

Unclassified

NEA/RWM/RKM(2014)8

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

02-Feb-2015

English - Or. English

**NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE**

Expert Group on Preservation of Records, Knowledge and Memory across Generations

Progress report of the initiative on the Preservation of Records, Knowledge and Memory (RK&M) across Generations

March 2013 - March 2014

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JT03370003

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**PRESERVATION OF RECORD, KNOWLEDGE AND MEMORY (RK&M)
ACROSS GENERATIONS**

2013/14 PROGRESS REPORT

1. Introduction

Various NEA member states are currently developing deep geological disposal projects for high-level and/or long-lived radioactive waste and spent fuel. These take decades to implement and operate. Once closed, these facilities are to remain safe for millennia. Deep geological repositories are designed to be intrinsically safe and final; safety is not to depend on human presence and intervention. There is, however, no intention to forgo, at any time, records, knowledge, memory and awareness of the repository and the waste it contains.

Against this backdrop, countries in various stages of development of their programmes for final radioactive waste management (RWM) are seeking to improve their understanding with regard to the preservation of records, knowledge and memory (RK&M) across generations. Questions arising in this context concern issues such as rationale, means, actors and timescales of RK&M preservation.

The NEA Radioactive Waste Management Committee initiative on Preservation of Records, Knowledge and Memory (RK&M) across Generations was launched to meet the demands from member countries for facilitating exchange and fostering reflection in this area.

The RK&M initiative started in 2011, with the first phase ending in March 2014. The main observations resulting from this phase regarding preservation of records, knowledge and memory across generations are the following:

- The context has changed greatly since the 1980s, when RK&M was thought to serve the sole function of deterring intrusion into a repository. Today, the goal is to preserve information to be used by future generations while maintaining technical and societal oversight of the repository for as long as practicable.
- There are a number of mechanisms, outside radioactive waste management, that can foster RK&M preservation. They constitute a potential resource for waste management organisations and governments.
- The period of time of a few centuries that will follow repository closure – defined in the RK&M Glossary as the medium term – is rarely specifically addressed in the literature. Yet, this is an important period for RK&M preservation and for preparing the future.
- The regulatory aspects of long term RK&M preservation are much in need of formulation and systematisation.
- Terminology is important when discussing long-term issues. Attention is called to the RK&M glossary.

In March 2014, the 47th session of the Radioactive Waste Management Committee (RWMC) decided to extend the RK&M initiative until 2017. The vision document for Phase-II (NEA/RWM/RKM(2014)1/REV2) outlines the scope, objectives and work programme for the period in question.

19 organisations from 13 countries, representing policy makers, regulators, implementing agencies and R&D institutions, participate in the initiative in this second phase.

In 2013/14, a number of project studies were finalised and are available on the RK&M website. The internal menu-driven document based on wiki-technology, a major deliverable of Phase-I, has been further

developed and now consists of 235 articles, including key RK&M resources such as a glossary, bibliography and regulatory catalogue.

Complementing the long-term, post-closure focus of the RK&M initiative, an initiative concentrating on the pre-closure period and the management of (meta-)data about radioactive waste and geological repositories was launched jointly with the Integration Group for the Safety Case (IGSC). The new, Radioactive Waste Repository Metadata Management (RepMet) initiative aims to bring about a better understanding of the identification and administration of metadata – a key aspect of data management – to support national programmes in managing their radioactive waste repository data, information and records in a way that is both harmonised internationally and suitable for long-term management and use.

The RepMet initiative is based on the observation that national radioactive waste repository programmes are collecting large amounts of data to support the long-term management of their nations' radioactive wastes. The data and related records increase in number, type and quality as programmes proceed through the successive stages of repository development: pre-siting, siting, characterisation, construction, operation and finally closure. Regulatory and societal approvals are included in this sequence. Some programmes are also documenting past repository projects and facing a challenge in allowing both current and future generations to understand actions carried out in the past.

Metadata allows context to be stored with data and information so that it can be located, used, updated and maintained. Metadata helps waste management organisations better utilise their data in carrying out their statutory tasks and can also help verify and demonstrate that their programmes are appropriately driven.

The first meeting of the RepMet initiative took place on 20-21 January 2014 at the NEA. 12 organisations from 12 countries are expected to join the initiative, which, in its early stage, is addressing the issue of metadata collected about “waste packages at site ready for disposal”.

The Vision Document for the RepMet initiative is available at the following address: oe.cd/DI.

2. Resources

Collective Statement of the NEA Radioactive Waste Management Committee (RWMC)

The NEA RWMC adopted a collective statement on “Foundations and guiding principles for the preservation of records, knowledge and memory across generations: A focus on the post-closure phase of geological repositories” at its 47th session, which took place on 27-28 March 2014 at the OECD conference centre.

The Collective Statement underlines that research and development underway on the disposal of long-lived radioactive waste in engineered facilities or repositories located in deep geological formations has confirmed this form of disposal as the ultimate solution for the long-term protection of human beings and the environment, eliminating the need for human intervention and maintenance. While the intention is not to abandon repositories for geological disposal of radioactive waste, either before or after closure, as with many long-term projects, it is a question of minimising the risk of losing records, knowledge and memory (RK&M). The international community of radioactive waste professionals is leading advanced work in this important area, dedicating efforts towards the preservation of RK&M across generations. At the end of its first phase of RK&M work, the OECD/NEA Radioactive Waste Management Committee (RWMC) observed that the context has changed considerably since the 1980s, when RK&M preservation was thought to serve the sole function of deterring intrusion into a repository. The goal today is to preserve information for future generations while maintaining technical and societal oversight of the repository for

as long as practicable. The foundations and guiding principles that serve this goal are presented in this Collective Statement of the NEA Radioactive Waste Management Committee.

The Collective Statement is available at the following address: oe.cd/DH.

Studies

A number of project studies were published in 2013/14 and are available on the RK&M website:

- *Literature Survey on Markers and Memory Preservation for Deep Geological Repositories (December 2013) – NEA/RWM/R(2013)5*

This study was originally commissioned by the Swiss Federal Office of Energy between 2008 and 2010. The intention was to investigate the “state of the art” on marking with a view to learning lessons for geological repositories.

The RK&M initiative found that providing such a study to a wider, and not only German-speaking audience, could be useful, and offered the platform for the publication of the English translation.

It should be stressed that the literature study does not seek to provide directly usable solutions in terms of marking, labelling and archiving. It is designed mainly to inform the various bodies responsible for radioactive waste disposal, national institutions as well as a wider interested public, and to convey the complexity of the topic and the variety of issues that have to be addressed in the future.

The study is available at the following address: oe.cd/DD.

- *Monitoring of Geological Disposal Facilities – Technical and Societal Aspects (February 2014) NEA/RWM/R(2014)2*

The RK&M initiative explores and aims to develop guidance on regulatory, policy, managerial, and technical aspects of long-term preservation of records, knowledge and memory of deep geological disposal facilities. While official responsibility for the preservation of records, knowledge and memory must remain with institutions, it is likely that local communities do or will have an important pragmatic role in maintaining the memory of a repository, e.g., by engaging at some level in its continued oversight. Monitoring – by collecting, interpreting and keeping data on a continuous basis – would serve the purpose of preserving records, knowledge and memory and continuous oversight. In order to tackle the subject, it is important, on the one hand, to describe the role of monitoring in a technical perspective and, on the other, to understand the expectations of local stakeholders regarding monitoring.

This report is based on two studies: an NEA internal report entitled “Monitoring of Geological Disposal Facilities” (August 2013), which provides an overview on technical aspects of monitoring, and an NEA public report entitled “Local Communities’ Expectations and Demands on Monitoring and the Preservation of Records, Knowledge and Memory of a Deep Geological Repository” (October 2013), which is a contribution of an NEA RWMC Working Party, the Forum on Stakeholder Confidence (FSC), to the RK&M project. The latter study draws on a questionnaire survey of FSC members in July and August 2012, followed by structured interviews with a range of involved stakeholders from both national and local levels from seven countries and also comprises a literature review on the subject.

The study is available at the following address: oe.cd/DE.

- *Loss of Information, Records, Knowledge and Memory – Key Factors in the History of Conventional Waste Disposal (March 2014) – NEA/RWM/R(2014)3*

The RK&M project is seeking, among other things, to gain insights into the factors influencing the loss and recovery of knowledge and memory preservation in areas other than radioactive waste. One area with similar characteristics, and therefore well-suited for comparisons, is that of landfills and old industrial or disposal sites for hazardous wastes. This report presents the results of an analysis of selected case studies of landfills and contaminated sites in Europe and other industrialised nations.

The study is available at the following address: [oe.cd/DG](#).

Internal menu-driven document based on wiki-technology

The internal menu-driven document based on wiki-technology has been developed further in 2013/14 and represents the final deliverable of the first phase of the initiative, reuniting all materials produced and thus representing a central source of information about RK&M preservation. It now counts 235 articles, some of which are presented below, and is used as an online collaboration tool by RK&M participants.

Strategic Briefs

Eleven briefs about strategic aspects of preservation of records, knowledge and memory have been finalised. They deal with the topics of archives, bibliography, causes of loss of records, knowledge and memory, connection to safety, cultural heritage, guiding principles, international mechanisms, markers, regulation, terminology and oversight and monitoring.

The Strategic Briefs are available at the following address: [oe.cd/I3](#)

Glossary resource

The RK&M initiative has produced a glossary that defines the most relevant key terms and concepts used in the project. The glossary provides useful guidance on terminology in the area of RK&M preservation for geological disposal, including the pre- and, especially, post-closure phases of the repository. The glossary is updated constantly and developed further by RK&M participants. It serves as a common reference in order to achieve clear and consistent communication within and outside the RK&M project and to help understand the key RK&M issues better.

The glossary is available at the following address: [oe.cd/I4](#)

Bibliography resource

The RK&M project has created a bibliography relevant to RK&M preservation for radioactive waste disposal. A significant portion of the existing references deals with one of two main topic areas: retention of RK&M for short-term, primarily operational purposes; and long-term retention of RK&M aimed at informing future generations about the existence of and hazards posed by a geologic repository. The analysis of this bibliography has revealed or confirmed the existence of a number of more specialised topic areas for which the existing literature provides relatively few references.

The latest version of the bibliography is available at the following address: [oe.cd/I5](#)

Regulatory catalogue

The RK&M finalised a regulatory catalogue consisting of legislative and regulatory requirements from NEA member countries, the EU and the IAEA in the field of the preservation of records, knowledge and memory. The catalogue allows user to filter these legislative, regulatory and guidance documents according to a number of criteria, such as the timescale they address.

The regulatory catalogue is reviewed regularly by RK&M participants.

Constructing Memory conference

“Constructing Memory”, an international conference and debate on the preservation of records, knowledge and memory of radioactive waste across generations, will take place in Verdun (France) in September 2014.

Long-term projects of any nature are vulnerable to loss of records, knowledge and memory (RK&M), and the international community of radioactive waste professionals is focusing on work to preserve RK&M across generations. Schemes for maintaining RK&M need to be prepared while the interest is high and funding is available. This conference will provide a forum for specialists and interested parties in RK&M preservation in general, and regarding radioactive waste in particular, to discuss prospects, current projects and challenges, and to build synergies. The OECD/NEA will share the findings of the RK&M initiative, within which this conference is taking place.

A programme committee consisting of participants in the RK&M initiative has been responsible for developing the programme of the conference. The conference is organised with support from Andra.

More information is available at the following address: www.oecd-nea.org/rwm/rkm/constructingmemory/.

3. RK&M group meetings

April 2013 (NEA, Paris)

During the April RK&M meeting, participants addressed developments with regard to the key resources – bibliography, regulatory catalogue and glossary. A number of studies under way at that moment were discussed, as was the Minimal Set of Records (see NEA/RWM/RKM(2013)3/PROV/REV1 for the Vision Document). The Minimum Set of Records (MSR) is conceptualised as a set of records that would describe a repository in order to give future finders information that is essential/important to them: it is a tool for direct communication with the future.

Participants were also briefed about the presentation of the RK&M initiative at the UNESCO Digital Memory Conference and the feedback received.

External participants from fields of relevance to the RK&M initiative delivered presentations that helped developed thinking on the issues in question within the RK&M group:

- *Archives and Digital Libraries (P. Carlsson)*

Mr. Carlsson gave an overview of SKB’s approach to archiving and related processes. An important feature is the need for good abstracts, which serve to introduce and summarise complex information. The inter-connectivity of different elements of the system, and the search-

ability of the system, were emphasised as well. Non-traditional records such as interviews with employees and films of the RWM system are also integrated into the system.

- *Difficulties in preserving knowledge across generations: Exemplification by the repository “Asse II mine” (K. Leopold)*

Mr. Leopold gave an overview of the loss of records at the Asse II Mine and the current need to recreate the knowledge and memory of the mine. The chief problem is that the original documentation is insufficient for the current work at the mine. There was no continuous documentation system, the design of the records changed, and there is lack of detail. Additionally, not all of the existing documentation is available to the Asse project.

Progress was also made with regard to the development of the internal menu-driven document based on wiki-technology, for which an editorial policy was discussed.

September 2013 (NEA, Paris)

The RK&M initiative continued its work on key project resources such as the glossary, bibliography and the internal menu-driven document based on wiki-technology.

The pre-pilot study of the Minimal Set of Records (MSR), which was conducted over the summer, led to changing the name of the study into “Set of Essential Records”. This is because the word “minimal” was received with suspicion by the civil society pre-pilot interviewees. They interpreted “minimal” as deliberate and questionable exclusion of nevertheless important information. The civil society interviewees expressed a clear demand for extensive meta-data. Although the main thrust of the study initiative at term is to identify criteria for "limiting down" the set of information, the empirical data collected in the pre-pilot phase led to opening up.

During the meeting, the RK&M group focussed particularly on further developing the articles on strategic aspects of RK&M preservation. The articles discussed were: bibliography, guiding principles, connection to safety, archives, cultural heritage, causes of loss of records, knowledge and memory, regulation, international mechanisms, and markers.

A presentation of the Memory of Mankind Project was delivered by its founder, Martin Kunze. The project aims at storing information on ceramic plates in a salt mine in Halstatt a UNESCO site Austria.

Participants discussed an outline of the international conference “Constructing Memory”, to be held in Verdun in September 2014. A programme committee to oversee the development of the programme was constituted at the meeting.

The group also discussed the priorities for Phase-II of the initiative, to be launched in April 2014.

February 2014 (NEA, Paris)

In addition to discussing the further development of the key project resources and of the Set of Essential Records (SER) study, the RK&M participants conducted an internal Wiki workshop to develop their understanding and skills with regard to the internal menu-driven document based on wiki-technology. They updated all strategic articles, including organisation and country pages, and pointed to the regulatory catalogue and bibliography resources, which need to be reviewed regularly. At the meeting, the RK&M group also discussed, updated and approved the proposal for Phase-II of the initiative, to be launched in April 2014. The proposal was then submitted to the 47th RWMC (26-27 March), which approved it as well.

February 2014 Verdun programme committee meeting (NEA, Paris)

A programme committee in charge of leading the development of the programme of the “Constructing Memory” conference had been created at the September 2013 RK&M meeting. This programme committee met for the first time following the February RK&M meeting and has held a number of teleconferences and meetings since. The committee work consisted in formulating topics for sessions and discussions, identifying potential panellists, session chairs and headline speakers.

April 2014 Set of Essential Records Subgroup meeting (NEA, Paris)

A subgroup working on developing the Set of Essential Records (SER) met in early April to discuss the re-conceptualisation of the SER based on a questionnaire completed by participants before the meeting. Participants agreed that the SER is part of an information system that is structured, ideally, in three different levels:

- A basic level consisting of documents sent to the archives due to legal and regulatory requirements. Typically, public bodies have to send all the documentation in their internal archives to the national archive. This documentation goes beyond safety case documents.
- A second level at which a selection would take place that aims at extracting the documents that are related to the post-closure safety. These documents would be identified as such and also kept in the national archives and elsewhere. (Set of Essential Records, SER)
- A top, third level which would consist of a summary of the previous documentation in a format and language accessible to a public of non-specialists. The summary would contain information not necessarily limited to safety, but referring also to the history of decision making concerning the repository. (Key Information File, KIF)

Ideally, the KIF would be a document (record) with concentrated information, and it is desirable that it does not exceed a few tens of pages.

Outlook for Phase-II – May 2014 meeting

The following items are on the agenda of the May 2014 RK&M meeting, which will be the first of Phase-II of the initiative:

- discussion of RK&M presentations at Verdun conference
- MSR/SER activities
- progress with and upkeep of the RK&M basic resources
- development of sections of the internal menu-driven document based on wiki-technology
- regulatory catalogue
- work priorities for Phase-II
- review of Phase-I.