



World Nuclear Association Annual Symposium  
5-7 September 2001 - London

## **The international conference on the safety of radioactive waste management: A way forward for solving the Achilles heel of the nuclear industry**

Phil Metcalf

During March 2000, the International Atomic Energy Agency convened an international conference on the safety of radioactive waste management in Cordoba, Spain [1]. It was attended by the major international, regional and national organisations actively involved in developments associated with the safety of radioactive waste management. Senior regulators attended the meeting from a number of countries with large, medium and small nuclear power programmes, those involved in the mining and processing of radioactive ores and minerals, those which extensively utilise radioisotopes and also countries which operate research reactors. The nuclear and related industries were also extensively represented. The meeting was convened recognising that the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management will most likely come into force in the near future and it was deemed timely for an international conference to focus on the status of the associated technical, legal and socio-political dimensions with a view to identifying any areas requiring further attention. The conference came to a number of conclusions. In September of the same year the third Scientific Forum of the General Conference of the IAEA was dedicated to "Radioactive Waste Management - Turning Options into Solutions". The forum was again attended by senior regulators, nuclear industry representatives and senior government officials and politicians. At the 2000 IAEA General Conference, a resolution was passed urging Member States to sign and ratify the Joint Convention; to establish national policies bearing in mind the conclusions of the Cordoba conference; and for the Agency to focus its work programme with a view to facilitating adoption of the recommendations of the conference.

### **The Cordoba Conference**

The Cordoba conference addressed the safety aspects of managing all types of radioactive waste and the various associated disposal options and came to a number of conclusions.

Fundamental in repository site selection is the need to develop public acceptance. Successful siting exercises have involved the establishment of clear national policies with gradual step-by-step approaches conducted in an open, inclusive and consultative manner. Complex technical aspects must be expressed in a manner that can be understood by members of the public and, whilst media involvement is important, the commercial aspects of journalism must be appreciated. The concept of risk often features in siting considerations and the associated complexities and perceptions of risk by different groups needs careful consideration.

Regarding legal and regulatory aspects, the “Joint Convention”, which binds parties to internationally endorsed standards and peer review of national arrangements, is predicted to assist in developing confidence in national arrangements. States that have not yet signed and/or ratified the convention were encouraged to do so. Whilst international consensus exists on the basis for legal and regulatory frameworks, national cultures will lead to different approaches. However, regulatory processes must be independent of their proponents, and political interference in the regulatory process should be precluded by legislation. Although globalisation leads to harmonisation of standards, protection of national sovereignty often detracts from complete harmonisation. Regulatory processes must ensure that a reasonable assurance of safety is established. What constitutes “reasonable assurance” for repositories will entail regulatory judgement - international co-operation in developing related guidance is considered to be important. Some parties have practical and ethical reservations over the ability of current generations to guarantee the safety of repositories for future generations. Limitations associated with long time term predictions must be recognised and caution should be exercised in making claims for the long term which cannot be substantiated. Views were expressed that the focus should be directed to shorter time horizons without foreclosing future options. The concept of international repositories shared by a number of countries have been identified to have a number of potentially positive benefits but their development will most likely only follow the establishment of a number of national facilities.

Technologies for pre-disposal management are well developed although the increased transfer of such technology to developing countries is necessary. Future options may include partitioning and transmutation but this will not preclude the need for disposal, neither now nor in the future. Delaying the disposal of radioactive waste is increasingly giving rise to problems in pre-disposal management and on the acceptability of storage facilities, which are being viewed as virtually permanent facilities

An ongoing question remains as to what wastes do not need to be managed as radioactive waste. The concept of “exemption” is well understood in the context of bringing radiation sources within regulatory regimes and the concept of “clearance” is becoming established but its practical application needs to be agreed. Also how the exemption and clearance concepts should be applied to materials containing naturally occurring radionuclides needs further consideration.

Over one hundred near surface repositories for the disposal of low and intermediate level waste have been successfully developed in a number of countries. The provision of effective safety, with reasonable assurance has been achieved by limitation of the content of long-lived nuclides, by provision of natural and engineered barriers and by the establishment of monitoring programmes and institutional controls. Nevertheless, there remains resistance both in a number of public interest bodies and in some political circles over the development of new near surface repositories. Considerations have been given to surface storage of low and intermediate level waste pending development of geological facilities and subsequent disposal in these facilities at marginal costs. It is thought that this approach may engender a greater degree of public acceptance. Near and on surface disposal of stabilised mine tailings can also provide an adequate level of safety but the long half lives of the nuclides indicates perpetual institutional control. Different radiation protection criteria have been used for these mine tailings disposal options in different parts of the world which is not ideal and needs to be rationalised. Additionally, the concept of “institutional control in perpetuity” has limitations, but if interpreted in terms of knowledge transfer to future generations may be considered reasonable.

Geological disposal raises a number of safety and ethical issues. Nevertheless, higher level and long-lived wastes exist and must be safely managed both now and in the future. There was general agreement that current generations must recognise the needs and safety of future

generations and in this regard particular issues must be considered. Attention must be given to the demonstration of safety for the longer term; to public acceptance; to the implications of providing for monitoring and retrieval; and to international repositories. Delay is not a real option and whilst safe long-term storage on the surface is technically feasible, it may be seen as *de facto* disposal and thereby provoke public antagonism. It is generally accepted that sufficient knowledge is available to enable geological repositories to be developed and to prevent the burdening of future generations. However, public participation in the process of developing and approving repositories is essential, and effective communication indispensable. Natural analogues could play an important role in communication with the public. Work to finalise internationally endorsed standards for geological disposal is of high priority. The provision for retrievability in repository designs is important for public confidence building, although the integrity of the repository must not be compromised nor must prospective safety assessment be delayed by such provision. Timeframes for closure of repositories should not be dictated *a priori*, rather time should be allowed for sufficient confidence to develop. The potential benefits of international repositories are recognised, but the impediments to their development in the short term are also clear.

The safe management of disused radioactive sources was identified as an area where problems are still arising. In the year 2000 five people died as a result of accidental exposure arising from such sources. Effective regulatory systems with competent personnel appear to be a pre-requisite for the safety of disused sources. Disposal options are not available in many countries and extended storage increases the possibility of loss of control. Measures to allow disused sources to be returned to manufacturers are encouraged together with development of simple, cost effective, robust and safe disposal options.

The conference also dealt with the issues of trans-boundary movement of radioactive waste. Such movements inevitably entail passing from one national legal regime to another and often through a number of transit states. Harmonisation is clearly desirable but is aggravated by factors such as the absence of international consensus on what materials are to be considered as radioactive waste, and what is and is not to be included in the "Joint Convention". Uncertainties also arise in respect of liability provisions during transit and the softer nature of certain legal instruments governing international transport of hazardous materials. Notwithstanding the above, the general safety record in the international movement of radioactive material has been exemplary.

The conference identified the major challenge as that of building public confidence in approaches and technologies that have evolved for the safe management of radioactive wastes. Major international initiatives will have to be mounted if this is to be achieved and all interested and affected parties will have to be involved. Further development of consensual international standards is needed in a number of areas, and mechanisms to facilitate the harmonised application of the standards internationally must be established.

### **The Scientific Forum**

The forum was intended to take forward the consensus emerging from the Cordoba meeting and to bring to the attention of senior government representatives some of the important technical and scientific issues in radioactive waste management and to promote awareness of the international dimensions of current developments. The forum considered the current state of the art in radioactive waste management and a number of topical issues. These included waste classification, transport, disused sealed radiation sources and disposal of spent fuel and high level radioactive waste.

The forum came to a number of conclusions. Prime amongst these was that the indefinite storage on the surface of radioactive waste is not a sustainable solution and that progress must be made to provide an integrated solution to radioactive waste management that includes disposal. It was concluded that transmutation technology on an industrial scale is not feasible at this stage; that geological disposal is the currently favoured approach; and that the technology is sufficiently developed in this area to move forward with repository development.

Nevertheless, experience has shown that it is counter productive for the scientific community to claim that they know all the answers and that the risks well into the future can be calculated with confidence. A more sustainable approach is to recognise that in order to gain public acceptance, it is necessary to take time and not try to rush premature decisions that would then be likely to be negatively received. A careful planned step-by-step approach, which involves the public and gives time to build trust and confidence, is necessary for success. In this regard elements of reversibility are being built into waste management programmes, including the possibility of provision for retrieving wastes from repositories should for any reason the need arise.

In terms of future international programmes it was concluded that further development of international consensual standards for the geological disposal of radioactive waste should move ahead and would assist in the confidence building process. Whilst societal involvement in decision making processes was essentially a national issue, further exchange of information in this regard was necessary at the international level involving the whole range of stakeholders with an interest in the safety of radioactive waste management.

## **Conclusions**

Significant developments are taking place in respect of finding solutions to the safe management of radioactive waste. A number of high profile scientific and political meetings have taken place in the recent past which have concluded that indefinite on-surface storage of radioactive waste is not a sustainable option. Further, although the technology has been developed to allow repository development to move forward, its acceptance by broader elements of society requires further careful consideration. Building the necessary confidence within broader societal spheres will need step-by-step processes involving all relevant stakeholders. The International Joint Convention came into force on 18 June 2001 and it is considered that this will contribute to public confidence building. Work is advancing on the development of international safety standards for the geological disposal of high level waste. A number of forums are being established at local, national and international levels to bring together stakeholders and to provide for the necessary exchange of information and views on moving forward with the disposal of radioactive wastes. Progress has been made in a number of countries with development work on geological repositories. In particular this has included Finland, Sweden, the United States and France.

A range of issues requires further consideration such as the control over disused radiation sources; the removal of materials from within regulated domains; and the long-term management of wastes containing natural radionuclides, including those from the mining and processing of uranium and thorium ores. Attempts to rationalise the management of all radioactive wastes within a common radiation safety framework are under development at the international level to address these issues.

## **REFERENCES**

- [1] International Atomic Energy Agency, Safety of Radioactive Waste Management, Proceedings of an International Conference, Cordoba Spain 13 - 17 March 2000.