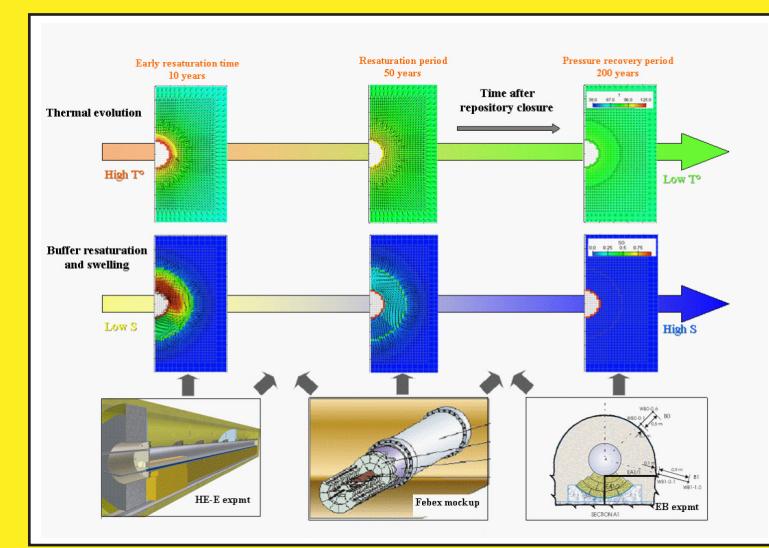




Long-term Performance of Engineered Barrier Systems, PEBS

A FP7 small scale coordinated action project

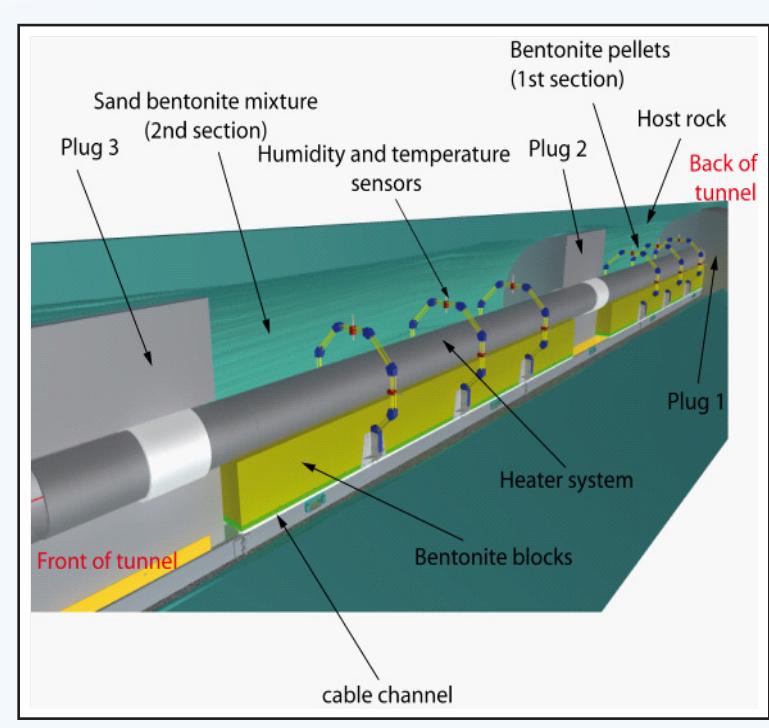
The research leading to these results has received funding from the European Atomic Energy Community's Seventh Framework Programme (FP7/2007-2011) under grant agreement n° 249681"



The main aim of PEBS is to evaluate the sealing and barrier performance of the EBS with time, through development of a comprehensive approach involving experiments, model development and consideration of the potential impacts on long-term

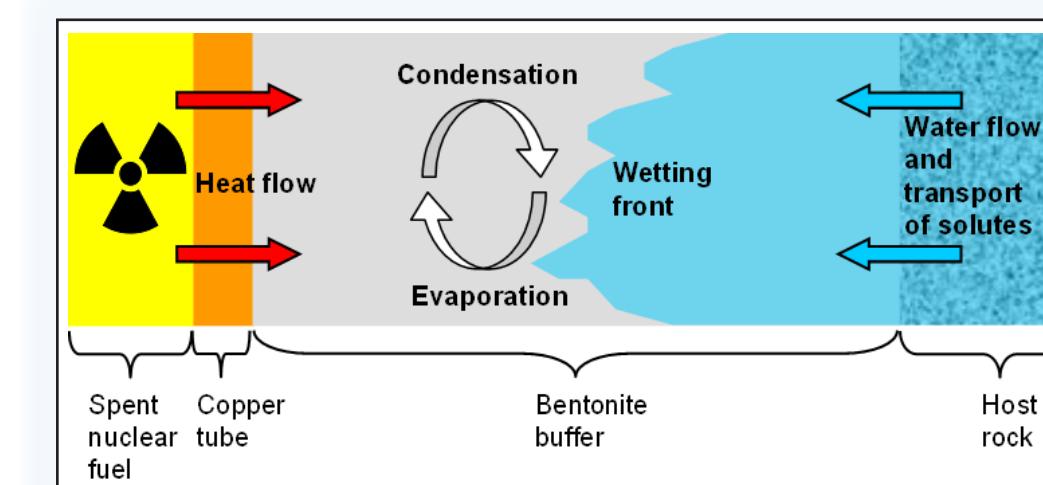
safety functions. The experiments and models cover the full range of conditions from initial emplacement of wastes (high heat generation and EBS resaturation) through to later stage establishment of near steady-state conditions, i.e. full resaturation

and thermal equilibrium with the host rock. These aspects will be integrated in a manner that will lead to a more convincing connection between the initial transient state of the EBS and its long-term state that provides the required isolation of the wastes.



Underground and laboratory experiments such as the EH-E Experiment (Heater Experiment), what is running at the Mont Terri Underground Research Laboratory to safeguard modelling results with real detected data in a real environment.

WP2

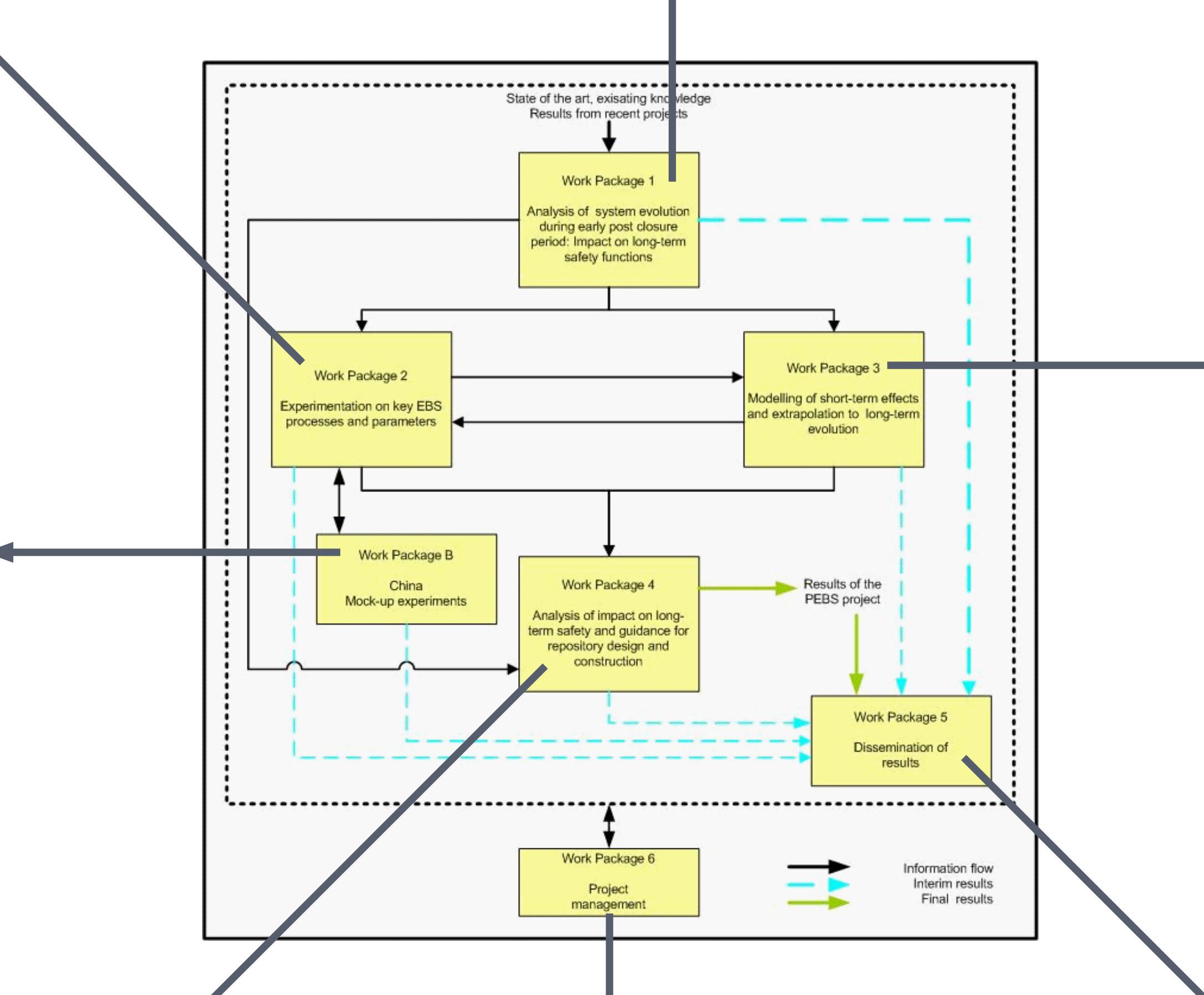


- Identify important processes during the early evolution of the EBS
- Describe the current treatment of the early evolution of the EBS in long-term safety assessments for spent nuclear fuel/HLW
- Discuss how the short-term transients will/may



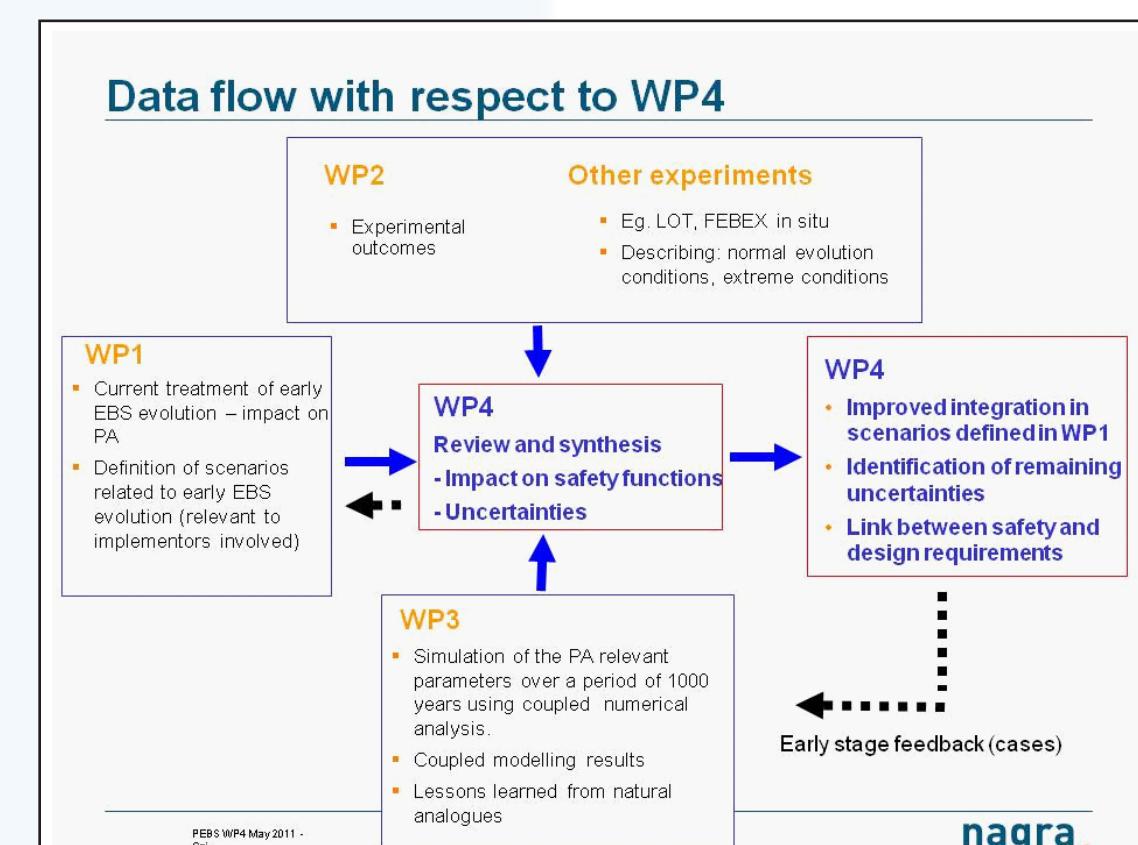
- To study the property of GMZ Na-bentonite and the bentonite-canister reaction under coupled T-H-M-C conditions;
- To simulate vertical placement of a container with radioactive waste;
- To monitor the behavior of GMZ Na-bentonite barrier at high temperature and special water;
- To provide data for future design for engineered barrier system.

WPB

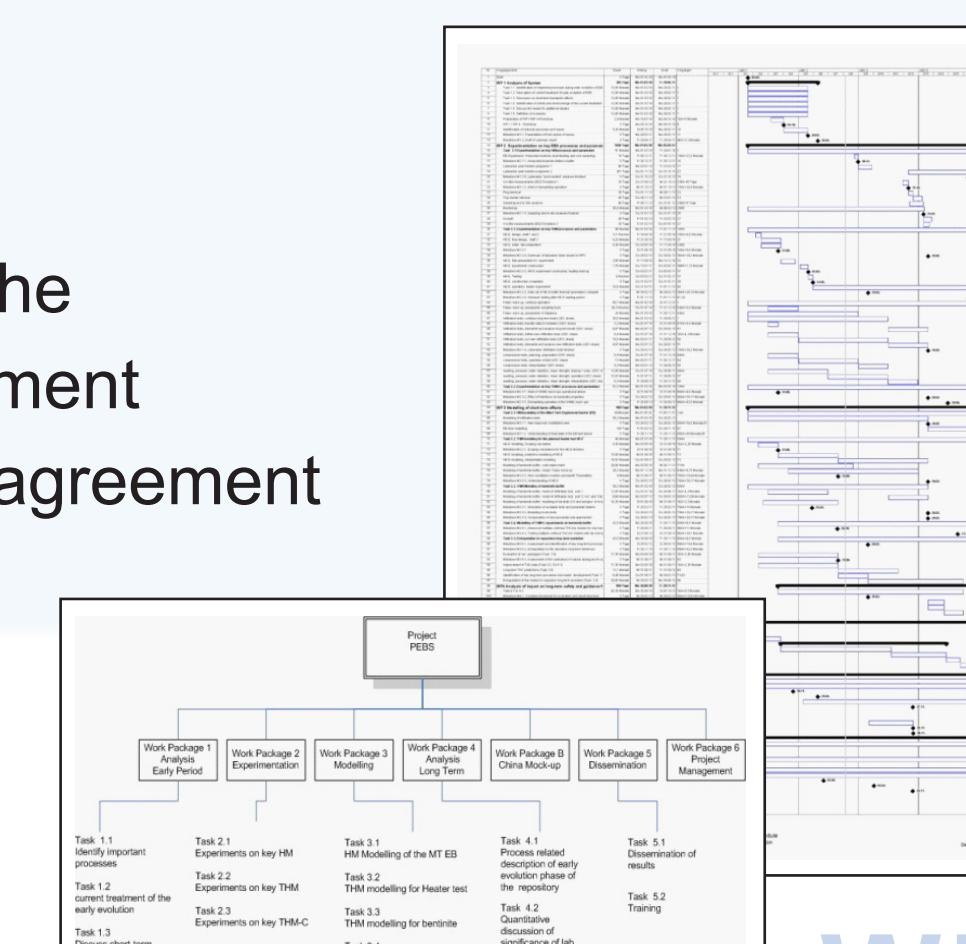


- Develop a synthesis showing how the EBS and near-field rock will behave both during and after the transient period
- Obtain a fully balanced view of all findings and relate them to the specific relevant time and spatial domains
- Give feedback to design in terms of guidance for performance limits or modifications to design
- Considerations
- Focus in particular on post-transient safety functions (e.g. swelling pressure, hydraulic conductivity, which generally have quantitative required target values). Consider factors such as: variations in density of the barrier, evidence for transient vs. permanent changes to properties such as swelling, changes in mineralogy swelling, extent transient hydraulic pathways etc.

WP4



The project management includes:



Coordinator:

BGR Bundesanstalt für Geowissenschaften und Rohstoffe

Partner:

ANDRA Institut für Atomwirtschaft und Radiochemie

Aitemin Centro Tecnológico

CNCI Beijing Research Institute of Uranium Geology

Ciemat Instituto de Energías Renovables

TCLY TECHNOLOGY AB

enresa

GRS

Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH

Golder Associates

JAEA

nagra

SKB
Svensk Kärnbränslehantering AB

SOLEXPERTS

TK

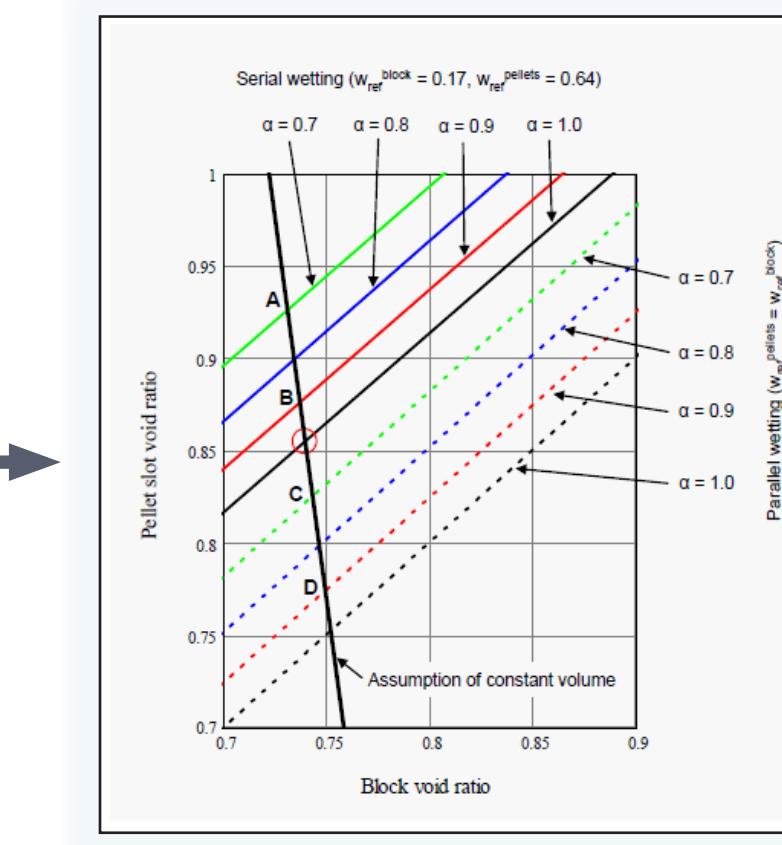
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WP1

affect the long-term performance and the safety functions of the repository.

- Identify the merits and shortcomings of the current treatment
- Discuss the needs for additional studies of these issues and how they can support future assessments – give directions to other WPs.
- Define „scenarios“ related to events in the early evolution of the EBS



Exemplary results:
The analytical mode showed that the wetting process („serial“ = slow or „parallel“ = fast, see figure), expressed by use of the wetting/drying retention curves of the clay, had a significant impact on the level of remaining heterogeneity of the buffer system.

Also, the difference in total pressure in the block and pellet slot, was found to have a significant effect on the homogenization process.

WP3

WP5



Dissemination includes:

- Public relations
- Communication
 - Newsletter
 - Web site
 - Publications
- Training
- Workshops

