

## **UPDATE ON IMPLEMENTING GEOLOGICAL DISPOSAL IN THE UK - 16266**

Bruce McKirdy, Natalyn Ala

Radioactive Waste Management,  
Building B587, Curie Avenue, Harwell,  
Oxford, Didcot OX11 0RH, natalyn.ala@nda.gov.uk

### **ABSTRACT**

For more than 60 years, Britain has been accumulating radioactive waste which is currently stored safely at over 20 sites around the country. Radioactive Waste Management (RWM) is responsible for making this waste even safer by disposing of it securely for the long term in a GDF. This paper provides an update on the implementation of the process for siting a Geological Disposal Facility (GDF) in the United Kingdom (UK) and the role of RWM as the developer in its implementation.

The UK Government favours an approach for selecting a GDF site that is based on working in partnership with communities. In early 2013 when there were no longer any communities participating in the site selection process, the UK Government embarked upon a review to consider what lessons could be learned. Informed by this review the UK Government published in July 2014 a renewed approach to implementing geological disposal based on working with interested communities. The first two years of the programme comprises of initial actions overseen by Government recognising the need to provide additional information before the siting process is formally launched in 2017.

### **INTRODUCTION**

As a pioneer of nuclear technology, the UK has accumulated a legacy of higher activity radioactive waste and material. This has arisen over the last 60 years and is being stored on an interim basis at around 20 nuclear sites across the UK. Additional higher activity radioactive waste will arise as existing facilities are decommissioned, and through the operation and decommissioning of new nuclear facilities. A new 16 gigawatt (electrical) nuclear power programme, such as that currently envisaged in the UK, would contribute around 15% to the total packaged volume of waste which will require geological disposal.

Higher activity radioactive waste comprises a number of categories of radioactive waste – high level waste (HLW), intermediate level waste (ILW) and that portion of the UK's low level waste (LLW) that is not suitable for near-surface disposal in current facilities. In addition there are some radioactive materials that are not currently classified as waste but would, if it were decided that they had no further use, need to be managed as wastes through geological disposal. These materials include spent nuclear fuel, plutonium and uranium.

The UK Radioactive Waste Inventory<sup>1</sup> is updated regularly to present the latest assessment of the radioactive wastes and materials expected to arise in the UK. Based on the latest national inventory and an assumed 16 gigawatt (electrical) new build programme the currently estimated volume of all the waste and materials which will potentially require geological disposal is around 650,000 cubic metres.

RWM is responsible for disposing of this waste safely and securely in a GDF. There is general agreement internationally<sup>2</sup> that this provides the safest long-term management solution for higher activity radioactive waste. Twenty-five countries have decided on a policy of geological disposal<sup>3</sup> including Canada, Finland, France, Switzerland, Sweden and the United States of America.

The UK Government's 2014 policy "Implementing Geological Disposal – A framework for the long-term management of higher activity radioactive waste"<sup>4</sup> sets out a developer-led process for siting a GDF through a voluntarism approach working with communities.

Government's policy does not cover Scotland which under its devolved powers has developed its own policy for higher activity radioactive waste management. Government has nominated the Nuclear Decommissioning Authority (NDA) as the implementing body and RWM is the organisation established by the NDA to deliver a GDF. In order to deliver a GDF, three distinct elements are required:

- (i) GDF designs and safety cases based on robust technical underpinning to provide confidence to all stakeholders.
- (ii) Radioactive waste packaged in a way that is suitable for disposal in a GDF.
- (iii) A suitable site that combines a geological environment relevant to the long-term safety of a GDF with a willing community.

RWM team comprises around 100 scientists, engineers, programme management and communications professionals with an annual budget of £25 million. RWM's work programme builds upon the knowledge and expertise developed over the last four decades through our technical and social research, waste management, community engagement and GDF siting experience.

RWM's has extensive knowledge and experience of design and safety case development, and waste packaging. The knowledge, systems and experience gained from GDF design and safety case development and waste packaging are essential for the GDF delivery organisation. Geological screening, site selection framework, local desk-based studies, initial site assessments, detailed site characterisation and engineering feasibility studies must be based on a comprehensive understanding of what is needed from the geological barrier to ensure safe disposal of higher activity wastes.

RWM currently operates a generic, non-site specific, work programme to develop disposal concepts and designs<sup>5</sup>, demonstrating the safety of geological disposal through a generic disposal system safety case<sup>6</sup> and developing the science and technology necessary to underpin geological disposal<sup>7</sup> building on relevant international experience. This generic work programme which considers a range of potential geological settings and disposal concepts will in due course inform the production of site-specific programmes as the site selection process progresses.

RWM also supports waste producers in developing optimised plans for the management of their higher activity radioactive waste and provides advice on the packaging of their waste to ensure there is a high degree of confidence that it will be suitable for disposal in a future GDF. Finally, RWM supports the NDA in developing an integrated and optimised waste management strategy by considering wider developments in radioactive waste management options.

In a volunteer process there is a need for the developer to engage and work in partnership with potential host communities. The aim is to encourage communities to enter into constructive dialogue about hosting such a development and what it would mean to their community. Ultimately that needs to result in the identification of a suitable and safe site and a willing community.

## **IMPLEMENTING GEOLOGICAL DISPOSAL**

The July 2014 'Implementing Geological Disposal sets out UK policy in the form of a framework for implementing geological disposal. The siting of a GDF is based on the willingness of local communities to participate in the process. UK Government policy

describes a process starting with a series of initial actions which will be completed by Government and RWM in the two years following its publication. (See Figure 1 below for the schematic that shows how this will work.) Together these will lay the foundation for the success of subsequent discussions between RWM and communities to identify potential GDF sites.

The availability of clear evidence based information will enable communities to engage in the process with more confidence. The initial actions set out in the UK Government's policy document to provide this information include:

- a national geological screening exercise;
- preparing to work with communities; and
- developing land-use planning processes.

In addition to these initial actions RWM is undertaking early national communications and engagement. These activities will help to raise awareness of the need for a long-term solution for the management of radioactive waste and explain the science and engineering of geological disposal in the context of Government policy.

### **National Geological Screening**

As part of the UK Government's review of the previous site selection process, people expressed a strong desire for early consideration of geology as part of building public confidence in the site selection process.

RWM, as the developer for the GDF, is carrying out national geological screening. This will bring together existing information about UK geology that is relevant to the long-term safety of GDF and make it available in an accessible form to support discussions with communities and inform the site selection process. National geological screening is based on the requirements of existing generic GDF safety case, which considers a range of geological settings and disposal concepts.

The national geological screening exercise is being conducted in two phases. The first phase involves developing the Guidance which sets out how the information will be assembled and presented. The second phase of the exercise involves applying the Guidance across England, Wales and Northern Ireland. During 2015 we have worked with geoscience specialists to develop the proposed Guidance for public consultation<sup>8</sup>. It was developed based on the geological attributes which influence the safety of a potential GDF site. After completion of public consultation the Guidance will be finalised in early 2016. RWM will then work with the British Geological Survey (the primary holder of the national data set) in applying the Guidance. The development and application of the Guidance is being reviewed by an independent panel established by the Geological Society of London, on behalf of the UK Government.

The screening Guidance comprises:

- the safety requirements to which the geological environment contributes;
- geological attributes that are relevant to meeting these safety requirements;
- sources of existing geological information relevant to understanding these attributes; and
- a description of the outputs that will be produced based on this existing geological information.

Thirteen geological attributes were identified under five geological topics: rock type, rock structure, groundwater, natural processes and resources. Contribution of the geological environment, as a component of a multi-barrier system, was paramount and account was taken of national and international standards and guidance<sup>9, 10, 11</sup> and our

generic safety case. Our proposed approach aims to provide descriptions of geology at a regional scale. The outputs of the screening will be presented as a brief narrative for each region describing the key characteristics of the geological environment and its relevance to safety, supported by illustrated maps.

This will provide authoritative information to allow RWM and communities to engage in early discussions about their geological potential to host a GDF. It is not intended to identify potential GDF sites or definitively rule all areas as either 'suitable' or 'unsuitable'.



Figure 1 – Geological disposal: making it happen

## Working with Communities

The UK Government has recognised the variety of community settings and local government structures across the UK. There are many different ways in which people identify with areas, or define themselves against localities within those areas. Evidence gathered through Government's review underlined the importance of finding an open and transparent approach that is clear, flexible, reflects the long-term nature of the siting process, and represents wider community groups appropriately.

Communities will be able to enter into discussions with RWM about the GDF siting process, and will have a right to withdraw from these discussions at any time, up to the point that an informed test of public support for hosting a GDF takes place. The UK Government is developing the process for working with communities as part of the initial actions. Government will work openly with experts in the field of community decision making to consider community representation and community investment.

## Community Representation

If community representation and engagement is to be credible and flexible enough to function over the long term, it needs to be further developed in an open and transparent manner. Therefore, the framework within UK Government's policy sets out how this process will be further developed rather than prescribing in detail the approach to community representation. It sets out a number of key principles for community representation which are described below.

- The objective of working with communities is that RWM is held to account, tasked with providing communities with all the information they require and with listening and responding to views and concerns in an open and transparent way. UK Government has recognised that local representative bodies, including all levels of local government, will need to have a voice in this process. However, the UK Government is currently of the view that no one tier of local government should be able to prevent the participation of other members of that community.
- To enhance the flexibility of the siting process, community representatives will be able to participate in discussions and be given more information without needing to make formal commitments to ongoing participation.
- Communities will have a right of withdrawal from discussions with RWM at any stage in the siting process leading up to a test of public support. If the test of public support is positive, then development of a GDF will be able to proceed, with RWM then applying for development consent for a GDF, and seeking permission to proceed from the UK's independent nuclear and environmental regulators.
- Throughout formal discussions between community representatives and RWM, there will be wider engagement with the local community and other interested stakeholders. The costs of this wider engagement will be met by RWM so that communities can participate at no cost to them.

To develop the detailed process for community representation from the principles listed above the UK Government has convened a community representation working group. The community representation working group will consider a range of complex topics including:

- developing approaches to defining 'communities';
- options for effective community representation;
- options for ensuring that all levels of local government have a voice in the GDF siting process; and
- guidance providing greater clarity on when and how a final test of public support should be carried out.

This will enable the UK Government to clearly define the approach to community representation by the time that initial actions on national geological screening and national land-use planning have reached completion. At that point, it is envisaged that the subsequent process of formal discussions between RWM and interested communities will begin.

## Community Investment

The construction and operation of a GDF will be a multi-billion pound project that will provide skilled employment for hundreds of people over many decades. A GDF will create around 550 direct jobs over the duration of the project, with workforce numbers rising to

more than 1,000 during construction and early operations<sup>12</sup>. Hosting a GDF will bring significant economic benefits to a community in terms of both employment and infrastructure over a long period.

UK Government policy also commits to providing significant additional investment to any community which hosts a GDF in order to maximise the benefits that are inherent in hosting a significant infrastructure project of this kind. Use of this investment will be tailored to specific localities and managed locally in order to bring long-term, meaningful benefits focused on ensuring the positive long term economic and social value of the development.

Such investment will also be made available early in the site selection process to support the development of communities that engage constructively in the process. Community investment of up to £1 million per involved community, per year, will be made available in the early stages of the siting process. This will rise to up to £2.5 million per year for the communities where intrusive site characterisation takes place.

The approach to the management and distribution of community investment funds is being considered by the community representation working group.

## **Land Use Planning**

A GDF is an infrastructure development of national significance and the UK Government, informed by responses to the consultation has determined that the approach to land-use planning should reflect this. In 2015 UK Government amended the Planning Act 2008 to bring geological disposal and associated deep borehole investigations in England within the definition of 'Nationally Significant Infrastructure Projects'<sup>13</sup>.

The Planning Act 2008 introduced the process for decision making on Nationally Significant Infrastructure Projects for energy, transport, water and waste in England. It sets out a clear decision making process, involving objective examination by the Planning Inspectorate, which recommends to the Secretary of State whether or not to grant development consent. The final planning decision is made by the Secretary of State, maintaining democratic accountability.

The development consent process for Nationally Significant Infrastructure Projects also places specific requirements on the developer to consult local communities, local authorities, statutory bodies, and other interested parties before any application for 'development consent' is made. This is consistent with a consent based site selection process, and this consultation will be over and above the engagement with local communities as part of the site selection process.

The UK Government is preparing a National Policy Statement to guide the Secretary of State and the Planning Inspectorate in the consideration of any applications for development consent. The guidance within the National Policy Statement may also be of wider relevance to the site selection process through the guidance it provides to the development consent process.

## **Regulation and Independent Scrutiny**

The process for implementing geological disposal needs to ensure the protection of people and the environment. RWM will be required to present safety cases for all aspects of a proposed facility to the independent regulators (the Office for Nuclear Regulation, and the relevant national environmental regulators). These will need to demonstrate the safety of all aspects of a GDF from transporting waste to the facility, to its design, construction and operation, and the continuing long-term safety of people and the environment following the closure of the facility.

The UK's independent regulators will only allow a GDF to be built, operated and closed if they are satisfied that it will meet their demanding regulatory requirements. These

requirements implement the protection standards established nationally and internationally. Regulators will make their requirements clear to RWM and any communities considering hosting a GDF, at an early stage in the site selection process.

RWM has entered into agreements to enable the independent regulators to provide early regulatory scrutiny in advance of formal regulation. This voluntary scrutiny covers RWM's development in preparation for formal regulation, its generic plans to implement geological disposal and the rigour and independence of the waste management advice it provides to waste producers.

The Committee on Radioactive Waste Management will continue to provide independent advice and scrutiny to Government on the plans and programmes for delivering geological disposal, including the safe and secure interim storage that precedes disposal.

## CONCLUSIONS

The UK Government has set out a clear process to implement geological disposal based around the willingness of local communities to participate in the site selection process.

Useful lessons have been learned about how a consent based approach can be delivered more effectively in the future, such as, the potential risk of an overly procedural approach to site selection and the need for upfront information, on issues such as geology, socio-economic impacts and community investment.

The programme of initial actions being undertaken by the UK Government and RWM will provide existing geological information at regional scale across the country, evidence-based information on the process for working with communities and a national planning process for geological disposal in the UK. These actions will enable communities to engage in the process with more confidence.

These initial actions will lay the foundation for subsequent formal discussions between RWM as the developer of a GDF and communities. The aim is for those discussions to lead to the identification and investigation of potential sites and in due course, to the successful construction and operation of a GDF.

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