

# **Regional and International Solutions for Long-Lived Radioactive Waste Disposal: the ARIUS Initiative**

Neil Chapman

*ARIUS : Association for Regional and International Underground Storage  
Mellingerstrasse 207, 5405 Baden,  
Switzerland  
Neil.Chapman@arius-world.org*

Charles McCombie

*ARIUS : Association for Regional and International Underground Storage  
Mellingerstrasse 207, 5405 Baden,  
Switzerland  
Charles.McCombie@arius-world.org*

## **ABSTRACT**

For relatively small quantities of waste (e.g. from countries with only small nuclear power programmes, research reactors or industrial arisings), the economic implications and allocation of resources to small, national repositories make little sense. Shared storage and disposal facilities are becoming widely recognised as a sensible and sustainable option that would assist in protecting the global environment and in providing nuclear power with a credible future. The new Arius association was formed in February 2002 to promote regional and international solutions worldwide. Arius plans to undertake a number of studies that are aimed at answering some of the principal questions surrounding international solutions. This paper reviews current activities around the world aimed at international storage and disposal solutions, outlines the background to the formation of Arius and explains the current activities of the association and, in particular, its development plans in the European arena for the near future.

## **I. GROWING INTEREST IN REGIONAL AND INTERNATIONAL SOLUTIONS**

Implementation of a deep geological repository for long-lived radioactive wastes may be difficult or impossible in some countries. For relatively small quantities of waste (e.g. from countries with only small nuclear power programmes, research reactors or industrial arisings), the economic implications and allocation of resources to small, national repositories make little sense. In addition, restricted siting options could raise problems. Shared storage and disposal facilities are becoming widely recognised as a

sensible and sustainable option that would assist in protecting the global environment and in providing nuclear power with a credible future. International facilities, accepting waste from anywhere in the world, may become possible in the future. There may, however, be more immediate prospects for considering repositories on a regional basis – for example, in Europe, the Asia-Pacific area or South America. The Eurobarometer poll of public opinion in 15 countries in the European Union, published in April 2002, indicates a significant growth in interest in regional solutions. The increased interest in shared disposal solutions is also reflected in the fact that the IAEA is currently supporting an advisory group working on multinational repositories and also by the inclusion of shared regional solutions in the recent draft Directive issued by the European Union to its member states.

It is important that discussions on shared facilities do not derail existing national disposal programmes, and it seems clear that national deep geological repositories will be implemented first, e.g. in the USA, Finland and Sweden. Because of the long development timescales, however, it is also important that the development of regional and international projects begins to move forwards in parallel with national developments. All nuclear power programmes, large and small, and all countries possessing long-lived wastes from research or isotope production reactors should be able to indicate a way towards a permanent solution of their waste problem. Exploring possibilities for regional cooperation – together with the build up of national expertise in waste management – is an appropriate approach. There is already significant discussion of the possibility of Russia accepting two categories of

waste for storage and (possibly) disposal: spent fuel and spent MOX fuel manufactured from decommissioned nuclear weapons. This broadens the value of international solutions into the area of disarmament and global nuclear safety, whilst raising issues of long-term safeguards.

## **II. A NEW ORGANISATIONAL INITIATIVE**

The new Arius association was formed in February 2002 to promote regional and international solutions worldwide. Arius is non-commercial and aims to attract members and interest from around the world; currently, however, it currently has a strong European focus. Arius has both organisational and individual members. The organisational members in its founding year are from Belgium, Bulgaria, Hungary, Italy, Japan and Switzerland. There are other countries that could obviously benefit from sharing repositories, based on one or more of the following criteria: limited waste inventories, small size, complex geological situations or difficult economic status. These countries are in Europe (e.g. Netherlands, Slovenia, Lithuania, Czech Republic, Romania, etc.), in Asia (e.g. Taiwan, South Korea), in the Americas (e.g. Mexico, Brazil, Argentina etc.) or in other parts of the world (e.g. South Africa, Australia). The support of international bodies and of national programmes will be needed to ensure progress. Accordingly, continued interactions with other international bodies such as the IAEA, the European Commission, the WNA and the NEA are foreseen by Arius. Maintaining contact with those countries that have decided on purely national solutions is also important. It is the sovereign right of any country to make such a decision and it is important both for these countries and for Arius members to make clear that there is no conflict arising here: national and multinational repositories must both be implemented.

The initial goals of Arius are to organise studies of the technical, legal, political and societal issues associated with multinational storage and disposal options, and to ensure that these options remain a topic for discussions on the world stage and are recognised as a feasible future choice for countries that opt for this strategy. Arius plans to undertake a number of studies aimed at answering some of the principal questions surrounding international solutions. These include:

- Feasibility of regional storage of long-lived waste in Europe

- Issues affecting transport to international storage & disposal facilities
- Feasibility of regional repositories in Europe (an expression of interest for a European Pilot Study for Regional Repositories was submitted to the EC)
- Feasibility of international repositories outside Europe
- Treaties/agreements/liabilities affecting the import/export of wastes
- Regulatory and licensing processes for international facilities
- Economics of shared storage and disposal facilities  
Public attitudes to import and export of wastes

## **III. THE THORNY QUESTION OF SITING**

The greatest hurdle in moving towards implementation of shared solutions concerns the feasibility of finding potential host countries. That there could be real material benefits for a host country is indisputable. But will the political leadership in any country be decisive enough to support any suggestion of hosting a shared facility, knowing that this will inevitably raise strong opposition in some circles? History does not give much cause for optimism here. In countries such as the UK and France that did (as part of reprocessing contractual arrangements) accept foreign wastes for disposal, policies were reversed in order to try to reduce opposition to national nuclear industries. In some countries where the proposal to host a repository began to be debated (e.g. Australia), many politicians rushed to express disapproval, despite significant support in scientific and business circles. In Russia, one of the few countries where Government agencies support waste import, public opposition has grown.

Nevertheless, advocacy of international or regional repositories is far from being a lost cause. The need for such facilities is almost universally accepted. Even those countries or organisations that have opposed opening the issue now acknowledge that shared disposal must come, for safety, environmental and economic reasons. National facilities will come first, but preparations for international disposal should nevertheless start now. Technical, public and political confidence in the use of nuclear technologies in small countries depends

upon having safe multinational disposal routes available. Where might these be?

The most advanced discussions at present concern Russia, since the Government would like to see such projects implemented. The advantage for Russia, apart from the obvious economic gains, are that resources would become available for urgently required clean-up programmes. There is, however, a negative attitude towards Russian proposals in many other countries. With good will and a concerted action programme, however, an acceptable Russian solution could be possible. Extreme measures, perhaps going as far as effectively ceding a part of their territory to international control may be needed. A recent related development that could possibly 'break the ice' by initiating multinational disposal of low-level radioactive wastes is in Kazakhstan, where the government of has suggested hosting such a facility and is recommending the parliament to agree an appropriate legal framework. The IAEA could play a key role in facilitating such approaches; its original charter shows that concepts for direct international control of nuclear materials were considered many decades ago. It could also assist in evaluation and audit, thus providing a guarantee that international disposal facilities are designed, developed, managed and closed to appropriate, internationally recognised safety standards.

A further solution that could become more attractive with time is a regional solution in some parts of the world. East Asia or Europe are obvious candidates. In the European context, key issues connected with radioactive waste management in the EU applicant states may be most effectively addressed by choosing this orientation for the Arius programme, and including more members from these states, together with members from the existing EU countries that are willing to share their expertise. In fact, although some individual member states of the current EU are opposed to shared repositories, Commission officials in Brussels openly recognise that this could be a sensible approach. The planned increase in EU membership involves a number of candidate countries that would be obvious partners in disposal projects. The draft Directive referred to above, as well as setting very ambitious targets for implementing disposal, realistically acknowledges that the regional repositories approach may be the solution for some current and future EU countries.

Finally, if or when geological disposal becomes a normal and widespread technology, countries that

have especially suitable geological and environmental conditions for hosting a repository may well be inclined to take advantage of the positive features that nature has endowed them with. These features include stable geology, extensive low relief areas, arid regions, low population densities etc. The especially suitable areas of the world include parts of Australia, Southern Africa, South America and China. Politicians in such countries will, however, hardly countenance the promotion of such proposals unless there is clear support and encouragement from the developed nuclear nations of the world. There should be clear recognition that countries that are willing to provide safe, state-of-the-art repositories for the use of others are providing a valuable environmental service and generating safety, security and economic benefits that can be shared by all partners.

#### IV. CONCLUSIONS

In conclusion, we summarise the most important messages about the shared repository concept:

- International and regional repositories can bring environmental benefits and help to improve global safety and security.
- They will not replace national repositories, some of which are now moving towards implementation. Both national and international facilities will be needed.
- For the latter to succeed, it will be necessary for the international nuclear community to provide support for the general concept of shared repositories and, specifically, for any country willing to consider hosting one.
- Discussion on shared repositories is growing; specific plans and projects have been proposed; international organisations are being more supportive; national programmes that are passing the siting stage feel less threatened.
- All of these developments indicate that regional or multinational repositories are a credible solution to be aimed at by numerous countries requiring access to deep geological disposal facilities.
- All those who are interested in global environmental protection and security and all those interested in retaining a nuclear energy option have good reasons for supporting the further development of the shared repository concept.