



UNIVERSITY OF GOTHENBURG

# Perspectives on geological repository monitoring: confirmation, compliance, confidence building and societal vigilance

18<sup>th</sup> EURIDICE Exchange Meeting  
“Instrumentation and monitoring in radioactive waste repository research” – Mol, 24/01/2013

# Content

- Context of this presentation: MoDeRn
  - General description
  - Social sciences contribution (Tasks 1.3 & 1.4)
- Research results for T1.3 & T1.4
  - On monitoring objectives & strategies
  - (How) can monitoring contribute to confidence building?

# CONTEXT OF THIS PRESENTATION

**MoDeRn: MONITORING DEVELOPMENTS  
FOR SAFE REPOSITORY OPERATION AND  
STAGED CLOSURE**

# The MoDeRn Project (FP7 – 232598)

- Collaborative project co-funded by the European Commission – EURATOM (FP7 – 232598)
  - On **strategies and technologies for repository monitoring** in view of **long term safety**
  - Duration: 1st of May 2009 – 31 October 2013 (4 1/2 years)
  - 18 partners from 12 countries; coordinated by Andra
- Aim: providing a **framework for the development and possible implementation of near-field monitoring activities** and associated **stakeholder engagement** during relevant phases of the radioactive waste disposal process.
- Published project documents: [www.modern-fp7.eu](http://www.modern-fp7.eu)

# Social Sciences Contribution

(UA – UEA – UGOT)

- Look at monitoring as a socio-technical combination
  - Relationship between monitoring and decision-making
  - Potential role of monitoring in building confidence in a repository system: What could be contributing factors?
  - Different stakeholders' understanding of and expectations towards (repository) monitoring
    - for this research: focus on local stakeholders
  - (local) Stakeholders' interest in discussing monitoring issues and how to put that in practice

- Understanding the experts
  - Document review and interviews with technical specialists
- Role of monitoring in building public confidence
  - Literature review of experiences: published accounts of relationship between stakeholders and monitoring activities in the nuclear sector and other contexts
- Reflection on the notions of vigilance and social trust
  - Drawing on literature on relations between experts and citizens
  - Focus on institutional arrangements

**Task 1.3 -  
Report D1.3.1**

- Exploratory engagement activity
  - Explore potential for (lay) stakeholder engagement in identifying monitoring objectives and strategies

**Task 1.4 -  
Report D1.4.1**

# Exploratory Engagement Activity

- Research driven, small scale
- Outside of national disposal programmes
- Volunteers from local communities on existing nuclear sites (varied experience with RW issues)
  - Belgium, Sweden, UK
- Three stages:
  - National workshop(s) – common ‘protocol’
  - Technical visit (with subset of national participants) to research facilities in Switzerland
  - National feedback meeting

# INTEGRATED CONCLUSIONS T1.3 & T1.4

**ON MONITORING OBJECTIVES &  
STRATEGIES – WHY AND WHAT ?**



# Why monitor ?

- Assumption among expert community that monitoring adds to public confidence building
- Participants in T1.4 acknowledge **potential** role of monitoring in public confidence building

## BUT

- Different expectations with regard to monitoring
- Monitoring is only one aspect of confidence building

# Why monitor ?

- Add to stakeholder confidence in safety of the repository
  - Compliance: with prevailing regulations & standards
  - Optimisation: in view of refinement or improvement

Important difference in emphasis on:

- PERFORMANCE **CONFIRMATION** (implementers & regulators)
- versus
- **CHECKING** EXPECTED BEHAVIOUR (citizen stakeholders)

**Dealing with uncertainty**

# Optimisation

- Objectives are guided by what is technically feasible today
- BUT no excuse not to monitor certain parameters
- Importance of accompanying science programme
  - Lab simulations to complement monitoring
    - ▶ BUT: transferability of results?
  - Continuous search for monitoring alternatives
    - ▶ BUT: within limits (time and expenses) ⇔ societal choice

# Optimisation

- Create decision milestones to encourage optimisation
  - e.g. restrict operational licence in time
- Stimulates continuous search for improvements
- Ensures sustained implementer performance

# What does it mean: to monitor?

Monitoring is understood broadly, and could cover

- any data gathering relating to behaviour of a repository and its natural and social environment
- a period from site investigation to post-closure

Different from the technical research in MoDeRn:  
focus on repository monitoring or near field  
monitoring

# What to monitor ?

## T1.3

- Technical specialists assume 'lay' stakeholders to focus on environmental and post-closure monitoring
- Focus on environmental monitoring seemingly confirmed by literature reporting on cases of citizen and stakeholder involvement with monitoring
- BUT also attention to other issues: e.g. socio-economic impact monitoring

# What to monitor ?

## T1.4

- Local citizens **less concerned with what parameters and where** exactly to monitor
- BUT focus on comprehensiveness of programme
  - Does it measure **all that is relevant** to be sure that it is safe today and will remain safe in the long term?
  - Will it be able to detect less likely or unexpected events?
  - Does it have a broad scope in both space and time?

# INTEGRATED CONCLUSIONS T1.3 & T1.4

**(HOW) CAN MONITORING  
CONTRIBUTE TO CONFIDENCE  
BUILDING ?**



# Monitoring as vigilance

⇒ **keeping an eye / remaining 'on guard'**

- Not for experts alone to decide 'How much and for how long?' and 'How to organise it?'  
(cf. Weinberg, 1972)
- Broad scope in space and time
  - Including post-closure
    - but no specification on what and where

# Monitoring as vigilance

⇒ **keeping an eye / remaining 'on guard'**

- Comprehensive monitoring programme
  - Including monitoring of repository system conditions, environmental conditions and socioeconomic conditions, evolutions in knowledge and technology
  - (SE) : Need to know 'what happens in reality'

# Recognition of trade-offs

- (BE) : What and how to monitor is determined by trade offs between the financial context, the social and political context and the level of knowledge and technology
- ⇒ **This should be recognised and made explicit !**

# Monitoring requires a response plan

- Monitoring means you are prepared to respond in case of unexpected results
  - ≠ unexpected results equals something is wrong
  - ≠ action equals retrieval of waste
- To respond to worst case scenario, a 'plan B' should be available
- Need to maintain the capability to do so
  - Maintain knowledge, skills, (financial and material) resources, memory, ...

# Monitoring - product and process (views from participants in T1.4)

- Implementer to act as monitor
- Regulator to monitor the monitor
- Additional mechanisms for building trust: e.g.
  - Independent oversight bodies
  - International guidance (rather than regulations)
  - ...
  - Active stakeholder engagement

# Active stakeholder involvement

## ⇒ claimed virtues from literature

- Increasing confidence in monitoring and management programmes
  - Awareness and understanding of the nature of the problem
  - Awareness and understanding of the science underpinning its management

(e.g. Gray 1989; Burger and Gochfeld 2009; Hartwell et al 2011)
- Mediate relationship between citizens and experts
  - Enhancing social capital and community well being
  - Enhancing mutual understanding
  - Fostering more active forms of citizenship

(e.g. Ottinger 2009; Conrad and Hilchey 2011)

# Active stakeholder involvement

## ⇒ lessons from MoDeRn

- Have an actual voice in decision-making on various steps in the disposal process
- Critical reflection in preparation and design / implementation / follow-up
- Enabling stakeholders to engage their own 'independent' expertise

## Some examples from literature (D1.3.1)

- Involvement in **developing** the monitoring programme: 'co-defining' objectives and strategies
  - E.g. Belgian LILW repository; the Port Hope Area Initiative (Canada)
- Involvement in **following up** monitoring programme and activity: engagement in oversight, organising independent scrutiny
  - E.g. Local information en oversight committee (CLIS) around Bure URL (France); Municipal Monitoring Commission for the decommissioning of the Vandellòs I l'Hospitalet de l'Infant NPP (Spain)
- Involvement in **conducting** monitoring activity: participatory monitoring
  - E.g. Three Mile Island Citizen Radiation Monitoring Programme; Nevada test site Community Environmental Monitoring Programme (USA)



# Active stakeholder involvement

## ⇒ lessons from MoDeRn

- Monitoring is part of a bigger story
  - Engagement with stakeholders on monitoring should be part of a wider process of consultation and participation dedicated to the question of geological disposal
  - Continuation of such a wider engagement process can be part of a broader approach to monitoring
- Public arenas at a local level to discuss safety issues and monitoring results
  - From T1.4: no agreement on active participation in monitoring

# On communicating monitoring results

- Monitoring data must be made publicly available
  - Cf. Aarhus convention
  - BUT not necessarily in real time
  - AND with instructions on how to interpret them
- Priority on periodic reporting: aggregated data in context
  - Need for raw data to be available on demand to verify interpretation
  - Open reporting, also of regulatory inspection and audit
  - Different translations of the same message for different audiences
- Important to start dialogue in research phase
  - Swiss field trip stimulated further discussion and nuancing of beliefs and expectations

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THANK YOU

