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TOWARDS A EUROPEAN REGIONAL GEOLOGICAL REPOSITORY

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ABSTRACT

Several EU countries are exploring the possibility of sharing a geological repository for higher activity wastes on a regional basis, in addition to pursuing their own national disposal programmes. This 'dual track' approach is being carried out in the framework of the European Repository Development Organisation Working Group (ERDO-WG). Since its inception in 2009, ten EU countries have been involved in ERDO-WG activities. All have either small nuclear programmes or long-lived radioactive wastes from other nuclear technologies and require access to a geological repository. At the end of 2011, the ERDO-WG reacted to the publication of the EC Radioactive Waste Directive (which acknowledges the possibility of EU states sharing disposal facilities) by submitting to EU governments that have shown interest in multinational approaches a set of structured proposals for a multinational European waste management organisation. Bilateral and multilateral discussions are currently in progress in Member countries. The EC Directive requires all EU Member States to report on progress with implementing their waste management programmes no later than August 2015, which means that those countries implementing a dual-track approach will be aiming at showing positive steps towards the establishment of an ERDO over the next two to three years. For the regional partnering approach to be as credible as a purely national strategy, the path towards establishment of a jointly owned European Waste Management Organisation should be clear. In the meantime, the ERDO-WG members are already collaborating actively on consideration of common waste management issues. This paper describes progress in the ERDO-WG over the period 2011-13.

SHARED, REGIONAL SOLUTIONS

Very soon after the peaceful use of nuclear energy began to spread in the 1960s and 70s there were proposals for multinational solutions to providing front- and back-end fuel cycle services to power plant operators. However, little progress was made, especially as interest in nuclear power subsequently appeared to be declining. Interest revived in the late 1990s, driven both by the high costs of geological repository programmes and also by the security concerns associated with the prospect of fissile material being widely distributed across the world.

The Arius Association [1] was founded in 2002 to advance the concept of multinational storage and disposal of radioactive wastes and spent nuclear fuel. The goal is to make safe, secure and affordable geologic disposal available to all countries with nuclear wastes, however small, and thus to enhance global safety and security. The SAPIERR EC projects [2] run by Arius, Decom and COVRA led to the foundation in 2009 of the Working Group on a European Repository Development Organisation (ERDO-WG) [3]. Since 2009, nine ERDO-WG meetings have taken place, hosted by differing participating national organisations.

Since its inception, 10 countries have been involved in the work of the ERDO-WG. Those that are currently the most active are Austria, Denmark, Italy, Netherlands, Slovakia, and Slovenia.

ERDO PROGRESS

The main working group activities since 2011 have been:

- Preparing a draft ERDO ‘Model Structure and Plan’ (comprising draft Articles, Operational Guidelines and Business Plan) for consideration by potential ERDO Members.
- Preparing and sending formal letters to all EU governments, informing them about that status of the work and inviting those interested to consider delegating representatives into a dedicated group tasked with agreeing a blueprint for a formal ERDO.
- Follow up at a national level by ERDO-WG members in their own countries.
- Presenting the ERDO-WG activities to other international groups interested in the regional concept:
 - in collaboration with the IAEA, in Tunisia (AAEA meeting);
 - in collaboration with the IAEA, in Vietnam (AAAS meeting)..
- Drafting documentation on regional solutions appropriate for member countries to include in their reports for the EC Waste Directive.
- Interacting with the IAEA, including drafting of the next planned IAEA report on multinational disposal concepts.

During 2011, the EC finalised its Directive on Spent Fuel and Radioactive Waste management and the ERDO-WG took an active part in the comment period. A position paper was drafted on “Impact of Proposed EC Waste Directive 2011 on Regional Disposal Initiatives” and comments on the draft Directive were submitted to the EC. The final version of the Directive acknowledges that regional cooperation is a viable approach to preparing a disposal strategy for countries within the EU. Its implications are described below in a dedicated section of this paper. With the appearance of the Directive, it was judged that the time is opportune for proposing the formal establishment of a multinational waste management organisation in Europe – the ERDO.

The ERDO-WG thus completed an important milestone in its exploratory studies on a European Waste Management Organisation. It finalised two reports that summarise the advantages of the dual track approach, present a roadmap for a jointly owned ERDO and provide starting models for the structure, programme and financing. The new documents were distributed to relevant decision makers in Member States of the European Union.

ERDO-WG members have reported that, despite approaching elections in many countries and the struggle with the financial crisis, all have started the discussion in

their ministries about whether and how a dual track strategy can be incorporated in the National Programme and about the role of ERDO-WG. It was decided that the future work programme should proceed along two complementary lines:

- Moving forward towards the ERDO;
- Addressing common challenges of small radioactive waste management programmes.

Moving forward from a working group towards a formal ERDO organization requires specific actions, including:

- Revision of the WG mission statement and terms of reference (ToR);
- Development of a common text for incorporating the dual track strategy approach into national responses to the Directive;
- Closer coordination with the work of the ENEF;
- Continued engagement with the EC and IAEA.

In addition, in conjunction with a proposal for a study of national attitudes towards and ethical opinions of a European repository, extensive discussions have taken place on the ethics of shared disposal – and especially on the topics of risk, benefits and compensation.

The discussion documents worked on to date by the ERDO-WG includes:

- Siting strategies for repositories.
- Size and form of Waste Management Organisations (WMO).
- Outreach activities.
- ERDO Operating Guidelines.
- ERDO Model Constitution.
- A proposal that national governments move on to found an official ERDO based on the preparations of the Working Group.
- Draft text for Directive reporting by countries following a dual track disposal approach.
- Revised mission statement for the ERDO-WG.

INTERACTION WITH INTERNATIONAL ORGANISATIONS

Contacts have been maintained to European Commission staff in the Transport and Energy Directorate and in the Research and Development Directorate. The ERDO-WG has been represented in the EC technological platform on

geological disposal (IGD-TP) and also at the sub-Group on Waste of the ENEF. These two bodies have each been helping progress radioactive waste disposal in Europe. The former is a scientific and technical forum focussed on the lead up to the operation of geological repositories for high-level nuclear waste, particularly in those Member States with the most advanced national programmes [8]. The latter is more directly involved with the waste management programmes of all 27 Member EU States and has issued a Guide [9] to help these meet the requirements of the EC Directive dealt with in detail below.

Contact has also been intensive with IAEA staff in the Nuclear Energy Department. Regional disposal concepts were on the agenda at Agency events at which information was requested about ERDO-WG activities since the European initiative is a possible role model for other regions of the world. In addition, significant input was provided for a new IAEA report [4] on *“The viability of sharing facilities for the disposal of spent fuel and nuclear waste”* and for a new report for emerging nuclear countries, *“Management of Spent Nuclear Fuel and Radioactive Waste for Countries Developing New Nuclear Power Programmes”* [5] (for which a draft has been submitted). Finally, effort is being devoted to a new IAEA project aimed at documenting *“Institutional considerations in the development of a multinational repository”*.

IMPLICATIONS OF EC WASTE DIRECTIVE

On 19th July, the Council of the European Union, after a long period of consultation, adopted a directive on the responsible and safe management of spent fuel and radioactive waste [6]. The directive covers all stages of the management of spent fuel and radioactive wastes. Each member state has ultimate responsibility for management of the spent fuel and waste generated in its territory. The following comments focus on the implications for European (and other) initiatives for shared regional repositories.

The main message in this respect is that the option of EU Member States sharing repositories is included by Clause 3 in Article 4 on General Principles which states that *“Radioactive waste shall be disposed of in the Member State in which it was generated, unless at the time of shipment an agreement ... has entered into force between the Member State concerned and another Member State or a third country to use a disposal facility in one of them.”* This implies that regional cooperation could be an

important aspect of the detailed plans that the EC expects Member States to produce within 4 years.

THE EC EXPLANATORY MEMORANDUM

The explanatory memorandum that accompanied earlier drafts of the Directive includes the important statement that *“(f)or High Level Waste (HLW)...there is a world-wide scientific and technical consensus that deep geological disposal represents the safest and most sustainable option”*. This is significant, given that opponents of nuclear expansion plans have recently (and increasingly) been challenging the stated consensus, despite the fact that it forms the basis of governmental waste management policies in almost all European countries (excluding Scotland). Further into the Waste Directive, one finds also the statement that *“(t)he storage of radioactive waste, including long-term storage, is an interim solution but not an alternative to disposal”*. Again, this is a significant statement, which challenges the assertions made by some anti-nuclear groups – and by some programs wishing to postpone the challenge of disposal.

The entire Directive is obviously of relevance for all EU Member States. The fact that the Commission sees it as potentially having an even wider impact is reflected in the statement that *“(t)he proposed Directive will implement the highest safety standards for spent fuel and radioactive waste management in a comprehensive manner and will thus form a model and benchmark for third countries and regions”*.

Finally in the explanatory memorandum, the objective of the Directive is described as *“the establishment of a Community framework for responsible management of spent fuel and radioactive waste, ensuring that Member States make appropriate national arrangements for a high level of safety and maintain and promote public information and participation”*. This definitely implies that all Member States must have **national plans** – but does not stipulate that these must be based only on **national facilities**. Some of the implications for the national planning in States that do consider the regional disposal options are pointed out below.

THE PREAMBLE TO THE DIRECTIVE

In the present context, the key paragraphs in the introduction are as follows:

(9) *“Council Directive 2006/117/Euratom (1) lays down a European Atomic Energy Community (‘Community’) system of supervision and control of transboundary shipments of radioactive waste and spent fuel. That*

Directive was supplemented by Commission Recommendation 2008/956/Euratom of 4 December 2008 on criteria for the export of radioactive waste and spent fuel to third countries.”

Commission Recommendation 2008/956/Euratom of 4 December 2008 [7] is specifically on criteria for the export of radioactive waste and spent fuel to third countries (i.e. countries outside the EU). In addition to its basic message that all countries exporting or importing wastes must have appropriate national capabilities and arrangements, the recommendation points out explicitly that:

- The decision to authorise shipments of radioactive waste or spent fuel to third countries is the responsibility of the competent authorities of the exporting Member State.
- Considerations, such as political, economic, social, ethical, scientific and public security matters, may be taken into account for authorising shipments of radioactive waste or spent fuel to a third country.
- States that treat wastes from others or that reprocess fuel from others have a right to return the wastes to the country of origin.

Current European **legislation** therefore apparently allows export to third countries under specified conditions – although EU **policy** statements have been made against export out of the EU. As described below the Directive offers the choice between national disposal, sharing with other Member States, or export out of the EU, with the last two options required to fulfil specific conditions.

(28) “Member States should establish national programmes to ensure the transposition of political decisions into clear provisions for the timely implementation of all steps of spent fuel and radioactive waste management from generation to disposal. It should be possible for such national programmes to be in the form of a single reference document or a set of documents”.

This requirement is valid for all Member States, whether they are developing plans for national disposal, for regional repositories or for both in a dual track-approach. The implication is that a European Repository Development Organisation must be able to prepare a suitable programme for use by its Members.

(32) “Cooperation between Member States and at an international level could facilitate and accelerate decision-making through access to expertise and technology”

(33) “Some Member States consider that the sharing of facilities for spent fuel and radioactive waste management, including disposal facilities, is a potentially beneficial, safe and cost-effective option when based on an agreement between the Member States concerned”

These are points that impact directly on the activities of the ERDO-WG and, later, the ERDO itself. Sharing of knowledge and expertise has been a key goal of the ERDO-WG since its inception. Any final agreements to share facilities would be predicated on extensive preparations to be carried out over the next several years following establishment of the ERDO, based on the groundwork being tackled at present by the Working Group.

LEGALLY BINDING ARTICLES IN THE DIRECTIVE

The overarching key article, Article 4, formally lays down General Principles for all Member States. Clearly, all of these principles must also be followed by States whose national programme includes the option of being involved in regional storage and disposal initiatives. An interesting difference concerns conditions for export to another EU Member State, relative to those for export to a third country. In the latter case, an authorised disposal facility must be operating. This has been interpreted to mean that export of HLW or spent fuel to countries such as Russia, which do not have operating deep geological repositories, is not currently an option.

Article 12 goes on to list in more detail all aspects that a national programme must address. By cooperating in a regional organisation, countries could develop a common programme for addressing many of the requirements on this list. Only relatively few points need to have specific national responses – thus illustrating once again the duplication of efforts that can be avoided by regional cooperation, even before the major benefits emerge during implementation of shared facilities.

Articles 14 and 15 in the Directive imply that, at the latest at the end of 2015, national programmes should include: plans for the construction and the management of final disposal facilities; a concrete timetable for construction, with milestones and descriptions of all the activities that are needed to implement the disposal solutions; cost assessments; and the financing schemes chosen. The national programmes do not require that sites have to be identified by then. A credible plan, including target dates for siting, would suffice.

CONCLUSIONS

The Directive texts illustrate that regional disposal facilities remain a legal possibility within the EU. The Directive has specific impacts on EU Member States that support the assessment of the feasibility of shared regional facilities. Most urgent in many cases are the national tasks of allocating responsibilities for decisions related to regional projects, defining present and potential future inventories and establishing financial mechanisms for supporting the work done in cooperation with their regional partners. The other requirements on national programmes related to repository design, post-closure measures, R&D needs, can be met by technical cooperation in teams working with the regional organisation. Even the challenging task of producing credible cost estimates for a shared facility should be relatively straightforward. The issues that need attention and cooperation at the highest political levels are the definition of the milestones towards implementation and the specific responsibilities for this. The ERDO-WG will work on proposing viable approaches to accomplishing these tasks in the most cost-efficient manner. The proposed timescales imply that States must have a plan within four years. The establishment of a formal ERDO with a working programme aimed at satisfying all of the EC requirements that are common to the ERDO participants could be a powerful mechanism to help small Member States.

Key overarching conclusions drawn from the ERDO-WG work to date include the following:

- The decision processes in Member countries concerning establishment of a formal ERDO are progressing more slowly than was hoped for. More interactions between ERDO-WG Members, their Government representatives and the ERDO-WG secretariat might help improve this situation.
- European countries with small nuclear power programs (or no nuclear power, but wastes that require geological disposal) will come under increasing pressure through the Waste Directive to develop a strategy and plan that will lead to safe and secure disposal of their radioactive wastes. It is positive that shared solutions are mentioned in the Directive but the ERDO-WG must be more specific about the implications.
- The ERDO-WG has decided that the scope of the activities should be broadened, with more emphasis on sharing knowledge and experience in the back-end activities of the smaller nuclear power or waste producing nations, before the final disposal stage.
- The IAEA has also pushed ahead with its support for regional solutions and has recognised that the ERDO

approach could be appropriate for other regions of the world. Strongest efforts are being made in the Arabian Gulf region and in South East Asia. The publication currently being produced by the IAEA directly reflects the concepts and strategies for regional cooperation that are being developed by the ERDO-WG.

- The future of the ERDO-WG is dependent on the feedback from national governments and WG Members are responsible for ensuring that this feedback is given.
 - If a new drafting or implementation initiation group is established, the ERDO-WG should be subsumed into this wider group in order prepare for establishing an ERDO within 1-2 years.
 - If the time is judged not yet to be ripe for establishing such a group, the ERDO-WG can continue in its present form to facilitate technical exchanges and to work further on specific issues that need to be clarified before a formal decision can be taken by the relevant governments.

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