Safety of Spent Nuclear Fuel Disposal in Crystalline Rock (SafeRock)

An initiative by some key organizations involved in geological disposal in crystalline rock.

The purpose is to elaborate upon the potential benefit in establishing a joint project on key remaining issues for the Crystalline Rock Safety Case.

POSIVA

AMPHOS 21

ÚJV

SKB
Svensk Kärnbränslehantering AB

SÚRAO

Kemakta Konsult AB

JRC
EUROPEAN COMMISSION

KIT
Karlsruher Institut für Technologie

Joint Research Centre

Background:

- **There are two very well advanced national programmes**
- **There have been joint R&D projects in the framework programme dealing specifically with the crystalline rock case (for example FUNMIG/RTDC4 and most recent CROCK), and several projects dealing with topics relevant also for the crystalline rock case (such as ReCosy, ...)**
- **There is a sound scientific-technical basis for the Safety Case**

On-going and finalized R&D projects, Safety Case studies and feed-back from license applications:

- **There are topics remaining that would benefit from joint R&D activities**

Overall project objectives:

Contributing to the on-going process of improving the evidence for the safety of spent nuclear fuel disposed in crystalline rock geological repository.

Specific Objectives:

–**Continuing investigations on the long-term safety of spent nuclear fuel disposal in crystalline rock with respect to physical and chemical processes influencing the mobility of radionuclides both in the near- and the far-field, in order to further improve the process understanding towards increasingly reliable safety assessment statements,**

–**Continuing R&D in view of monitoring and further developing the state-of-the-art on radionuclide migration source-term, including radionuclide release from defect spent nuclear fuel segments and migration/retention processes in the near-field,**

–**Continuing R&D on the far-field radionuclide migration processes along with recommendations from the recently finalized far-field project FP7-CP CROCK,**

Specific Objectives (cont.):

- **Contributing to confidence by verifying that relevant processes are not overlooked, the verification achieved by combining different scales, systems, samples and conditions and comparing the outcome of these different approaches,**
- **Continuing Training and Education in view of maintaining existing and generating next generation of expertise in this field,**
- **Bringing the scientific knowledge into practical application in the disposal safety assessment, and**
- **Disseminating the knowledge especially in view of confidence building.**

R&D topics discussed (few selected from long lists):

- **Development of (smart) Kd, including consistency and defendable minimum values, ...**
- **The role of O_2 intrusion during operational phase.**
- **Chemical competition between different species.**
- **Microbial activities.**
- **Impact of the rock pore space (physical retention).**
- **A combination of in-situ experiments in Äspö and Onkalo with simulated samples, and accompanying laboratory experiments with anoxic material, including real fuel (process verification, transition from near- to far-field, ...)**
- **Modelling (i) individual processes, (ii) coupling, and (iii) up-scaling**
- **.....**

Conclusion of the initiative

With respect to the Crystalline Rock Geological Disposal Safety Case:

- **There are several pending issues/topics**
- **There are several such issues / topics with urgent timing**
- **There are several such issues that would benefit from R&D on a broad European level**

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SafeRock

Initiating group is asking the IGD-TP to form a Working Group on this topic

- **Verify that there is a benefit from such a joint project**
- **Bring together interested organizations to form a consortium:**
  - **Prepare for a project proposal**
  - **Recommend support of such a project**
  - **Submit request in response to call**

Questions?