

For Official Use

NEA/RWM/CLAYCLUB(2004)6



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

08-Dec-2004

English - Or. English

**NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE**

Integration Group for the Safety Case (IGSC)

MAIN ITEMS AND DECISIONS OF THE 14 PLENARY MEETING OF THE CLAY CLUB

**Held at the ONDRAF/NIRAS offices in Brussels, Belgium
on 20-22 October 2004**

JT00175570

**Document complet disponible sur OLIS dans son format d'origine
Complete document available on OLIS in its original format**

**NEA/RWM/CLAYCLUB(2004)6
For Official Use**

English - Or. English

**MAIN ITEMS AND DECISIONS
OF
14th CLAY CLUB PLENARY MEETING**

For more details, the summary records of the 14th meeting are presented in the NEA/RWM/CLAYCLUB(2004)5 document.

Dates: 20-22 October 2004.

Location: ONDRAF/NIRAS HQ, Brussels-Belgium.

All slides and supporting materials are posted on the restricted Clay Club website.

1. GENERALITIES

Next Clay Club Meeting

- The 15th Clay Club meeting will take place on 8-10 November 2005, at the NEA-HQ in Issy-les-Moulineaux, France.
- No topical session has been proposed yet; any idea is welcome.

2. SELF-HEALING CLAY CLUB INITIATIVE

- **Status of the report**

Status Summary per chapter given hereafter:

- Chapter 3: Geo-mechanics; about 40p; need for final editing, need more rock specific information (already received from Nagra and University of Bern), 5 days.
- Chapter 4: dilatancy and brittle-ductile transition: about 40p, nearly to the end, need final editing about 5 days.
- Chapter 5: fractures and faults; looked through the literature; 35 pages; requires re-ordering about 5 days.
- Chapter 6: stress; need to incorporate additional information, 5 days.
- Chapter 7: plastic deformation; this section was added in 2004, final editing needed; 5 days.
- Chapter 8: creep deformation: reasonably mapped out, need for final editing, (may move some materials from chapter 2 on Basic Concepts on geomechanic), 5 days.
- Chapter 9: swelling and softening; almost finalized from a hydro-mechanical point of view, may require input materials from CNRS/CREGU.

- Chapter 10: geochemical changes: structure made, need for assistance from CNRS/CREGU.
- Chapter 11: fault sealing closed to the end, 5 days.
- Chapter 12: repository excavations, some integration needed, 5 days.
- Chapter 13: conclusions, to be finalised.

- **Decisions/Actions**

- ***End –Product***

- Style of the report to be thought in view of a reading by non-geomechanic-educated readers. Report currently too long => Need to be reduced to ~400pages.
- Copyrighting be checked by BGS for open literature (e.g. use of illustrations) and by funding agencies for site-specific information.
- Current gaps in the report reflecting gaps in the open literature and therefore need for a review by funding organizations before the publication of the report.
- Need for consistency on terminology between the Clay Club and the EC-SELFRAC reports: the Clay Club report will use the EC-SELFRAC terminology and the word “sealing” will be put in place of “healing” in the Clay Club report.

- ***CNRS Contribution:***

- Contribution from CNRS (CREGU-Nancy) on Chapter 9 (swelling) and Chapter 10 (geochemical changes) of the Clay Club report by reorganizing its contribution to fit into BGS current structure. Field observations should be added.
- Contract to be provided directly to the CREGU by the NEA (without going neither through CRNS nor via FORPRO and with using HSK contribution), after reception of technical and cost proposal from the CREGU.
- Agreement on this to be confirmed by BGS ASAP and contract to be updated by removing CNRS subcontract.
- Quotation based on agreement with the BGS on the content of the contribution to be provided by the CREGU.

- ***Review by funding organizations***

- look in particular for any missing points on site-specific issues;
- check if site specific information is correctly taken into account;
- check that all used data and information are publishable.
- Basic structure of the BGS document not to be revisited and modified.

- ***Schedule***

- By end of 2004 : Final Draft of the report except (chapter 9 and 10) from BGS
- By end 2004: Contribution from the CREGU on Chapter 9 and 10.
- By end January 2005: Consolidation by the BGS.
- By end of April 2005: 3-months review by funding organizations (no comment means agreement).
- By end of June 2005: Final consolidation by the BGS; (BGS contract be formally extended without additional funding).

- By end 2005: Published report consisting of a NEA black and white official report; NEA publication available.

3. PROPOSAL FOR A CLAY CLUB WORKSHOP IN 2006

- **Proposal**

- Suggested title of the workshop: “*Faults & fractures at depth in argillaceous media – origin and evolution*”.
- Where do we stand ten years after the Bern workshop in 1996 which raised issues linked with fracture flow in clays.

- **Decisions/Actions**

- Agreement in principle.
- Focus on clays (cap rock) but CO₂ sequestration R&D to be looked at as well as oil industry experiences (mostly through geological surveys and universities).
- **No workshop before the End of 2006** in order to build networking with oil industry that might take time, and to get new data from waste management organizations (e.g. Nagra).
- Organisation of the workshop to be set-up quite well in advance such as early 2005 in order to explore the possibilities of collaboration with EAPG (European Association of Petroleum Geoscientists) or other professional organizations
- Announcement at the Tours conference of March 2005 via a flyer.
- Nagra will explore oil & professional contacts.
- Ondraf/Niras will check with Prof. Vandenberghe (KUL, Belgium) the timing and hosting availabilities.
- Program Committee: Nagra, Andra, Ondraf/Niras (lead), IRSN and BGS representatives; additional members are welcome.

4. TOPICAL SESSION: ORGANIC MATTERS, CHARACTERIZATION & EVOLUTION

- **Objectives**

- To provide a rough overview of current activities within several agencies and research centres regarding the characterisation of organic matters (OM) that are present in natural argillaceous settings and regarding the assessment of its evolution through time and considering repository-induced perturbations.

- **Suggestions for further work**

Potential improvements on organic matters characterization:

- Detailed mapping of organic matters distribution in clay rocks (where is it?) in relationship with porosity.
- Improvement of “soft” extraction techniques (i.e. extraction that minimise induced perturbations to the rock and its pore water).
- Increase of the level of OM basic thermodynamic data.
- Further understanding of OM mobility.

- Potential benchmarking exercise based on same extraction and analytical techniques, “good”, well preserved samples from Opalinus Clay, Callovo-Oxfordian Clay formation, Boom Clay ... + ... and undisturbed situation.

• **Decisions/Actions**

- Too early for establishing a formalised and comprehensive assessment of what has been done up to now and defining recommendations.
- Continuation of exchanging information on what is ongoing at regular Clay Club meetings.
- Series of questions in relation to what is expected for the safety cases to be defined in order to structure the exchanges of information).
- Clarification of expectations with support of the IGSC.
- First draft of synthesis of the topical session with the help of the chair and the NEA secretariat by end of December; Synthesis to be reviewed by the chair of the Clay Club.
- Proceedings (general distribution report) within the synthesis and compilation of slides early 2005.

5. FEPCAT CLAY CLUB INITIATIVE

• **Feedback from end-users**

- Responses on Questionnaire [NEA/RWM/CLAYCLUB (2003)5] from height “Clay” organizations on the utilization of the NEA FEPCAT.
- Compilation to be revisited in order to make a consistent synthesis of all comments and to provide some key recommendations for the future.
- Methodology of derivation and classification of FEPs well received.
- FEPCAT used both as a base for a priori FEPs list development and as *a posteriori* checklist. Report considered as helpful for safety assessment specialists as for site characterization experts, which means that the initial goal has been achieved.
- But database not very usable for assessing “domestic” level of knowledge especially due to high heterogeneities in the considered programs.
- Need for more details on uncertainties but it was considered by the Clay Club members as practically impossible to be achieved.
- Helpfulness of FEPCAT in defining “gaps” in knowledge base and potential for international cooperation.

• **Decisions/Actions**

- Need for updating the FEPCAT per group of FEPs (discipline oriented) when specific new information available rather than in bulk after key safety cases being produced, with a frequency of about 5 years.
- Additional feedback on FEPCAT utilisation still welcome.
- Need for clarifications on some comments; the NEA will contact directly organizations.
- Compilation of all answers by the NEA secretariat with the help of Martin Mazurek.
- Presentation of feedback at the 6th IGSC meeting.

6. CATALOGUE OF CHARACTERISTICS

- **Status**

- Positive answers received from US, Canada and UK regarding the inclusion of “past” formations in the Catalogue.
- No answer received from Italy, Italian clay formation removed from the catalogue.
- Final draft version available on the Clay Club website since May 04.

- **Decisions/Actions**

- The Catalogue: introductory brochure + specific databases in a CD-ROM (MS Word and Excel versions) per formation.
- All the necessary caveats to the use of the Catalogue (e.g. significance of the data and data variability, principal utilisation of the Catalogue, etc.) to be mentioned.
- Cautious messages within the brochure on curves (illustrations curves not to be used to define a specific relationship between parameters). Explanation on correlations’ illustrations.
- Map of various locations of Clay formations of the Catalogue well received, but needs to be finalized.
- No detailed history in Table 3 (e.g. dates of approval to be removed).
- With respect to the updating, too early to decide. Same procedure as the FEPCAT (questionnaire on end-using) to be follow. Not underestimating the updating work.
- **By 15th of December**, review of the brochure by organisations and consistency checking. Before and as soon as possible J-Y. Boisson will send to each organization what he has already pointed out as inconsistency. Organisations to formally agree on the brochure by the 15th of December and in particular, (i) need to approve the acknowledgement session by checking names of all contributors to the catalogue from their own organizations; (ii) review carefully the chapter on “Limitations” especially regarding spatial variability.
- **By 15th of December**, Grants for publication to be sent by the BGR and ENRESA to the NEA.
- **Early 2005**, publication by the NEA (brochure and a CD-ROM with all Excel tables).

7. IMPACT OF NEA PEER REVIEWS ON R&D PROGRAMMES REGARDING ARGILLACEOUS HOST-FORMATIONS

Experiences from Opalinus Clay (Nagra), Dossier 2001 Argile (Andra) and SAFIR 2 (ONDRAF/NIRAS) peer reviews:

- Peer reviews help confirm adequacy of methodologies and provide hints on future national R&D programs.
- The NEA peer review is one review among a broader series (academic, regulatory, etc.).
- Only Nagra used purposely the NEA peer review results for public relation purposes.
- The classical request after a peer review is a one-to-one follow-up of the recommendations; however, there is a need to prioritize recommendations and to put each of them in a wider perspective in order to cope with various constraints

- Consistencies among the various peer reviews should be fostered.
- Importance to consider reviews' recommendations *vis-à-vis* the initial Term of Reference.

Each peer review report is available and could be downloaded from the NEA website:
<http://www.nea.fr/html/pub/webpubs/welcome.html#rp>.

8. GEOSPHERE STABILITY WORKSHOP

Workshop on “Stability and buffering capacity of the geosphere for long term isolation of radioactive waste: application to argillaceous media”, hosted by GRS on 9-11 December 2003 in Braunschweig, Germany.

- **Feedback from participants**
 - Overall positive.
 - Good platform for academic participants to have a better idea of WM issues.
 - Good mixture of academic + agencies + regulators.
 - WM site specific datasets usually of high quality and resolution; so need to better “advertise” this in order to foster interaction with the academic community (even on sites with relatively smooth evolution).
- **Status of the synthesis and actions**
 - Proceedings: synthesis of each presentation and key findings per each main topics covered by the workshop, put end- users perspectives and compile all papers abstracts received since the workshop.
 - Final draft under review and be available for final approval by end of November.
 - NEA publication released early 2005.

9. IGSC SELF-EVALUATION /TRANSFER OF KNOWLEDGE ON URL EXPERIENCES

Topic identified during the self-evaluation of IGSC [NEA/RWM/IGSC(2004)17].

Hungary presentation on experiences and needs regarding the transfer of knowledge on URL (underground research laboratory) and to get an overview report providing guidance to organizations which are planning new investigation program and/or URL. Some of the typical questions are as follows: How to carry out investigation program? When/why to go underground? How not to repeat the same mistakes/duplication? What must be measured *in situ*/in URL?

One of the latest NEA/SEDE initiatives provided some ideas regarding the rationale for going underground for testing (see: GD NEA/RWM(2001)6/Rev1 on <http://www.nea.fr/html/rwm/docs/2001/rwm2001-6-rev1.pdf>).

• Decisions/Actions

- Potential specific technical contribution from the Clay Club on what to measure and how but need to revisit the SEDE document to be decided by the IGSC.

- Importance of networking, of sharing of bibliography and of long- term archiving was also acknowledged.
- Clay Club compilation initiatives (FEPCAT, Catalogue, Extraction techniques, etc.) viewed as efficient entrances to other national programs.

10. CLAY CLUB PROJECT ON LONG-TERM NATURAL TRACERS PROFILES: NAMELY “CLAYTRAC”

• Status

- Total cost for the project 140,000 Euros; Six organisations committed themselves (Andra, IRSN, Mecsekerc, Nagra, Numo, Ondraf/Niras); binding answer from BGR still to come.
- Kick-off meeting of the 19th of October 2004 regarding the “Natural tracer profiles across argillaceous formations - review and synthesis”, namely the CLAYTRAC project:
 - Guidelines fixed for future work and project formally launched.
 - Formal agreement on technical content of CLAYTRAC reached.
 - Approval by funding organizations to include recent developments in extraction and analytical techniques in the study.
 - No collection of new tracer data or development of new codes.
 - Boundary conditions viewed as most difficulty for modelling task.
 - Revised version of the proposal namely “Project Guidelines”.
- Flow of information between organizations and core group (CG)¹ as followed:
 - Technical information: Delegates <-> C G, cc NEA.
 - Administrative information: Delegates <-> NEA <-> C G.
- Approval by funding organizations on the following commitment:
 - Provide data; Formal clearance of data and formal approval of the choice of the code(s) to be used at milestone 1 (July 05); Attendance to the workshop; Formal review at milestone 2.

• Decisions/Actions

- Martin Mazurek, University of Bern confirmed as the adequate person to co-ordinate CLAYTRAC project.
- Organizations, who have no sites/data to be involved in CLAYTRAC in order to better understand methodology aspects, justify the choice of most promising tracers, acknowledge modelling difficulties.
- Helpfulness of CLAYTRAC to provide arguments when presenting a safety case.
- End-product will be and an open, printed document of the NEA (colour publication is absolutely necessary); additional scientific publications encouraged.

1. Consisting of members the Rock-Water Interaction Group of the University of Bern, Switzerland (M. Mazurek [lead], T. Gimmi, H.N. Waber, P. Alt-Epping), of Andra (S. Buschaert) and Nagra (A. Gautschi)

- Duration of the project: Jan 05- Dec 06.
- July 05 – Milestone 1- compilation of data and approval on code to be used.
- August 06-milestone 2- draft report.
- Funding organizations will have full control of the schedule.
- Presentations of progress on the occasion of Clay Club meetings.

11. INTERNATIONAL CONFERENCE, TOURS, FRANCE, MARCH 2005

Forthcoming international conference on “Clays in Natural and Engineered Barriers for Radioactive Waste Confinement”, in TOURS, France on 14–18 March 2005 as a follow up of the Reims conference of 2002 (see: www.andra.fr/meeting2005/).

Second circular of the programme awaited for December 2004.

12. COUNTRY REPORTS

Level of detail and the type of information covered in the country reports (both oral and written) too variable from one country to another (from detailed experimental results to change in the legal framework).

Most reports are organisation-specific rather than national.

Lot of duplication with similar reports given at IGSC or RWMC levels.

Despite this, usefulness of the country reports confirmed as an entrance to national programme.

Need for a further harmonisation, in coordination with the IGSC, guidelines for such reports being prepared by the NEA secretariat.

Suggestions by the Clay Club for a common IGSC and Clay Club general report with a more specific annex dealing with clay-specific results and information.