The choice of which sources of power are to be utilized in each country will depend on the availability and cost of fuel and capital funds and on political decisions. Many countries will opt for a balanced mix of energy sources in order to protect their economies against variations in price and uncertainties of supply. In this context, nuclear power will be competitive, environmentally preferable and supportive to sustainable development of the world's economy, and hence it must - and will - remain a viable option for the future.

5. Country and regional reports from East and West Europe, North and South America and Asia indicated that nuclear power is already well established, economic and accounting for a significant percentage of the power supply. In the long term, the continuing demand for electricity will lead to a growth in nuclear power as well as the other options. The advantages of nuclear power are its competitiveness, price stability and environmental benefits. The rate of growth and timing will vary between countries, but worldwide it may be expected that growth will continue at the present rate of 3-8 GWe/year, increasing to 10 GWe/year and higher in the next century.

6. The People's Republic of China and India both reported an imbalance of power demand over supply, with shortages of money and other resources limiting the urgently needed growth of nuclear power. Russia, Ukraine and other East European countries also have an urgent continuing need to increase - and improve - their nuclear electric generating capacity. Latin America has well defined needs and a shortage of resources. France, Japan and the Republic of Korea each has a strong continuing programme. Italy is reconsidering its nuclear power moratorium. Poland expressed strong interest in nuclear power. Utilities in North America currently have excess capacity, but expansion based on nuclear power and other sources is expected to resume when economic growth leads to absorption of the excess capacity.

7. Lessons of value in current operations have been learned from problems encountered. Equipment, procedures and training programmes have been upgraded. Improved communications and co-operation between operating plants have resulted in improved performance. WANO reported that availability has increased while the number and severity of reportable incidents have decreased.

8. The United Kingdom utility Nuclear Electric described a remarkable improvement in the performance of its AGR stations, with load factors going from 40% to 79% thanks to a four-year improvement programme.

9. The publication by international organizations of results demonstrating the continuing sound performance and safety of operating plants was advocated by several speakers as being essential to the improvement of public acceptance. One paper examined the good production record of WWER-440/230 plants and the reasons for it, contrasting them with safety concerns due to the absence of some safety features. The performance of the successor design (WWER-440/213) was reported to be generally better, but WWER-1000 plants have not performed as well as WWER-440/230 plants. Many factors make analysis difficult, and it is not possible to confirm the criticism that a lack of safety features helps to improve performance; the WANO paper and others established exactly the opposite, i.e. that a well managed and productive plant was also a safer plant.

10. The evolution of quality management into a philosophy promoting the improved quality performance of all staff and not just the production of quality documentation under the supervision of a quality department was described.

11. The importance of retaining existing nuclear power plant sites and improving plant economics by maximizing plant operating life was discussed. Longer life of existing plants is desirable in order to reduce the demand for new plants and to defer decommissioning and associated waste disposal requirements until facilities are available. It was noted that in Russia and East Europe several reactor pressure vessels (RPVs) had been annealed and that consequently RPV embrittlement was no longer considered a life-limiting feature.

12. With regard to public acceptance, Japan and France recommended creating a symbiosis between plants and their local communities and building trust by listening and responding to local concerns. Russia noted that during the current crisis in the national economy the public saw nuclear power as an "island of stability". It was noted by the USA that public support was often underestimated, which leads to hesitation on the part of government officials and others to speak out and take strong action in support of nuclear energy. New approaches to understanding public concerns were presented.

13. The papers on irradiated fuel and waste management all emphasized that safety is the paramount consideration. France described the development of a complete inventory of all radioactive waste in the country and reported that media references to the activity had been generally favourable, demonstrating the value of openness in gaining public confidence. Several speakers noted that progress in siting and operating waste disposal facilities was vital to future progress.

14. The session on safety covered improved safety features, safety assessment methods and safety culture. Some speakers considered there was a need for cost-effectiveness in making safety improvements, a view not shared by the regulatory community. Concern was expressed about a proposed feature of new plant safety requirements - that no accident should be so severe as to require off-site emergency planning - on the grounds that it would cause great difficulty if it was to be applied to the existing generation of NPPs. There was agreement on the need for continuing demonstration of the safe and productive operation of existing plants in order to help sustain public confidence. Harmonization of regulations was generally endorsed, but it was felt that variations and flexibility at the national level were to be expected. The harmonization worldwide of basic safety objectives, however, was agreed to be very desirable.

15. Discussion of a joint IAEA-OECD/NEA paper on liability for nuclear damage highlighted the disagreement as to whether liability should rest with the equipment supplier or the operator, but did not provide any solution. Russia stated that improved performance and safety were more likely to arise from increases in resources in countries where plants are located than through the supply of equipment by external vendors.

16. The need to attract and train further qualified staff was noted, and some concern was expressed in this connection. The public image of nuclear power, particularly at high schools, was identified as a problem. It was felt that there is a lack of interest which also applies to university teaching and research work. The contraction and diversification of R&D institutes are also leading to a serious reduction in available qualified staff that took

many years to build up. Action must be taken by governments to ensure that this trend is reversed if they wish to preserve the nuclear power option.

17. In summary, it was felt that the conference was timely and the coverage of topics complete. The demand for nuclear power will increase, but will not be homogeneous. In his closing remarks, the Deputy Director General for Nuclear Energy and Safety noted the consensus that there is a future for the nuclear power option and that nuclear power in many countries is not only a viable option, but the preferred one, being proven, economically competitive and environmentally benign. However, the safe and reliable operation of nuclear power plants, a convincing solution of waste storage and disposal problems and a predictable licensing process are essential prerequisites for the revival and expansion of nuclear power in the near future. Together with a supportive government policy consistently applied, they are needed in order to achieve better public acceptance of nuclear power, which constitutes another - and probably the most important - prerequisite.

18. The tasks in question cannot all be accomplished at once, but the results of the four-day conference indicate that the activities necessary for accomplishing them should be maintained or initiated soon in preparation for a timely revival of the nuclear power option.

19. Press interest was high. Several TV and radio interviews took place, and there was coverage by all major international news agencies and relevant technical journals.

20. The Secretariat hopes to publish the conference proceedings in March 1995 and an in-depth review of the conference in the May 1995 issue of the IAEA Bulletin.