

## SITING MULTINATIONAL FACILITIES: A BOTTOM-UP APPROACH

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### ABSTRACT

The potential advantages of countries sharing centralized facilities for storage and disposal of spent nuclear fuel or HLW are generally recognized [1]. They include increased global nuclear safety and security as well as improved local and regional economics. The challenges presented, especially in the societal aspects of siting such shared facilities, are also acknowledged. A few individual countries have indicated an interest in hosting a multinational store or repository, but no project has yet come close to realization. This paper discusses approaches that could lead towards successful siting of multinational repositories, using lessons learned from national programmes. The different approaches that have been proposed or tried are top-down decision by a national government; private, commercial enterprise, bottom-up self-help group; and supra-national decisions and organisation.

### INTRODUCTION

This paper discusses approaches that could lead towards successful siting of multinational repositories, using lessons learned from national programmes. The following different approaches that have been proposed or tried are discussed:

- top-down decision by a national government,
- private, commercial enterprise,
- bottom-up self-help group,
- supra-national decisions and organisation.

A “top-down” process starting with a national declaration of interest in hosting has been exemplified by Russia, but it is not without acceptance problems, both inside and outside the country. A better known example of a top-down approach is when technocratic experts decide on a “best” site, without sufficient regard for societal aspects. This has been seen in several national programmes where it has encountered well-known problems. Top down approaches at either a national or a multinational level are increasingly recognised as provocative and unlikely to lead to success.

It is inconceivable that common facilities will be implemented without the positive support of the key international nuclear organisations. It is encouraging, therefore, that in 2003 the IAEA and the EC have taken steps in this direction. However, these organisations can never assume a direct leadership role in, or initiate shared facilities “from the top”. The conclusion that must be drawn is that those nations with a direct interest in the success of multinational approaches must engage themselves directly in “bottom-up” efforts to progress cooperation.

For this reason, the Arius association was founded as a self-help organisation, aimed originally at promoting the general concept of shared storage and disposal. The most immediate appeal is to small nuclear nations that may have problems implementing a purely national facility. Support, however, can

also come from larger nuclear nations, such as the USA, that are concerned about global nuclear safety and security. Arius has a medium-term development strategy that concentrates firstly on increasing support for the concept and later moves to evaluate specific initiatives for regional or fully international facilities.

In this paper, the activities of Arius in its first two years of existence are briefly described. These include intensive efforts aimed at communicating the advantages of multinational cooperation to a wide range of audiences, development of a specific study plan, and growing the association. A highlight of the Arius programme has been the initiation, together with Decom, Slovakia, of a European Commission project dedicated to studying the potential for a European regional repository.

The intentions of Arius are to ensure cooperation between countries interested in advancing the concept of shared storage and disposal. Small potential users of a common facility should be able to speak with a common voice when discussing the options with international bodies or with potential host countries offering such back-end services.

### **MULTINATIONAL FACILITIES BRING GLOBAL BENEFITS**

The potential advantages of countries sharing centralised facilities for storage and disposal of spent nuclear fuel or HLW are generally recognised. They include increased global nuclear safety and security as well as improved local and regional economics. It is relatively easy to identify countries that could benefit most directly from the availability of shared waste repositories. These are the countries that will have difficulties in establishing an expensive and complex disposal facility for small quantities of wastes. They are not the only potential beneficiaries of multinational repositories, however.

It is important to note that there are also global advantages of having disposal facilities available to all countries where nuclear materials are to be found - irrespective of their size and economic status. These global advantages are of an environmental nature, but also directly related to nuclear security. This aspect has recently grown enormously in importance due to the all too frequent demonstration that there are terrorist groups who would be eager to misuse such material, even if it means losing their own lives.

It is also apparent that there are numerous ways in which a country satisfying relevant requirements could benefit from hosting a shared disposal facility. The obvious benefits are not only direct financial compensation. A hosting country could use the resources derived for environmental remediation of sites (e.g. abandoned uranium mines or nuclear and other industrial facilities) in its own territory. It could also benefit from the introduction of the long-term high-tech industries associated with disposal (e.g. cask manufacture). Not least, a hosting country could increase its international influence, since it would become an important player on the global scene connected with non-proliferation activities.

Despite all of the obvious benefits that a multinational repository could bring, there have been only a few expressions of interest and no concrete project is close to realisation. The obvious stumbling block is the huge societal and political challenges facing any country that considers hosting. The fact that other hazardous materials are routinely transferred between countries, if this enables better environmental management, appears to have little impact when nuclear issues are discussed. How can the difficult question of encouraging voluntary host countries be approached?

### **LESSONS FOR MULTINATIONAL SITING FROM NATIONAL APPROACHES**

A common misconception concerning the multinational repository concept should be dispelled. The immediate objection that is often raised to multinational facilities is that "there is no site identified". A comparison with national waste disposal programmes illustrates that the selection of a site is not the first

step towards successful implementation. Countries that nominated a site near the beginning of a disposal programme (such as Germany with Gorleben in the 1970s) have struggled for decades to justify the selection process itself. Experience has shown that a more promising national approach is first to achieve sufficient consensus on the necessity for implementing a centralized storage facility or a geological repository. In countries where this has succeeded (e.g. Sweden, Finland, USA), it has then been possible to move to specific siting. In countries where the geological concept itself has been challenged, this is not possible, as shown clearly by the Canadian example[2].

Once the need for a facility has been agreed, there have been various national approaches to siting repositories. These range from pure volunteering by a community (as is being tried in Japan), to proposals for a technically optimised site as it has been done in various countries, e.g. UK with Sellafield, Switzerland with Zürcher Weinland. A more favoured approach, however, involves engaging with more than one potential host community in discussions of the final siting choice. A structured process for this was initiated in the USA for siting of LLW repositories. States were encouraged to join together in “compacts” that would seek shared disposal solutions, without necessarily identifying the host state at the outset. Some of the good and bad experience from national siting efforts can be usefully transferred to initiatives for multinational repositories, as discussed below. The problems will be essentially the same, although their relative difficulty will increase when we consider countries, rather than regions or states within a single country. In particular, the conclusion that in repository planning the societal problems in repository implementation outweigh the technical problems [3], is even more valid for multinational than for national projects.

## **POTENTIAL APPROACHES TO MULTINATIONAL REPOSITORY SITING**

Different approaches that have been proposed or tried can be distinguished. These are:

- Top-down decision by a national government,
- Private, commercial enterprise,
- Bottom-up self-help group,
- Supra-national decisions and organisation.

These categories overlap to some extent with the “scenarios” for implementation of a multinational repository, as they are described in a recent IAEA technical document [4]. In practice, these are not distinct approaches since any successful siting effort will involve a host community, a host nation, a number of bilateral agreements between nations and a degree of international consensus and also international oversight.

### **Top-Down Siting**

This approach implies direct support at political levels for an initiative to host a multinational repository. Given the public controversy that such a suggestion is likely to lead to, and the relatively long timescales before benefits might be seen (certainly long compared to electoral periods), direct initiatives from government level are unlikely in democratic countries. This is well illustrated by the fact that proposals of this type have in the past come mainly from Russia and China. The reactions to these proposals, even in the potential customer countries, have been cool to negative. Negative reactions of the national public and

parliament to the plans of the Russian Government have also been recorded, although it is difficult to judge how widespread the opposition is or to what extent it is fuelled by the pressure of organisations such as Greenpeace.

The record of Russia in environmental management has also been poor and this has led to doubts regarding the credibility of implementing safe international repositories there. On the other hand, the pressing need for environmental restoration and the lack of the funding necessary for this have also been put as arguments in favour of a Russian solution. A positive development might be for the Russian Government to acknowledge the reservations of other nations and thus to accept a much higher level of international oversight, or even control, of a multinational repository.

In fact, readiness to do so has been recently signalled by the responsible Russian minister when he proposed a system of international fuel cycle centres (FCC) with strict IAEA control [5]. This proposal was linked to discussions on the security concerns caused by spent fuel being stored at numerous scattered sites throughout the world. It is likely that the security issue may well lead to increased top-down support for multinational repositories in other countries too.

A better known example of a top-down approach is when technocratic experts decide on a “best” site, without sufficient regard for societal aspects. This has been seen in several national programmes where it has encountered well-known problems. Top down approaches at either a national or a multinational level are increasingly recognised as provocative and unlikely to lead to success. It will be interesting to observe the progress of the latest example of extreme top-down siting at national level; this is in Italy where in November 2003 the Government issued with no public consultation a decree nominating a geological disposal site.

A less proactive form of Governmental level support for a multinational repository in a country may conceivably be the assent at some future time to a national disposal organisation accepting foreign wastes. This is referred to in the IAEA document as an “add-on” scenario. It is well known that the countries with commercial reprocessing (France, UK, Russia) originally retained the wastes from reprocessing of foreign fuel. This situation could possibly return when such countries have themselves implemented deep geological repositories.

### **Private, Commercial Enterprises**

In the nuclear area, there are examples of private initiatives being able to respond more flexibly to the requirements of partners and thus being able to site potentially controversial facilities. In the successful Swedish and Finnish disposal programmes, the drivers are private power companies. In Switzerland, a centralised storage facility was sited through the utilities. In the USA, Government attempts to site a centralised, monitored, retrievable storage facility (MRS) were unsuccessful and this led to the private initiative by the company PFS for storage in Utah [6].

In the international arena, there have also been private, commercial initiatives. The most recent are the Non-Proliferation Trust (NPT) proposal and the Pangea Project. Both had solid technical and economic concepts behind them. The former was tied strongly to encouraging remediation, the latter was based on a scientifically attractive concept of identifying “high-isolation” sites where disposal would be most straightforward. Neither has led to success. The necessary top-down support was lacking and this discouraged potential user countries from making any firm commitments.

### **Bottom-Up Initiative**

There are also useful national parallels in this category. The example of Nagra in Switzerland is typical of various countries where organisations that are responsible for the long-term care of radioactive materials have formed themselves into a “self-help” group that can most effectively address their common problems. The organisations involved (normally power utilities) acknowledge their responsibilities, and resolve to solve their problems without any commercial motive behind their joint waste management programme. Translated into an international context, this leads to the concept of countries with a common problem that they cannot easily solve alone coming together to explore common solutions. In the present context, these would be countries with:

- Small Areas And/Or Complex Geological Environments,
- Limited Nuclear Power Programmes And Hence Waste Inventories,
- No Nuclear Power, But Long-Lived Wastes From Other Applications,
- An Interest in economic optimisation of their disposal programme.

The Arius Association, founded in 2002, is an example of this type of self-help organisation. The goals of Arius are non-commercial; they are the promotion of concepts for safe and secure storage and disposal of radioactive wastes. The activities of Arius are described in more detail below. In its short lifetime, Arius has gained credibility and has contributed to the clear swing in recent opinion towards support of multinational approaches. This trend is illustrated clearly by the words and actions of international organisations, as is discussed in the following section.

### **Supra-National Approaches**

This terminology is applied to the case where the initiative is taken by a special body that organises or coordinates a number of nations in a specific area. There are already such entities in the nuclear field, the prime examples being the IAEA, the EU and the NEA. In the first two of these, there are definite signs of increasing support for the multinational disposal concept, as will be clear from corresponding talks at the special conference session for which the present paper is prepared.

The IAEA, as well as organising a special working group to prepare the document previously referred to, has talked publicly on the advantages of multinational repositories. Whereas, in 1999 the Agency was warning of a possible backlash from discussions on multinational repositories, and in 2000 was still characterising them as “premature”, in October 2003 the statement was that “considerable advantages - in cost, safety, security and non-proliferation - would be gained...” [7, 8, 9]. Nevertheless, although the IAEA, when originally set up, was conceived of as having an operational function (e.g. for international plutonium storage), its more likely role in multinational disposal is as the highest oversight or supervisory agency.

The European Commission has also recognised the potentially beneficial role of shared repositories; its 2002 Directive on Waste Management [10] initiated discussion on regional repositories in Europe and finally led to EC support for a specific project, SAPIERR, studying this question. Could a multinational or regional repository conceivably be run by the EC? Although the EC does run some facilities, these are largely research institutions rather than industrial operations such as those needed for geological disposal. Therefore, the EC would also more likely have an oversight or coordination role in any shared repository project in Europe.

## **A COMBINED APPROACH TO DEVELOPMENT OF SHARED FACILITIES**

As mentioned previously, some combination of approaches may be most likely. One, or preferably more than one, potential host country might emerge either in an add-on scenario or by agreement between a group of small countries that some sub-set of their number could be a host. The support of international organisations would be needed at the outset. This has been recognised for example by Russia, where Minister Rumyantsev has even suggested that facilities should be built “under the auspices of the IAEA”. In the “add-on” scenario, the credibility of the project would also be greatly enhanced if a number of user-countries were prepared to be identified and to enter into serious discussions. This method of enhancing credibility has proven problematic in the past because of the “chicken and egg” syndrome – the potential user countries will allow themselves to be publicly linked only with projects that already have sufficient credibility !

In the small country, bottom-up, approach, the sensitive issues for participants are:

- a) Ensuring that the concept is supported by the national population and international community and;
- b) Tackling the question of host country selection.

The former point has led various countries to hesitate in joining a grouping such as Arius; as indicated above, however, overt support by the international community has increased and this will have a positive feedback at the national level. The host country question is sensitive because each participating country in a self-help grouping must consider whether it is itself a potential host. Owing to the sensitivity of this issue, one approach is to deliberately postpone the question of hosting until all partners have looked at potential benefits and drawbacks of the shared solution. This is analogous to common national siting approaches and it is the way chosen for the first phase of the SAPIERR project.

Thus, a combination of top-down and bottom-up approaches will be necessary. In practice, the commercial approach is also of importance even through a purely commercial venture is unlikely or impossible. In any scheme for shared repositories, there will be very important commercial issues to be addressed. These concern not only straightforward tasks, like the setting of prices and schedules, but also complex questions concerning the allocation of liabilities throughout the project's long lifetime.

A final important point to be made concerning the international agreements influencing any shared repository concept is that the USA has a special position. Because of the necessity of having US consent to transfer most of the materials that might go to a common repository, any proposed scheme will require US approval. The fact that this approval would not be withheld for transfers fulfilling well defined environmental and safety conditions has been documented in numerous written positions of the US State Department - including in its contribution to this conference special session [13].

## **PROGRESS AT ARIUS**

Arius was founded predominantly as a bottom-up, self-help organisation. The initial membership comprises 6 organisations, each from a different country, and of varying types. Some are national waste management agencies, others nuclear utilities and others private companies. The initial goals were to strengthen support for the concepts of shared storage and disposal and thereafter to initiate specific projects leading towards development of facilities.

Since its inception, a wide range of activities have been undertaken. These include participation in numerous conferences, publication of journal articles and direct presentations to interest bodies. A web-

site has been established, a quarterly Newsletter is produced and a database of relevant literature on international disposal is accessible to members. More specific is the work done within the scope of the IAEA Consultant Group on Multinational Disposal and the participation in relevant joint discussions and field trips organised by the National Academies of Russia and the USA.

The most concrete step, however, is undoubtedly the initiation of specific project work within the scope of the European Union Sixth Framework Programme. The project SAPIERR is now being run by Arius together with Decom Slovakia, which has taken on the role of Project Coordinator. The project is aimed at clarifying the necessary conditions for regional repositories in Europe, not at identifying sites. It includes organisations from a much wider range of countries than those in Arius currently. SAPIERR is described in more detail in another paper in this session [8].

In the coming years, significant Arius effort will be devoted to the SAPIERR project. Equally important, however, is continuation of efforts to increase the breadth of membership. Accessing funds that could help finance participation of economically disadvantaged countries in Central and Eastern Europe could be a valuable mechanism. Arius, however, has goals extending beyond the European area that is currently the prime focus. In other regions of the world there is also an obvious need for consideration of shared facilities for managing radioactive materials. South-East Asia is one example; Central and South America is another. Arius will continue to look for ways to help increase collaboration between countries in these areas.

## **THE WAY AHEAD**

There are pessimists who point to the lack of concrete multinational projects as evidence that these are not feasible. If the same attitude were to be taken to the many national programmes that have no specific repository project, then the outlook for geological disposal would be very dismal indeed!

In fact even those countries that have postponed geological disposal for long or indefinite times (Netherlands, Japan, Slovenia, Spain, Switzerland, etc.) acknowledge that it must take place in the future. Similarly, a look at the numbers of countries possessing highly-active or long-lived wastes that require geological disposal makes it clear that there must be consolidation involving sharing of facilities.

An important new element is the strongly heightened appreciation of the safety and security advantages to be gained by gathering sensitive nuclear materials into fewer, well-guarded sites. This global security issue has focussed more top-down attention on the problem. International nuclear fuel cycle centres intended to reduce the threats of terrorism or nuclear proliferation must also include safe and secure disposal facilities.

Global security arguments originating mainly at the highest government levels reinforce the bottom-up views of small nuclear countries in favour of shared storage and disposal facilities. This could well mean that the time is ripe to move the concept forward more rapidly. Large countries and regions with security concerns (e.g. the USA, Western Europe) could help progress the efforts of smaller countries with nuclear wastes by supporting, morally, politically and financially, efforts aimed at implementing common disposal solutions. The concern is sometimes expressed in large countries that such support could impact negatively on their national programmes, since their own population might assume that this could lead to waste import. This concern can be alleviated by a firm statement of a strictly national policy, anchored if necessary, by appropriate legislation. This is the approach taken, for example, by Sweden.

In summary, the ingredients for successful progress in multinational projects may be:

- A number of countries that are openly interested in being potential users of a common facility;
- A number of countries (possibly including any or all of the above) that are prepared to consider the possibility of hosting a shared facility;
- A number of countries that have opted for a purely national solution, but which openly and
- Actively support the communal efforts of others in need of shared disposal facilities;
- Agreement by a major country with suitable repository sites to transfer these to a supranational organisation that can operate a disposal facility available to all;
- Commitment by international organisations such as the iaea and the ec to openly support specific repository projects and to make all efforts to ensure that the facilities are strictly regulated and safeguarded.

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