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Title:	R&D for geological disposal: Regulators role and expectations
Notes:	none

1 – Background and Context

1.1 The West Cumbria MRWS Partnership ('the Partnership') exists to "*make recommendations to Allerdale Borough Council, Copeland Borough Council and Cumbria County Council on whether they should participate or not in the geological disposal facility siting process, without commitment to eventually host a facility*". The Partnership is therefore predominantly concerned with the siting process up to a "Decision to Participate", defined as Stage 3 of the site selection process in the Managing Radioactive Waste Safely (MRWS) White Paper[1].

1.2 The Partnership Steering Group has developed a work programme[2] around the criteria that it will use when making a recommendation on whether to participate further in the MRWS Site Selection process.

1.3 Criterion 1b is that the Partnership should be "*Satisfied that that NDA RWMD has suitable capability and planning processes in place or being developed to protect residents, workforce and the environment*". The specific task that the Partnership wishes to address is to consider the *"Acceptability of the NDA's research programme"*. In this respect the Partnership have identified "*Task 1b(ii)- Review and comment on NDA's R+D plans*".

1.4 This paper has been produced by the regulators[3] to support a request from the Partnership for a presentation on 3rd March 2011.

1.5 This paper focuses on the Environment Agency (EA), because of the EA's early entry into formally regulating a future geological disposal facility (GDF), which for the purposes of planning, could be around 2017 (when the construction of boreholes could commence as part of the characterisation of one or more candidate sites). However, an overview is included of other relevant activities such as the joint scrutiny of RWMD by the Health and Safety Executive (HSE) and the Department for Transport (DfT) in conjunction with the EA.

1.6 The regulators recognise that further discussion with the Partnership may be required on issues raised in this briefing paper and the associated presentation.

2 – The role of the research and development in a safety case

The Safety Case

2.1 The Partnership's Document 36 describes the regulators' roles and processes in relation to a future GDF. This section provides information on the role of research and development in supporting a safety case.

[1] *Managing Radioactive Waste Safely: A framework for implementing geological disposal*, A White Paper by Defra, BERR and the devolved administrations for Wales and Northern Ireland, June 2008.

[2] *Work programme for 2010/11 (draft)*. West Cumbria MRWS Partnership Document 13.1 draft 25th January 2011.

[3] The Environment Agency, Health and Safety Executive's Nuclear Directorate and the Department for Transport.

2.2 A safety case is a structured collection of arguments and evidence that demonstrates the safety of a facility (in this case a GDF). The developer needs to develop an appropriate safety case to support an application for a permit or licence. The regulators will examine relevant parts of the safety case when considering submissions from the developer for regulatory approval of proposed activities. The safety case will need to satisfy the requirements of all regulators.

The Environmental Safety Case

2.3 The developer will need to submit to the EA an Environmental Safety Case (ESC) to support any application for an environmental permit. The EA's guidance[4] sets out the principles and requirements that a developer would need to address in an ESC. An ESC should demonstrate that the level of protection provided by the disposal system during the operational phase and in the long term will protect members of the public and the environment to the required standards. The developer will need to decide what R&D is required to support an ESC at any particular stage.

2.4 In planning and undertaking research and development in support of an ESC, the developer is expected to apply the following principles:

- The use of sound science.
- The use of good engineering practice.
- The application of tried and tested methods (the use of leading edge approaches or techniques is possible, provided the developer has undertaken appropriate trials and can demonstrate that the techniques proposed meet our requirements).
- Guiding research by the needs of the ESC which is proportionate, focussed and iterative.

3 – Regulators scrutiny of RWMD's work relating to geological disposal of higher-activity solid radioactive waste

Early engagement

3.1 At present, prior to any formal application for a permit or licence, the role of the regulators is to provide advice and comment on regulatory matters. The regulators are also co-ordinating and participating in a joint programme to scrutinise RWMD's work including:

- Geological Disposal Facility concept
- Safety case development
- Research and development

History of Scrutiny of RWMD's research and development

3.2 In 2009 the EA and HSE reviewed RWMD's research and development strategy and draft Technical Baseline and underpinning Research and Development (TBuRD) document. In summary the regulators' comments[5] were:

- *In the absence of an identified site and final design, we consider that research and development should support the near term requirements of the programme and provide a basis to underpin key decisions that will be needed at an early stage. Current research and development should focus on generic uncertainties that are independent of detailed design decisions and siting implications, and on developing tools to use in the future programme. We think that RWMD's focus on near term aspects (e.g. next 5 years or so) in the draft TBuRD is appropriate. We*

[4] *Geological Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation*, February 2009. Available at http://publications.environment-agency.gov.uk/pdf/GEHO0209BPJM-e-e.pdf

[5] The full comments are available via the following link (620 KB file size) http://publications.environment-agency.gov.uk/pdf/GENW1010BTEC-e-e.pdf

think the TBuRD usefully outlines many of the key, longer-term aspects that will require work in the future, in so far as these can be known at present.

- *The draft TBuRD document is well structured and provides the right level of information. The separation of baselines for "development activities" and "research" framed around the multi-barrier concept seems sensible. RWMD should recognise potential overlaps and ensure no research and development needs are missed.*
- *The TBuRD is one of a suite of documents that RWMD is producing to scope, define and support the research and development needs of the geological disposal programme. We encourage RWMD to set out the relevant document hierarchy and to outline the purpose and intent of each document. We also encourage RWMD to describe the process by which it identifies and prioritises research and development.*
- *We encouraged RWMD to publish as many aspects of its research and development programme as possible without compromising commercial and security requirements.*
- *RWMD should document the drivers for and purpose of the research and development more fully.*
- *We urged RWMD to outline how it will determine whether its final list of research and development tasks is comprehensive, and to present a summary of such reviews and how the findings have been addressed.*
- *We urged RWMD to publish the research and development programme (and its prioritisation) for wider scrutiny and input, especially from the scientific community.*

Current position

3.3 RWMD has moved away from use of a TBuRD document and have produced a Research and Development Programme and supporting documents which we will be providing comment on later in the year.

Scrutiny of RWMD's safety case development

3.4 RWMD has decided to publish a generic Disposal System Safety Case (gDSSC) in early 2011, providing illustrative assessments for generic disposal concepts in representative geologies, and an explanation of how the research programme will support development of the ESC. We expect the gDSSC to explain how R&D has been used in safety case development.

3.5 The gDSSC is not a regulatory submission and we will only provide advice and comment – we will not be making any regulatory decisions. Our advice and comment should inform RWMD's work programme on geological disposal and any future development of a DSSC for a geological disposal facility.

3.6 The combined views of the regulators on the gDSSC will be provided to RWMD in autumn 2011 and will be published at that time. We will identify good practice and any deficiencies in the necessary safety related research required to support the safety case.

3.7 We shall provide the Partnership further information on our review of the gDSSC in the future.

4 – Role of research in regulation

4.1 Regulators commission R&D projects to increase understanding of technical issues relevant to their roles and use the output R&D projects to inform their views and

advice, and to aid decision-making. It is not the role of regulators to undertake R&D to support safety case development.

4.2 The EA commissions R&D studies to improve its understanding and to help shape and guide advice to, for example, communities, Government, RWMD and others. Recently two such projects have been completed.

- **Technical issues associated with deep repositories for radioactive waste in different geological environments**[6]
  The study examined the technical issues that could be important to the post-closure safety of a GDF for several potential geological environments found in England and Wales. The project concluded that there are many technical issues to be addressed in building and operating a GDF; some of these are already being addressed either in the UK or in overseas disposal programmes. Overseas studies would need to be re-evaluated in the UK context including inventory and specific conditions should a candidate site (or sites) be identified. Some technical issues can only be addressed once a candidate site has been chosen.
- **Understanding controls on the performance of engineered barrier systems on high-level radioactive waste and spent fuel repositories**[7]
  The current understanding of what controls the long-term performance in different facility designs for HLW and SF disposal was examined, focusing on the role of the engineered barrier system (EBS). Eleven key controls on the performance of a GDF were investigated. The relative importance of these different controls and their overall impact on safety will depend on the precise details of the site and facility design. The performance required of an EBS depends on, for example, the role and nature of the EBS itself, the characteristics of the surrounding geosphere (the geological environment in which the system is based) and any regulatory requirements.

4.3 The EA has R&D projects in progress that will support its ongoing scrutiny of the management of higher-activity wastes including RWMD's work and inform its role as the environmental regulator for any future GDF. Reports from these R&D projects will be made publicly available when the work is complete.

[6] Our summary of the project is available via the following link (350 KB file size):
http://publications.environment-agency.gov.uk/pdf/SCHO0809BQVV-e-e.pdf
The full contractor report is available via the following link (2.8 MB):
http://publications.environment-agency.gov.uk/pdf/SCHO0809BQVU-e-e.pdf
[7] Our summary of the project is available via the following link (86 KB):
http://publications.environment-agency.gov.uk/pdf/SCHO0910BSZF-e-e.pdf
The full contractor report is available via the following link (6.2 MB):
http://publications.environment-agency.gov.uk/pdf/SCHO0910BSZE-e-e.pdf