Integration Group for the Safety Case (IGSC)

CLAY CLUB Mandate

This draft Clay Club mandate requires approval by the members of the IGSC at its 16th plenary meeting on 7-9 October 2014.

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1. PREAMBLE

The area of repository development for long-lived waste is a strategic area in the work programme of the NEA Radioactive Waste Management Committee (RWMC) and an area of traditional strength of this Committee.

In that context of geological repositories, argillaceous media are being considered in numerous OECD/NEA Member countries as potential host rocks for deep disposal of radioactive waste. These media have a number of favourable attributes, e.g. significant lateral extent, low hydraulic conductivity, self-sealing of fractures, chemical buffering, low groundwater flow rates, diffusion dominated mass transport and a marked capacity to chemically retard radionuclide migration.

For evaluating these geological media and, notably, for quantitatively assessing the potential migration of radionuclides to the environment, an understanding of the physical and chemical processes that govern groundwater, gas and solute transport through host rocks is a key issue. In that context, the NEA established, in 1991, a Working Group on Measurement and Physical Understanding of Groundwater Flow through Argillaceous Media, known more commonly as the “Clay Club”.

Despite the wide spectrum of argillaceous media and the various stages of repository programme development across countries, common issues related to the reliable characterisation and role of argillaceous media in a repository safety case have provided a basis for a directed and meaningful programme of work achieved through workshops, regular meetings, joint industry conferences and seminal state of science NEA reports.

Since 2000, the Clay Club has operated under the “chapeau” of the Integration Group for the Safety Case (IGSC), an international forum on the area of confidence-building in repository technical safety cases and on the underlying methodological and scientific basis for the purpose of decision-making in repository development. The IGSC was established by the Radioactive Waste Management Committee (RWMC) in April 2000 [NEA/RWM/IGSC (2000)9] and operates under its auspices.

In order to take account of the progression of the Clay Club, as well as the fact that the integration of the scientific studies is a key issue for building confidence in a deep repository, the CLAY CLUB changed its name in 2002 [NEA/RWM/CLAYCLUB(2002)1] to:

“IGSC Working Group on the Characterisation, the Understanding and the Performance of Argillaceous Rocks as Repository Host Formations”

The Clay Club continues to examine various argillaceous rock settings considered for the deep disposal of radioactive waste, soft clays to more indurated shales. These rocks exhibit a wide range of petrophysical, geochemical, hydrogeologic and geomechanical properties relevant to safe repository construction and their role as an integral long-term barrier to mass transport.
2. DESCRIPTION

The Clay Club promotes the exchange of information and shared approaches and methods to develop and document an understanding of clay media as a host rock for a repository.

The Clay Club generally establishes the programme of work at its own initiative, based on experience, consensus and progress in repository programmes of its member countries. The work programme and products are presented at each IGSC plenary meeting. The Clay Club may also carry out specific tasks at the request of IGSC dealing with, for instance, the barrier performance of clays for repository safety case purposes.

General activities

The Clay Club provides advice to the IGSC on major and emerging issues related to the understanding of the characterisation, evolution, modelling and performance of argillaceous media. In particular, the Clay Club addresses recommendations, trends, and information gaps concerning issues such as:

- the understanding (and development of associated conceptual models) of argillaceous rocks barrier integrity as determined through field and laboratory characterisation, numerical simulation, URL experimentation and natural analogues;
- the reliability (characterisation, understanding and conceptualisation capability), limitations, and transferability of the geoscientific information available;
- performance assessment, including integrated conceptual geosphere model development, numerical simulation and abstraction and, traceability of related data and information;
- links and potential knowledge transfer between the understanding of clay as a host material and its use in engineered barrier systems of geological repositories;
- relevant progress in research and development on argillaceous sediments in other fields or industries, such as petroleum exploration and CO₂ sequestration.

Specific topics

Topics that have been addressed in recent projects and topical sessions include:

- Catalogue of Clay Characteristics (CCC) for the various argillaceous media;
- Catalogue of geoscientific Features Events Processes governing clay formation suitability for radioactive waste management purposes;
- use of natural tracers to assess long-term mass transport process and groundwater system stability;
- role and influence of faults and fractures at repository depths;
- phenomena and processes contributing to the self-sealing of fractures in clay rocks.

Examples of topics that are currently being studied, or might be in the future, are:

- Revision of Catalogue of Clay Characteristics.
- Imaging of clay pore structure and geometry.
Case studies relevant to the understanding of diffusive/advective solute migration in clay formation.

- The application of site-specific natural analogues within clay formations (i.e., anomalous hydraulic heads; environmental tracers).
- The role of clay formation attributes and long-term performance in a repository safety case.

When possible in its activities, the Clay Club also aims to take advantage of the relevant expertise on argillaceous media from non-nuclear fields such as the petroleum industry, the geothermal industry, gas storage, and CO$_2$ sequestration.

3. MEMBERSHIP

The Clay Club working group is composed of senior technical specialists with experience in assembling or reviewing the understanding of argillaceous media as host rocks for deep geologic disposal projects. Members represent waste management agencies, regulatory authorities, academic institutions, and research and development institutions. Clay Club members have a level of seniority in their organisations such that they can mobilise resources as contributions to Clay Club initiatives.

4. MODE OF OPERATION

The work programme and modus operandi of the Clay Club emphasise the pooling of resources, the sharing and synthesis of understanding and experiences, and the communication of findings to various audiences.

Clay Club projects are established most often at the initiative of the members; work may also be undertaken on specific topics at the request of the IGSC. The topics of work reflect issues of common interest, considering the experience, progress and challenges of national programmes. Decisions on projects are made on a consensus basis, taking into account the importance and urgency of the issue, the breadth of interest (i.e., the number of national programmes for whom the issue is considered a key issue), and the necessary resources and schedules to accomplish the work proposed.

The Clay Club chooses among a variety of mechanisms for projects, including, for example: to install task-oriented expert groups; to organise workshops; to hire dedicated consultants and specialists; to collaborate in conferences and other fora; or a combination of these. A high priority is placed on making the results of Clay Club projects publicly available, using printed and/or electronic publications. In order to increase its visibility, and in addition to publication through the NEA channels, the Clay Club fosters publication of its outcomes in scientific journals. The form of the final product and the means of distribution are expected to be defined from the early stages of project planning in order to ensure the product reaches as many interested experts as possible.

Communication within the group takes place through plenary meetings, which occur annually. The use of electronic technologies as e-mail and the NEA website further facilitate communication between those meetings. The plenary meeting is devoted to:

- in-depth discussions of current knowledge on clay formation and of topical issues, where specialists (e.g.: academic scientists or safety experts) from outside the radioactive waste disposal community may be invited;
discussion of the progress and outcomes of expert groups and projects (e.g.: FEPCAT);
• the identification of main messages to be communicated to the IGSC. (Customarily, the chairman of the Clay Club is invited to the IGSC plenary meeting to present the status of the Clay Club activities);
• the identification and review of relevant topics of interest;
• review and co-ordination of the working programme, to take (or re-confirm, as appropriate) decisions regarding on-going and future activities by the group, as well as to assure that adequate resources are available for their accomplishment;
• exchange of information on recent development on the study or understanding of clay media and particularly on underground research laboratories (URLs) in member countries; and
• technical visits, as appropriate.

The mode of operation of the Clay Club meeting is discussed and refined at the plenary meetings of the group. In addition to discussions at plenary meetings to evaluate the work programme and to review progress on specific activities, the Clay Club may also periodically undertake more in-depth evaluations to assess the effectiveness of the Clay Club and to update the overall directions of the programme of work.

A report of current or future activities of the Clay Club is presented at each plenary IGSC meeting.

5. RESOURCES

The Clay Club Chairman chairs the plenary meeting. The Chairman, in consultation with the NEA secretariat, prepares the topics and agenda of the plenary meeting. The NEA Secretariat helps in the practical organisation and reporting of the Clay Club activities, liaising with the relevant groups and individuals from among the Clay Club, IGSC, RWMC, NEA, and member countries.

If needed and decided at the Clay Club meeting, a consultant may carry out some tasks and it is understood that members will provide funding to support such approved work by a consultant.

It is also understood that the Clay Club members are responsible for:
• liaising with relevant experts in his/her own organisation;
• promoting Clay Club activities in his/her own organisation;
• providing relevant data and bibliographic material to support Clay Club initiatives;
• as appropriate and on an ad hoc basis, making human or financial resources available to the Clay Club initiatives.

6. DURATION OF THE MANDATE

The duration of Clay Club is until December 2016. Given the nature of the Clay Club, an extension of the mandate is envisaged as consistent with the IGSC mandate.