

5.2 Preservation of know-how on R&D activities in the field of radioactive waste management

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Since 1976, when the fourth modification of the German atomic law (ATG) passed the Bundestag, the polluter-pays principle was fully accepted. Scientists, engineers and politicians assumed that the questions concerning the disposal of nuclear waste could be resolved within one generation, which means that those who benefitted from nuclear power should pay for the back-end. Over time, societal, political and scientific views to the problem of nuclear waste disposal changed significantly. Finally, the report of the “Kommission Lagerung hoch radioaktiver Abfallstoffe” [1] proposed a way forward which requires preservation of knowledge and know-how for many decades. For this reason, an attempt was made to view and summarize the results of R&D performed at the former Kernforschungszentrum Karlsruhe (KfK) / Nuclear Research Centre Karlsruhe. Many of the R&D outcomes were not published in regular journals, but in conference proceedings, internal reports and other hidden documents. The studies covered following aspects:

- R&D activities in the field of nuclear waste management and disposal at the Kernforschungszentrum Karlsruhe [2, 3]. The retrospective analysis of nuclear waste management research programs clearly points to the close relationship of research priorities with changes in societal and political perception of nuclear energy and nuclear waste issues.
- A re-evaluation of results of corrosion studies for disposal casks. In this study, the corrosive mass losses of different metallic and ceramic materials under saline conditions were summarized [4]. This report is based on numerous publications but also on the availability of the database of more than 7000 experimental data sets including details of the various long-term experiments. Most of the immersion test were performed at temperatures above 90°C up to more than 600 days.
- Treatment of liquid highly radioactive wastes, discussing the vitrification processes and other options. The report covers the R&D performed in Germany, Europe, USA, Russia and Australia and the discussions and decisions leading to the selection of borosilicate glass. The vitrification process developed by INE resulted in the single

stage directly heated ceramic melter technology which was implemented and successfully operated in the VEK plant for the solidification of the high-level waste from the WAK [5]. Comparisons with other solidification processes (phosphate glass, glass ceramics or Synrock) are shown, as well as the international methods for comparing the quality of the waste products.

- Organic matrices for solidification of low/intermediate level waste streams. This waste stream was generated in Germany: 2% of the wastes in the Asse II salt mine consist of bituminized waste forms. Additionally, 185 tons of solidified organic waste forms are waiting to be disposed. The report provides an overview of the use of organic matrices, such as bitumen, polyethylene, and other plastics in various fields of nuclear technology, the process technologies and provides characteristic mechanical, chemical and radiological data as well as data on leaching behavior of these waste forms [6].

References

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