

EURADWASTE '04 – Global summary

A sound scientific basis for serious decisions

Significant progress was made on the technical and scientific basis for geological disposal of radioactive waste during the European Commission's Fifth Euratom Framework Programme for Research (FP5). Deep geological disposal is technically feasible now and can demonstrate the guarantees of long-term isolation and protection the public demands. In parallel, socio-political studies have produced methodologies for constructive dialogue with potential host communities that reflect the honesty and openness expected by a democratic society. A harmonised legislative framework for nuclear safety and waste disposal across the enlarged European Union is currently being discussed.

The Sixth European Commission Conference on 'The Management and Disposal of Radioactive Waste: Euradwaste '04', held on 29-31 March 2004 in Luxembourg, reviewed scientific and political progress in achieving a solution to the waste issue. With 163 nuclear plants providing around 35% of the enlarged EU's electricity supply, radioactive waste management is a key issue affecting Europe's future security of energy supply.

Disposal in deep (> 300 metre) geological repositories, the favoured strategy in Europe for long-lived high-level radioactive waste, is now possible.

Research in FP5 and elsewhere has confirmed that the multi-barrier option is technically feasible and can be practically realised today. Performance Assessment Analysis and related modelling indicate that long-term isolation of these waste types over timescales of 1 million years or more is possible in a wide variety of European rock formations from granite to rock salt and clay.

Each individual barrier envisaged in a geological repository from the waste form itself, through its metallic canister, the clay backfilling materials, and the repository's location at depth in a stable rock, pose considerable obstacles to human intrusion and radionuclide mobility. The basic science and modelling of the behaviour of

radionuclides have made significant advances, though some areas require further research, including microbial mediated processes, colloidal transport, and sorption of radionuclides. Although current models of radionuclide release are highly conservative, they show that the concentration reaching the environment would be at orders of magnitude less than natural background radiation levels, implying effective containment/isolation can be achieved. The basic engineering techniques – including waste retrieval if this is deemed necessary by society – needed to make and operate a real repository have been demonstrated.

Societal acceptability requires open dialogue, trust building and clear benefits

Many lessons have been learned about social interaction and political dialogue in discussions on repository sitings. The classical model of “decide-announce-defend” is clearly untenable in modern and informed European society. Constructive dialogue at a variety of levels (local, regional and national) in an open and transparent manner is vital. The local community that agrees to host a facility must be able to see clear and concise benefits, and be supported by access to expert resources. A step-wise approach to disposal with no individual step being irrevocable seems to point the way to success. This includes the potential for waste retrieval at any time in the future.

Where does Partitioning and Transmutation (P&T) fit in?

Tremendous advances have been made in this combined technique to separate the long-lived actinide species and then convert them to shorter-lived nuclides. Partitioning was declared “an impossible task” less than ten years ago, but is now on the verge of pilot plant scale-up. Design and supporting studies for an experimental accelerator driven system (ADS) for transmutation are making good progress and have allowed nuclear expertise to be conserved and retained in Europe.

However, some controversy remains as to the value that P&T can bring to the overall strategy of geological disposal of nuclear waste. P&T is not a solution in itself but a potentially valuable complement to deep geological waste repositories, reducing the time for the isolation of waste radionuclides from millions of years to, say, 1 000 years. This could be a valuable factor in addressing concerns about the long-term safety of geological repositories. The opposing view is that geological repositories can be built effectively to ensure no human intrusion and undesirable

environmental impact in any time frame, in which case, P&T may not add value.

The 'nuclear package' – safety and security in a harmonised legal framework

The nuclear package comprises two EU Directives on nuclear safety and nuclear waste disposal. The main aim of the package is to harmonise differing practices across the Union on safety and waste management, thus ensuring an equivalent high level of protection of the public, workforce and environment across all Member States in the enlarged Union of 25 Member States. It includes a request for each Member State to establish a national programme for the management – including disposal – of all its radioactive waste within a defined time frame. The original proposals adopted by the European Commission have provoked considerable controversy, but amended proposals have since been agreed by the European Parliament, though debate is continuing among the Member States in the Council of Ministers' Atomic Questions Group (AQG).

The main controversies among Member States include whether binding legislation or non-binding guidance should be introduced, the flexibility of the timetable for building waste repositories (each Member State would have individual responsibility for its own waste), the nature of nuclear safety inspections, and whether EU legislation will add value to established international conventions such as those under the auspices of the IAEA (International Atomic Energy Agency). The Commission may propose a revised package which will address controversial issues and introduce greater flexibility. Appropriately, the package could be one of the first Directives to be approved by the enlarged Union.

Would a European Research Area (ERA) add value?

The area of radioactive waste disposal enjoys significant research collaboration across Europe with high added value from sharing experimental facilities and mobility of personnel – characteristic of a true ERA. The new instruments in FP6 encourage larger collaborations to bring improved coherence and add weight, although there is some concern about ensuring that support to science continues across the EU, and over the increasing administrative burden.