



## Expert stakeholder workshop Workshop Brief

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## **An International Workshop for Expert Stakeholders on Geological Repository Monitoring**

**Venue: Oxford Spire Four Pillars Hotel, Oxford, UK, May 4<sup>th</sup>-5<sup>th</sup> 2011**

**Organised by the UK Nuclear Decommissioning Authority (NDA)**

This brief provides information for attendees of the Expert Stakeholders Workshop, organized by MoDeRn (Monitoring Developments for safe repository Operations and Staged Closure), an EC co-sponsored FP7 project. This information has been provided to inform the invited experts of the scope of the work programme and the content of the workshop.

### **SUMMARY OF MODERN WORK PROGRAMME**

The objective of the collaborative project MoDeRn is to take the state-of-the-art of broadly accepted, main monitoring objectives, to develop these to a level of description that is closer to the **actual implementation of monitoring** during the staged approach of the disposal process.

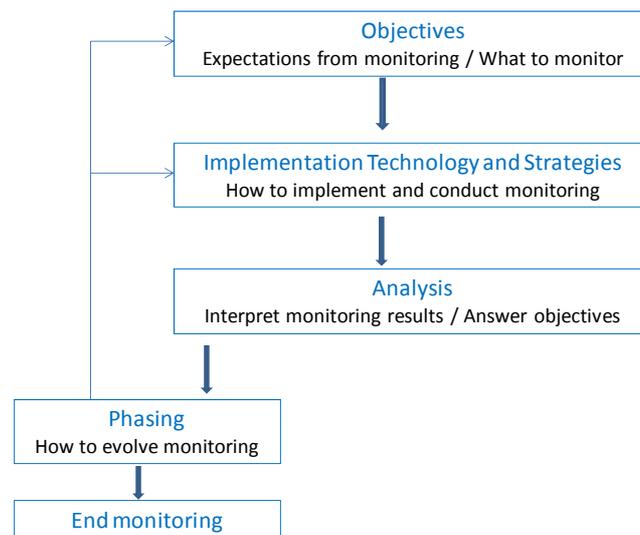
It is intended to verify whether such implementation is able to address **expert and lay stakeholder expectations**, to provide an understanding of **monitoring activities** and **available technologies** that can be implemented in a **repository context**, and to provide recommendations for related, future stakeholder engagement activities.

As a core part of its proposed activities, MoDeRn will provide a clear description of monitoring objectives and strategies, taking into account a variety of physical and societal contexts, available monitoring technology, and feedback from both expert and non-expert stakeholder interactions. In relation to this, the project has defined the technical requirements of monitoring activities and has begun to assess the latest relevant technology. A technical workshop involving other monitoring Research and Technology Development (RTD) projects was hosted to identify RTD techniques that enhance our ability to monitor deep geological repositories. In particular, innovative monitoring approaches specific to repository design requirements are being tested within underground research laboratories. In addition, a case study was initiated to illustrate the process of mapping objectives and strategies onto the processes and parameters that need to be monitored in a given context, with a further aim to illustrate the potential design of corresponding monitoring systems and possible approaches to prevent and detect measurement errors. The case study will also show how unexpected repository evolutions may be handled.

Collectively, these activities will form the basis for a 'roadmap for repository monitoring' which should enable radioactive waste management organisations to further progress towards implementing deep geological repositories that are safe and acceptable for all.

It should be noted that the MoDeRn project recognizes the diversity of monitoring activities that will be required in a repository, in particular related to operational safety and environmental impact assessment. **The projects emphasis, however, is on the main monitoring objective of verifying/confirming expected repository system evolutions** (i.e. natural environment and engineered system evolutions) during a progressive construction, operation and closure phase that may last on the order of a century, to the extent these would be related e.g. to the basis of the safety case and/or to evolutions that may be of interest to evaluate disposal process management options.

The flowchart below provides an overview of key steps to consider when developing a monitoring program.



These have been developed to a greater level of detail (see the Preliminary MoDeRn Monitoring Workflow on next page) and will be presented and discussed during the workshop.

All project work programmes are progressing and the following documents have been published and are accessible on the MoDeRn website (<http://www.modern-fp7.eu/>):

- Project Presentation
- National Monitoring Contexts – Summary Report
- National Monitoring Contexts – Country Annexes
- Technical Requirements Report
- Monitoring Technologies Workshop Report (and the workshop presentations)
- Site plans and monitoring programmes report (for monitoring demonstrators)

Interaction with stakeholders is at the heart of the MoDeRn project. Workshops (such as this one) and conferences will provide opportunities to report and discuss results with the research community, experts (e.g. from technical safety organisations) and non-experts (e.g. from civil society) and to collect feedback. Note that the topic *International Performance Confirmation Strategies for Geologic Repositories* was recently introduced to the planning of the **WM2012** conference. It will provide further opportunity to present and discuss progress on repository monitoring. Also note that the project will organize and host an **International conference on repository monitoring**, scheduled for early to mid-2013, providing a broad platform for presentations and discussions as well as a further opportunity to present MoDeRn project results.



# A Preliminary MoDeRn Monitoring Workflow

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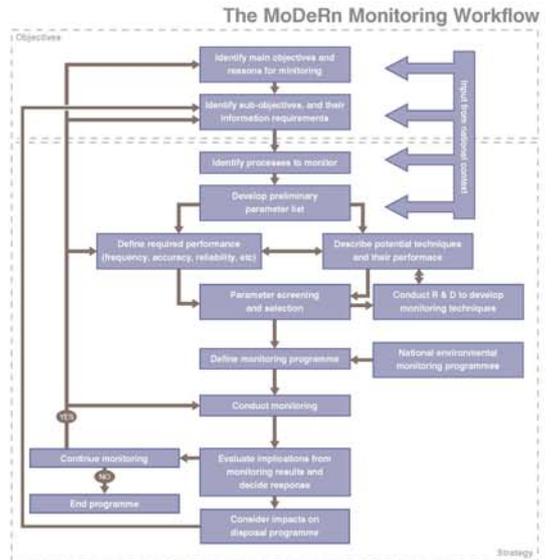
Monitoring Developments for safe Repository operation and staged closure

## Background

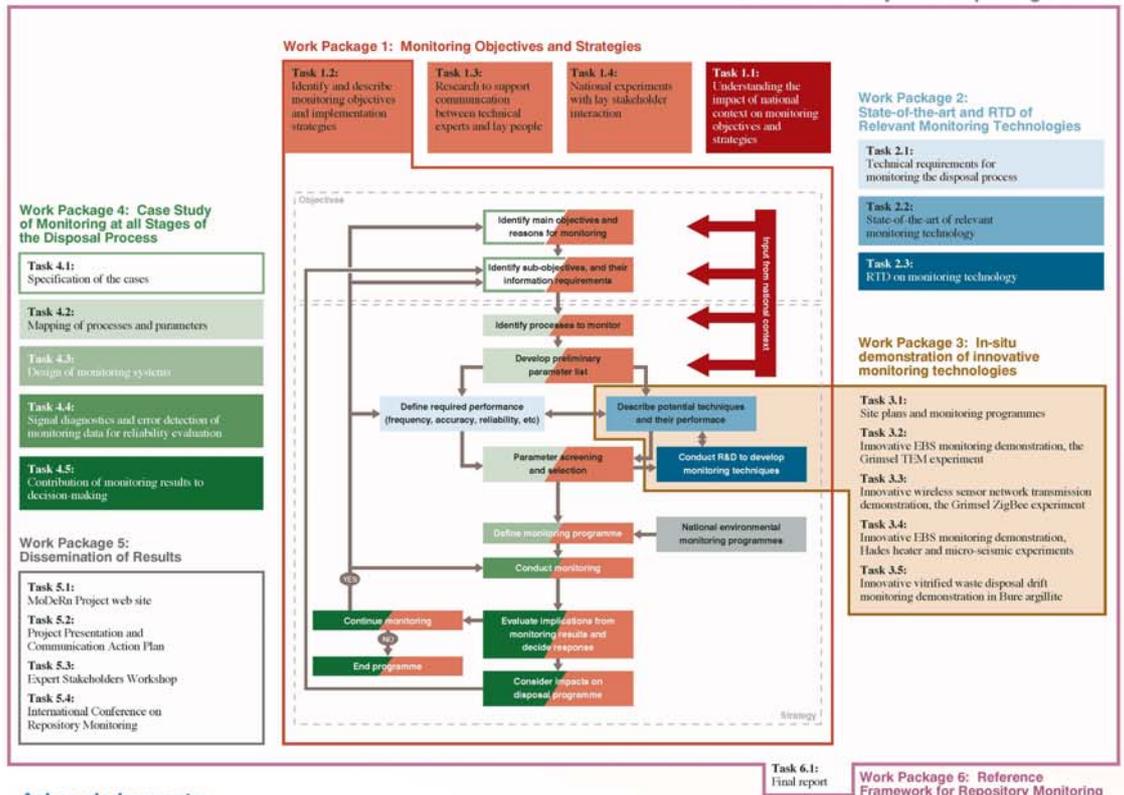
Early work in the MoDeRn Project has included preliminary development of a generic structured approach – the MoDeRn Monitoring Workflow, which provides a methodology for developing and implementing a monitoring programme under specific national boundary conditions. This poster presents the preliminary MoDeRn Monitoring Workflow and illustrates how the workflow relates to work being undertaken in the project.

## Further Development

Development of the MoDeRn Monitoring Workflow will continue throughout the project. The workflow will be tested by the detailed work in each work package task, and will be revised based on the outcomes. It is anticipated that the MoDeRn Monitoring Workflow will provide a reference framework against which specific monitoring programmes can be developed with due consideration of the appropriate boundary conditions (i.e. the national context).



Relationship of the MoDeRn Monitoring Workflow to MoDeRn Project work package tasks



## Acknowledgements:

The preliminary MoDeRn Monitoring Workflow has been developed through discussions at MoDeRn Project workshops, to which all project partners have contributed.

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## AIMS OF THE WORKSHOP

The partners in this EC MoDeRn Project have invested in this work programme with the aim of providing a generic monitoring roadmap for use in national programmes; to develop a better understanding of the state-of-the-art for monitoring through research into available technologies and our own programme of development and demonstration of leading-edge monitoring technology.

This workshop forms part of our programme of engagement in the MoDeRn programme. Our aim from this workshop is to present to our expert stakeholders the programme content; where we are now; and some of our thoughts and developments with a view to seeking discussion, feedback, challenge and advice to aid the direction we take in completing this work programme. After presenting work done so far in defining an approach to developing repository monitoring programmes as well as progress on associated technological aspects of monitoring, the workshop aims at engaging and facilitating expert stakeholders' discussions on these two overarching issues to incorporate workshop results and feedback into the remainder of the programme.

The output from the workshop will be produced as a report of the workshop proceedings. We would aim to produce this within 1 month of completion and circulate to attendees for comment prior to publication.

We would also value any further feedback and comment after the event and we plan to provide attendees with the means for providing such feedback.

## GENERAL ORGANISATION

The workshop will be organised and hosted by the NDA (UK), and is one of three key outreach events of the MoDeRn project. The workshop duration is one-and-a-half days. The workshop will provide for a mix of plenary presentation and discussion sessions, and breakout group discussions.

Enclosed are details of how to get to the venue with details of transport (bus and rail) from London and Heathrow Airport.

A copy of the workshop agenda is appended. The first afternoon will include brief summary presentations of the work programme as a basis for informing invited experts on the programme content, as well as providing an overview of related IAEA Safety Standards, with opportunities for questions and discussions. The second day will provide an opportunity for the invited experts through breakout groups to consider two key themes of the programme: "Process" (a.m.) and "Technology" (p.m.). For each of these themes, three working groups will be formed with a chairperson nominated by the group members to lead discussions on a specific topic. The working groups are viewed as an opportunity for the invited experts to provide their views on monitoring; MoDeRn partners will assist the work of the breakout group by acting as rapporteurs for each chairperson and by providing, as requested, information relating to the project programme. The chairperson will nominate a member from each group to present their findings to the other groups. **Invited experts are asked to advise Dr Alastair Clark ([alastair.clark@nda.gov.uk](mailto:alastair.clark@nda.gov.uk)) of their first and second preferences for specific topics for both thematic sessions.** We will aim to organise groups to meet your preferences while ensuring balanced group sizes and appropriate spread of representatives from each country.

## Detailed Agenda and Breakout Group Topics

### Draft Agenda

<b>Wed 4 May</b>	<b>Item</b>	<b>Lead</b>
14.30 – 15.00	Coffee and Registration	NDA
15.00 – 15.10	Welcome	NDA
15.10 – 15.40	Project Overview	Andra
15.40 – 16.10	IAEA, Safety Standards for Monitoring	IAEA
16.10 – 16.40	Process (WP1, WP4)	DBE/UA/GSL
16.40 – 17.10	Technology (WP2, WP3)	NDA/Aitemin
17.10 – 17.40	Day 2 Programme & Discussion	Andra/NDA
18.30 – 19.15	Reception	
19.15 – 22.00	Dinner	

<b>Thu 5 May</b>	<b>Item</b>	<b>Lead</b>	
08.30 – 08.45	Introduction to Theme: <i>Process</i>	Andra	
08.45 – 10.30	<i>Process</i> Theme Group Session: (3 parallel Topics) <b>Topic 1:</b> Expectations and requirements of a monitoring programme (with distinction of aspects pertaining to pre-closure management and to support basis for long term safety). <b>Topic 2:</b> Relationship between monitoring programme and managing the disposal process. <b>Topic 3:</b> A structured approach to developing a generic monitoring roadmap	Information	Scribe
		1 - Andra	NDA
		2 – NDA	GSL
		3 - DBE	GSL
10.30 – 11.00	Coffee		
11.00 – 12.00	<i>Process</i> Plenary feedback & discussion	Nagra	
12.00 – 13.00	Lunch		
13.00 – 13.15	Introduction to Theme: <i>Technology</i>	NDA	
13.15 – 14.30	<i>Technology</i> Theme Group Session: (3 parallel Topics) <b>Topic 4:</b> How to get representative monitoring information across the facility? <b>Topic 5:</b> Confidence in monitoring results <b>Topic 6:</b> Monitoring techniques/technologies	Information	Scribe
		4 - NDA	GSL
		5 - DBE	NDA
		6 - EURIDICE	GSL
14.30 – 14.45	Coffee		
14.45 – 15.45	<i>Technology</i> Plenary feedback & discussion	Aitemin	
15.45 – 16.00	Conclusions and closing remarks	Andra	

## **Breakout sessions - Themes and Topics**

### **THEME: PROCESS**

#### **Topic 1: Expectations and requirements of a monitoring programme (with distinction of aspects pertaining to pre-closure management and to support basis for long term safety).**

Open questions related to this topic:

- Do you agree with the projects main objectives?
- Would you use monitoring differently than the implementer?
- What are your priorities for monitoring?
- What do you see as others' priorities?
- What level of flexibility should there be in defining the monitoring programme now for future stages? Could monitoring be reduced or augmented over time?

#### **Topic 2: Relationship between monitoring programme and managing the disposal process.**

Open questions related to this topic:

- What is the relative importance of monitoring to you?
- How do you view monitoring and what do you require for your own confidence building, i.e. in order to authorize further progress in the disposal implementation?
- How do you view monitoring in the context of others' (e.g. general public) confidence building?
- What type of decisions should be supported by monitoring information?
- What type of decisions do not require support by monitoring information?
- What are the key stages of repository implementation requiring monitoring input for your decision making? In particular, does monitoring play a key role in allowing a decision to close? Do we know enough to completely define what will be required for closure? Can we or do we have to decide today on post-closure monitoring, if any?
- What are the responsibilities of the different actors (implementer, regulator, other stakeholders) in the monitoring programme (expectations, development, implementation, use...)?
- What advice would you give us in communicating our programme to lay stakeholders?
- What do you think is your role in communicating on monitoring to the lay stakeholders?

#### **Topic 3: A structured approach to developing a generic monitoring roadmap**

Open questions related to this topic:

- How useful is the monitoring workflow diagram?
- Does the workflow represent a structured approach for monitoring developments?
- What steps in the workflow need clarification?
- Will the approach provide a basis for development of a generic monitoring roadmap?
- What would you do differently – could you suggest items to improve the workflow?
- Is the workflow complete as presented or should something be added?
- Is the monitoring workflow applicable (truly generic) to your national context?

## **THEME: TECHNOLOGY**

### **Topic 4: How to get representative monitoring information across the facility?**

#### Open questions

- How to deal with spatial aspects (what distribution of monitoring can be considered as representative for the whole repository)?
- How to deal with time-scale issues (for all those processes important to long term safety evolving very slowly and/or not materializing until long after repository closure)?
- What are corresponding (and/or other) limitations of added value that can reasonably be expected from monitoring? Are these acceptable? How to communicate on them?

### **Topic 5: Confidence in monitoring results**

#### Open questions

- What is basis for judging monitoring results?
- How should boundaries (e.g. trigger values) be defined?
- Should bounding values be related to the conservative assumptions of models to predict evolutions?
- How should the implementer deal with unexpected results (i.e. results outside initially identified bounds, calling for careful analysis and possibly further actions)? Will they call for different type of actions whether they relate to pre-closure performances as opposed to the basis for long term safety?

### **Topic 6: Monitoring techniques/technologies**

#### Open questions

- Is our approach to concentrate on non-invasive technology appropriate?
- Can you recommend other techniques for monitoring?
- Should additional techniques be developed?
- How should we deal with further development of state of art? What might be the influence of new technologies on monitoring approaches? When should we stop incorporating new techniques into the monitoring programme?