REPORT OF AN IAEA/CEC INTERNATIONAL SYMPOSIUM
Vienna, 2–6 June 1980
The symposium was attended by 150 participants from 25 countries and four international organizations Forty-seven papers were presented in eight technical sessions

Management of Alpha-Contaminated Wastes

With the increasing use of nuclear energy throughout the world for the generation of electric power and, especially, the use of the plutonium cycle for fast breeder reactors (FBRs), close attention has to be given to the safe management of alpha-contaminated wastes arising from spent-fuel reprocessing or mixed fuel fabrication Appropriate handling, conditioning and disposal of these wastes is, therefore, an activity of highest importance to ensure adequate protection of man and his environment from the potential hazard they pose over long periods of time.

As the generation of alpha-contaminated waste is expected to increase considerably in the 1990s, when FBRs and the associated plutonium recycling will reach an industrial scale, it was felt timely to review the present state of the art in this area.

The symposium organized jointly by the IAEA and the Commission of European Communities (CEC) was the first international symposium dealing with this specific topic. Its principle aim was to serve as "zero-point" stating the present technical knowledge in view of the future needs for the management of alpha-contaminated wastes, before an industrial scale of production will be reached.

The programme of the symposium was drawn up in eight sessions and covered the following topics: general policies; general practices; volume reduction techniques (two sessions); conditioning; alpha-monitoring; actinides partitioning; and disposal options.

A variety of techniques has been investigated in various countries for several years for managing alpha-contaminated wastes. The first target was to reduce the volume of the wastes and to study matrices for the immobilization of waste radionuclides with a view to final waste disposal. At present, operational experience has been gained at different nuclear laboratories and facilities. At the same time various disposal options have been investigated.

Some of the major items discussed at the symposium might be concluded as follows:

- As regards the definition what is an alpha-bearing waste, it seemed that a number of participants were supporting the idea that such a value might be based on the concept of the MPC (maximum permissible concentration) — for drinkable water — and that the radioactivity of these wastes might be expressed in such a way in view of the conditioning and the disposal requirements.

- It was the consensus that it is necessary to prevent production of large amounts of alpha-bearing wastes by improving the engineering and operational procedures of the reprocessing units and of the fuel fabrication plants, and to recover the major part of alpha emitters (plutonium) from the wastes by recycling.

- As far as the treatment of such wastes is concerned, methods for reducing the volume have been improved. Techniques for sectioning large items and decontamination processes are now available Incineration at low temperature has proved its efficiency for the volume reduction Slagging incineration and acid digestion are also ready for an industrial development.

- With regard to the conditioning it appeared that, in addition to the borosilicate glasses which are developed to industrial scale in France, several other matrices are under consideration and the first results are very promising. These matrices include vitreous and crystalline ceramics and synthetic rock materials. A substantial effort has been done in this field to ensure the quality of the final waste form for disposal.

- For the monitoring of alpha emitters in the waste, several techniques are applicable at industrial level; they include gamma spectrography and passive neutron counting. Active neutron assay is under improvement and the results are very promising. A new technique is also under consideration using linear accelerator technology to detect trace amounts of transuranics in waste barrels.

- As regards the actinide partitioning from high-level waste, great progress was made at laboratory scale using different kinds of solvents and ion exchangers which give a satisfactory rate of recovery. Nevertheless, these results must be improved to show the industrial feasibility of the process. The concept of partitioning and transmutation of actinides is, however, reportedly not promising as the reduction of the long-term hazard potentially achievable by this concept is unlikely to justify the associated increase in short-term risks and costs

- The possibility of disposal of this kind of waste which remains hazardous for a very long period of time has been extensively studied during the past years Several options are under investigation of which underground disposal is the most feasible method It is agreed that a multi-barriers scheme including man-made barriers and the barriers provided by the environment may provide the necessary long-term isolation of these waste.

The symposium has shown that, based on present technology and continuing improvements of the different methods used, safe handling and disposal of alpha-contaminated wastes is possible.