WG1 - Industrialisation and optimisation

IGD-TP EF7

Working Group 1

Summary by

Chair Johan Andersson, SKB
Rapporteur Johanna Hansen, Posiva

20 persons representing WMO's, TSO's and RE's and several persons working actively in Joprad

Aim of WG1

- To find out whether there are joint industrialisation and optimisation aspects for reaching the *Vision 2025* (for spent fuel or other high level waste) – and/or as an action within *joint programming*
- The discussion will take place within WMO's and organisations supporting the WMO's to reach the target.
- Aspects are relevant also for countries still developing disposal concept, since the countries/WMO's near the licencing phase are pacemakers and have experience in scientific, political and societal questions related to the final disposal

WG1 Presentations

- Industrialisation and optimisation of the KBS-3 repositories
- Development of optimisation methodology and methodology illustration
- Reducing the cost of waste containers for decommissioning and geological disposal
- Pyro(hydro)lysis of Spent Ion Exchange Resins for the Disposal of Organic-Free Radioactive Waste
- Looking for rational environmentally friendly approach for development of concept for safe nuclear waste repository in preparing for future projects

Needs for industrialisation and optimisation

- Radiation protection (ALARA)
- EIA and environmental aspects
- Logistics (underground work, material flows)
- Methods for production (fast, reliable, QA/QC)
- Licencing
- Occupational safety and design
- Alternatives and options for future
- On site tests – learning for others
- Safety case co-operation for operational facilities in future

Areas of common interest?

- Research results and technology know-how that can be useful for implementation and optimisation:
  - Host rock issues e.g.:
    - Applicability of site descriptive models
    - Means of adapting repository to site conditions (selection of suitable rock volumes)
    - Detailed methods and interpretation
  - Canister issues e.g.: (WG2)
    - Material science
    - design and verification,
    - NDT methods
  - Buffer, backfill and closure aspects e.g.: (WG4)
    - homogenisation, chemical and mechanical erosion, interactions – how these items does influence to the design – and how these will be verified in full scale
- What else?

What is meant with optimisation ?

- Nuclear waste repositories can only be developed in a staged iterative fashion
- Requirement management – interaction with safety assessment
- The previous safety cases have been conservative
- The design is easily too conservative or robust as well (easy to analyse)
- But is it implementable?
- The design requirements are therefore in important role
- But the same safety is needed.
- Balance between what is necessary and what can be technically achieved and the way of doing it is iteration.
- Canister thickness as example

Are full scale experiments needed?

- The requirements needs to be proved during manufacturing and installation
- QA/QC are in very big role in future development
- Some equipment cannot be purchased in open markets
- To show to society and stakeholders that the early evolution is according to design basis (FISST and future test at SKB)
- EC can accept the full scale experiments in Joint Programming, but may fund only the joint aspects

Challenges

- The WMO's are at very different stages of development
  - other are working with specifications and FSAR
  - some are working with design basis and conceptual design
- Different host rocks, different conditions (if the requirements and design basis are not joint – also the cooperation might get difficult)
- Harmonisation requires huge amount of work even for organisations with similar concept and host rock
- Still research issues or development of methods can be done jointly
- Information exchange is needed to be able to be aware of ongoing work

Questions discussed in the WG1

- Are we following best practice in design optimisation for a disposal facility?
  - Is there an interest in developing a guidelines?
  - N.B. Typical stages of design (feasibility, conceptual design, system design, detailed design, implementation, operation) well established.
- How can we best learn from others? Forum for case studies? (Later to focus on R&D)
  - Interaction design, operational and post closure safety assessment, and other requirements and criteria for optimisation
    - Drivers of optimisation (cost, practicalities/industrialisation, workers protection. Management of accidents)
    - Legal restrictions on optimization – after license hard to change
    - How much is enough (at different stages of development)?
  - Lessons for early stages of design? What to focus on and when
  - What is optimal for the whole waste cycle – or optimal for only a repository?
- R&D needed to support design and optimisation
  - Need a systematic assessment on more focused issues
  - Research on processes affecting evolution of EBS barrier materials and seals (cement, bentonite, metals,..) and waste treatment…
  - Can we look at common supply chains or at least common knowledge data bases?
  - Conflicts between post closure safety and practicality/workers, e.g. Repository depth
  - Generic aspects of interest from the large scale tests planned by advanced programmes?
- Optimal solutions for countries with low waste inventories
  - Largely political, IGD-TP could write a white paper on DBD (lots of input from Andra, SKB USNWTRB)

Kiitos

Thank you