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TOPICAL SESSIONS
Reports of Co-Chairmen for Highlight Sessions

T-18: Management of Long-Lived and High-Level Radioactive Waste

Wednesday, 17 May 2000

Chairs and Keynotes: A. Sugier, W. Kraus

The disposal of long-lived and high-level wastes is a rapidly evolving area of radiation safety aimed at the protection of the present and future generations.

A. Sugier, in presenting one of the ***keynote*** papers, gave an overview of the main orientations of ICRP recommendations on waste disposal, particularly in ICRP 77 (1997) and ICRP 80 (2000). Topical guidance of ICRP in this area was urgently needed. The choice between diluting/dispersing and concentrating/retaining (with the possibility of a delayed dispersion by natural processes and of human intrusion) should be based on an optimization. Optimization of protection in waste disposal is a judgmental process rather than a cost-benefit-analysis. A constraint of 0.3 mSv/a should be applied. The role of the collective dose is limited because of the long time frame and the uncertainties of the potential doses connected with natural processes and human intrusion. Forecasts of a health detriment for time periods exceeding several hundred years are to be examined critically. The dose-risk concept should be used more as an indicator, and additional indicators can be used that are independent of human features. The probability of potential exposures as a result of natural processes and their doses should be disaggregated and not amalgamated in a single risk number. The recently developed generic intervention levels may be applied to the consequences of human intrusion. Institutional control can enhance confidence of the public in the safety of a disposal and might be maintained for a very long time period as required for uranium mill tailings.

The information given by ***G. Linsley*** on the development of IAEA waste safety standards was focused on the development of safety indicators in agreement with the relevant ICRP proposals. Because of the uncertainties, dose and risk can only be regarded as quantitative measures of safety for a few hundred years, at least not more than 10,000 years, into the future. Beyond this time there are only qualitative safety indicators, possibly to be used up to a million years. Standardized approaches for modeling components which have a high degree of uncertainty associated with their prediction into the far future, such as critical groups and the biosphere should be adopted. Alternative and supplementary safety indicators are radionuclide fluxes through barriers and the environment or comparisons with levels of natural radioactivity. The protection of biota other than man should also be regarded. The approach of fluxes through the geosphere needs to be quantified. For the assessment and evaluation of human intrusion into a geological repository a standardized approach is needed as well. Retrievability of wastes disposed of

needs further discussion. The IAEA will further develop all these approaches that are totally in line with the ICRP recommendations.

In the paper of ***U. Kautsky*** the assessment of the post-closure safety of a deep repository for spent fuel in Sweden was presented. Three hypothetical sites with known geological conditions were examined. The developed complex safety assessment should be used for licensing a future facility. It covers the transport processes of radionuclides in the near field around the canisters and tunnels, in the far field, and in the surface ecosystem. The scenarios handled are the normal development of the repository as planned, corrosive defects of the canisters, climate changes such as glaciation, tectonic activities and future human intrusion. The performance assessment for all three sites has shown that for more than a million years the established dose criterion of 200 µSv/a can be met.

In the second ***keynote*** paper, ***W. Kraus*** dealt with the problem of management of wastes from mining and minerals processing that belongs to the new area of protection against enhanced natural radiation where international guidance and harmonization is urgently needed. Hundreds of millions of tons of waste have been produced with activity concentrations up to few thousands Bq/g. The social, economic and political consequences of any decision on NORM industries and on management of their wastes can be large. A comprehensive, systematic and - in terms of risk - completely consistent approach for these types of wastes is at the moment not achievable. The requirements in the European BSS regarding work activities are favoured to deal with these wastes. Established screening levels given as activity concentrations should be used and the ultimate decision on the disposal should be based on a dose criterion. In Germany, 1 mSv/a will be used. Existing exemption and clearance levels on the basis of the 10 µSv/a criterion are not applicable. There are, in principle, many waste disposal options. In order not to exclude their reasonable use the term “radioactive waste” should be used only with reservation.

There were no contradictions between the papers presented in the session. In summary, there is a tendency towards more realistic and practicable approaches recognizing the uncertainties of any predictions into the far future. In the discussions following the presentation of the papers, further international harmonization was demanded. In particular, questions of human intrusion and retrievability of wastes, characterization of natural fluxes and dose criteria to be used were discussed.