

IMPLEMENTING GEOLOGICAL DISPOSAL IN THE UK

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This paper describes the recent development of the process for siting a Geological Disposal Facility (GDF) in the United Kingdom (UK) and the role of Radioactive Waste Management (RWM) in its implementation.

For more than 60 years, Britain has been accumulating radioactive waste which is currently stored safely at over 30 sites around the country. RWM is responsible for making this waste even safer by disposing of it securely for the long term in a GDF.

The UK Government favours an approach for selecting a GDF site that is based on working in partnership with communities. However, by early 2013 there were no longer any communities participating in the site selection process. Therefore the UK Government embarked upon a review to consider what lessons could be learned.

Informed by this review the UK Government has set out a renewed approach to implementing geological disposal based on working with interested communities. This begins with two years of initial actions overseen by Government recognising the need to provide additional information before formal discussions with communities. These actions will address the issues of importance to the public and stakeholders in order to support communities' involvement in the site selection process.

I. 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 30 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 Inventory¹ 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.

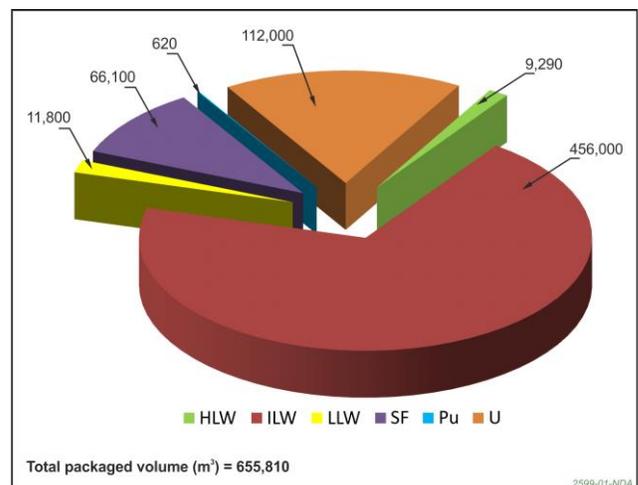


Fig. 1: Potential Inventory for Geological Disposal

RWM is responsible for disposing of this waste safely and securely in a GDF. This will make this waste even safer by removing it from the surface, away from people and the environment. There is general agreement

internationally² that this provides the safest long-term management solution for higher activity radioactive waste. Other countries that have decided on a policy of geological disposal include Canada, Finland, France, Switzerland, Sweden and the United States of America.

RWM was formed as a wholly owned subsidiary of the Nuclear Decommissioning Authority (NDA) in April 2014 with a specific mission to implement geological disposal and provide radioactive waste solutions. RWM currently employs around 100 mainly technical and scientific staff and has an annual budget of over £20 million. RWM's work programme builds upon the knowledge and expertise built up by its predecessor organisations over the last four decades.

RWM currently operates a generic, non-site specific, work programme to develop disposal concepts and designs³, demonstrating the safety of geological disposal through a generic disposal system safety case⁴ and developing the science and technology necessary to underpin geological disposal⁵ 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 GDF⁶. Finally, RWM supports the NDA in developing an integrated and optimised waste management strategy by considering wider developments in radioactive waste management options.

II. MANAGING RADIOACTIVE WASTE SAFELY

In 2001 after the failure of previous programmes to dispose of the UK's higher activity radioactive waste the UK Government and devolved administrations initiated the Managing Radioactive Waste Safely programme⁷. This aimed to find a practical long-term management solution for the UK's higher activity radioactive waste.

Between 2003 and 2006, the independent Committee on Radioactive Waste Management (CoRWM) considered a wide range of options for dealing with the UK's higher activity radioactive waste. This involved extensive consultation with the public and expert groups and options ranging from indefinite storage on or below the surface through to sending it into space were considered.

In light of this extensive deliberation and engagement CoRWM recommended⁸, in July 2006, that geological disposal, coupled with safe and secure interim storage, was the best available approach for the long-term

management of the UK's legacy of higher activity radioactive wastes. CoRWM also concluded that Government should seek willing communities and progress disposal of higher activity wastes as soon as practicable, consistent with developing and maintaining public confidence.

In October 2006, the UK Government and the devolved administrations accepted these recommendations⁹. Between June and November 2007 the UK Government, in conjunction with the devolved administrations of Wales and Northern Ireland, then consulted on a framework for implementing geological disposal¹⁰.

This consultation informed the publication of Managing Radioactive Waste Safely – A Framework for Implementing Geological Disposal¹¹ in June 2008. This set out Government policy for implementing geological disposal based on local communities' willingness to participate in the process. International evidence shows that this approach is most likely to be successful, with programmes based on these principles making good progress in Canada, Finland and Sweden.

The siting process set out in 2008 operated for five years. A number of communities engaged with the process or canvassed public views on doing so. However, the discussions between the interested parties did not progress to the identification and assessment of potential sites. Following a decision by Cumbria County Council not to proceed to the next stage of the site selection process, the process in Cumbria came to an end (despite decisions by Copeland Borough Council and Allerdale District Council to move forward). Therefore by February 2013, there were no longer any communities actively involved in this process.

III. REVIEW OF THE SITING PROCESS

After the siting process came to an end in Cumbria the UK Government reiterated its commitment to implement geological disposal through an approach based on the willingness of local communities to participate in the siting process. It therefore commenced a review of the lessons which could be learned from the operation of the siting process since 2008. To enable a wide range of stakeholders to have input into this review Government launched a public 'Call for Evidence'¹² in May 2013,

Informed by this period of evidence gathering, the UK Government and Northern Ireland Executive issued a consultation document¹³ in September 2013 looking at aspects of the siting process that could be revised in order to help communities to engage in it with more confidence, and ultimately to help deliver a GDF.

The consultation document posed a series of questions about the Government's proposals, which included

decision making, roles in the siting process, community representation and investment, a proposal for there to be a direct test of public support, technical delivery of the GDF, information about geology, the inventory of waste for disposal and land-use planning.

The UK Government received 719 responses to the consultation in total, 301 of which were part of a letter writing campaign. Government has published a summary¹⁴ of the responses it received and how it has responded to the comments made.

TABLE I. Consultation Responses

Respondent Category	Number
Academia and Learned Societies	11
Individuals and Society	530
International Governments and Crown Dependencies	2
International Organisations	1
Local Government	94
Local NGOs (Non-Governmental Organisations)	22
National NGOs	7
Not Stated	3
MPs, Councillors and Political Parties	12
Regulators, CoRWM and other public sector organisations	7
Trade Unions	2
Business	28
Total	719

Informed by the call for evidence and subsequent consultation the review of the site selection process identified useful lessons about how a consent based approach can be delivered more effectively in the future. In particular, it identified the importance of providing upfront information on issues such as geology, socio-economic impacts and community investment.

It is also clear that, while an open process engaging local communities is crucial to the success of the site selection process, there are risks in being overly prescriptive about the procedural arrangements and decision points at the outset of such a long-term process.

The UK Government also identified that there are tangible benefits to be had from further consultation and engagement, and from enlisting the help of experts in local democracy in designing an open, credible process that can gain public trust.

IV. IMPLEMENTING GEOLOGICAL DISPOSAL

In July 2014, based on the review of the site selection process, the UK Government published ‘Implementing Geological Disposal’¹⁵ setting out its policy in the form of a new framework for implementing geological disposal.

The new site selection framework remains 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. Together these will lay the foundation for the success of subsequent discussions between RWM and communities to identify and consider potential GDF sites.

The availability of clear, evidence based information on both technical issues and the process of working with communities will enable communities to engage in the process with more confidence. The initial actions set out in the UK Governments policy document to provide this information include;

- a national geological screening exercise,
- planning for working with communities and
- clarification of the process for development consent.

In addition to these initial actions RWM will undertake early national communications and engagement. These will 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.

IV.A. National Geological Screening

The public consultation conducted as part of the review of the site selection process revealed a strong desire for early consideration of geology as part of building public confidence in the site selection process.

Therefore, the UK Government has asked RWM to ‘carry out a national geological screening exercise based on the requirements of existing generic GDF safety case and available geological information. RWM’s existing generic disposal system case considers a range of geological settings and disposal concepts.

The national geological screening exercise will be conducted in two phases. Firstly, screening guidance will be developed by RWM based on the geological attributes which influence the safety of a potential GDF site. Once this high level guidance has been developed it will be applied across England, Wales and Northern Ireland. This will draw together existing information about the presence of the identified attributes of relevance to GDF siting safety in order to support discussions with interested communities and inform the site selection process.



Fig. 2. Geological Disposal: Making it Happen (Department of Energy and Climate Change, Open Government License.)

The development of the screening guidance will consider openly what geological attributes should be considered in producing national, high level screening guidance. Potential attributes will be identified based on their relevance to isolation and containment of radioactive materials as part of the multi barrier approach to safety within generic GDF safety cases. Potential attributes may directly relate to geological attributes of relevance to long term safety or may be indicators of other attributes of interest. The development of national screening guidance will also be informed by the level of existing information which is likely to be available and whether this is sufficient to enable a potential attribute to be used nationally.

The development of the screening guidance will be led by RWM, as the developer of a GDF, in line with international guidance and RWM will engage widely during the development of the guidance. RWM is also committed to consulting on the draft guidance to ensure that the public and stakeholders have an opportunity to

influence the development of the guidance and to build public confidence in the final guidance and the screening exercise. Both the development and application of the guidance will be reviewed by an independent panel established by the Geological Society of London at the request of the UK Government.

The outputs from the national geological screening exercise will use existing information to describe geological attributes of relevance to the safety of a GDF, their relevance to the isolation and containment of radioactive waste in a GDF and where possible identify where those attributes occur across England, Wales and Northern Ireland. This will provide authoritative information to allow the developer and interested communities to engage openly on questions about local geological prospects and future geological investigations from the beginning of formal discussions but will not seek to identify potential GDF sites or definitively rule all areas as either 'suitable' or 'unsuitable'.

IV.B. Working with Communities

The UK Government has recognised the variety of community settings and local authority 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 the consultation 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 formal discussions with the developer 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. This commitment to a local test of public support before the construction of a GDF can proceed is a key addition to the new site selection process in light of the lessons learned from the review of the operation of the previous process.

The UK Government intends to develop the detail of a process for working with communities as part of the initial actions to be taken over the next two years. Government and RWM will work openly with experts in the field of community decision making to consider community representation, community investment and access to expert advice.

IV.B.1. 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 Implementing Geological Disposal sets out how this process will be further developed rather than prescribing in detail the approach to community representation. It does however set out a number of key principles for community representation which are described below.

The objective of working with communities is that the developer 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 site selection 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 be able to proceed in the process at the pace at which they are comfortable, and access to information should not be limited by predetermined decision points.

Communities will have a right of withdrawal from discussions with RWM at any stage in the siting process leading up to a local test of public support. If the test of public support is positive, then development of a GDF will be able to proceed, with the developer 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 the developer, 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 above the UK Government will convene a community representation working group. This group will consider the complex issues that have been raised in relation to community representation and engagement around potential sites.

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 test of public support should be carried out. The consideration of these issues will be carried out in an open, transparent and inclusive way which will include regular updates on progress and a public consultation on proposals if necessary.

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.

IV.B.2. 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 operations¹⁶. 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 provide 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.

Additional 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 will be considered by the community representation working group.

IV.B.3. Access to Independent Expertise

The UK Government has committed to establish a mechanism by which communities, the developer, and Government itself can access independent, third party views on issues contested during the GDF siting process.

The UK Government will work with relevant Learned Societies (for example the Royal Society, the Geological Society of London and the Royal Academy of Engineering) to develop the details of a mechanism to enable their members to engage with these issues. It is planned that this mechanism for obtaining advice will be available from the beginning of formal discussions between RWM and communities.

The UK Learned Societies will identify who, within their memberships, is best placed to provide an independent expert view on any particular subject. Members of the Learned Societies engaged through this mechanism will offer an independent expert view on a subject where a view has been sought so as to inform the requesters' considerations. Experts identified by the Learned Societies will not however, make decisions for the requester or provide recommendations to them.

Depending on the topic, members of the Learned Societies may either be called upon individually or as part of a panel in order to offer a collective view.

IV.C. 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. UK Government therefore intends to amend the Planning Act 2008 to bring geological disposal and borehole investigations in England within the definition of Nationally Significant Infrastructure Projects.

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 will also designate 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.

Preparation of a National Policy Statement will be brought forward as soon as a GDF and associated boreholes have been brought within the definition of 'Nationally Significant Infrastructure'.

The National Policy Statement for geological disposal will be non-site specific, focussing on the high level assessment principles against which development consent applications will be considered for any GDF in England, rather than identifying specific sites.

IV.D. Formal Discussions

The initial actions described above form the basis for the subsequent formal discussions between RWM and communities.

Further assessments of local geology and other factors will be carried out in order to identify potentially suitable sites in interested communities. Once RWM has identified in discussion with communities a small number of sites which show good prospects for successful development a major programme of site characterisation will be undertaken, including the drilling of deep boreholes. This site characterisation will be used to determine the suitability of potential sites and to gather the information

necessary to develop safety case(s) to support the safe development of a GDF at the chosen site(s). These intrusive investigations will require development consent and the approval of the relevant environment agency.

Once RWM as the developer is satisfied that it has sufficient information to demonstrate that a site is suitable then, subject to a positive test of public support, the granting of development consent and the approval of the independent nuclear and environmental regulators, construction of a GDF could proceed.

IV.E. 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 arguments 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.

CoRWM 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.

V. 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.

A programme of initial actions will be undertaken by the UK Government and RWM over the next two years which will provide evidence based information on both technical issues and the process of working with communities. These actions will enable communities to engage in the process with more confidence. These initial actions include a national geological screening exercise, planning for working with communities and enabling the use of a national planning process for geological disposal in England.

These initial actions will lay the foundation for subsequent formal discussions between RWM as the developer of a GDF and communities. These formal discussions with interested communities are intended to lead to the identification and investigation of potential sites and in due course, subject to a test of public support, and the necessary planning and regulatory consents, to the construction and operation of a GDF.

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