Gesellschaft für Anlagen- und Reaktorsicherheit

GRS is the central technical research and expert organization for nuclear safety in Germany

Division B70 in Cologne: acting as a TSO almost exclusively for Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

Division B40 in Braunschweig acting as a research institute almost exclusively for the German Ministry of Economics and Technology (BMWi) in the field of applied basic research

Compliance of the Key Topics with the strategic needs arising from the Vision 2025. How this can be carried forward into deployment and true collaborative RD&D

- GRS agrees with the vision 2025 on a European scale and thus to the greatest possible extent with the draft SRA although the respective date in Germany is 2030 or 2035, respectively

  We have some minor comments on the draft version dated December 23, 2010 (see the following)

GRS comments on the draft SRA version dated December 23, 2010

- Chp. 1.2, page 6, 3rd para: Please insert reference to PAMINA (www.ip-pamina.eu)
- Chp. 1.3, page 7 (fig. 3.11) and 8, 2nd para: the term "***confinement***" should be replaced by "***containment***". Confinement is predominantly used in reactor safety and transport safety, however, for radioactive waste repositories the term "containment" is more regularly used. In fact, in the IAEA document WS-R-4 /ref. /1-19/ the term confinement is not mentioned at all.
- Chp. 1.4, page 11, top line: To concentrate on …
- Chp. 2.2, page 17, 2nd para.: The meaning of the last sentence is unclear. The sentence implies that uncertainties with great significance for the safety of the total disposal system exist but will deliberately not be addressed in the SRA.

The priority and urgency for each topic should be justified. Some of them are not clear, e.g.

- Section 3.1.2: We think that priority and urgency of topic 1.3 is not correct. A lot of new knowledge from PAMINA is available and should be tested asap.
- Section 3.2.3: It is not clear, why topic 2.5 is urgent and should be started in 2012-14.

Added value of the SRA to the IGD-TP participants

Key Topic (SRA, section 3) • GRS-Topics	Potential Partners
Topic 1.1 confidence in / testing and refinement of tools	
• THMC: still better understanding of coupled processes needed	ANDRA, NAGRA, NDA, SCK-CEN, SKB, Universities
• Harmonise methodology for use of Natural analogues in the safety case	ANDRA, ENRESA, NAGRA, NDA, NRI, ONDRAF, POSIVA, SCK-CEN, SKB
• Develop a broader view and systematic for the use of indicators • Develop guidelines	ANDRA, BGR, ENRESA, NAGRA, NDA, NRI, SCK-CEN, SKB, TUCl,
Topic 1.3 Sensitivity and uncertainty analyses	
• Application / testing of new methods for deriving parameter uncertainties and pdfs • Application / testing of modern methods for sensitivity analysis	ANDRA, ENRESA, Facilia, NAGRA, NDA, NRG, SCK-CEN, SKB, TUCl

high interest | medium interest | medium to low interest

Added value of the SRA to the IGD-TP participants

Key Topic (SRA, section 3) • GRS-Topics	Potential Partners
Topic 2.1 High burn-up fuels	
• Impact of increased rapid release fraction on safety assessment • Impurities in UO_2 and Zircaloy and their impact on specific radionuclide inventories	CEA, ENRESA, KIT-INE, NAGRA, NDA, POSIVA, SCK-CEN, SKB
Topic 3.6 Full-scale demonstration of plugs for salt formations	
• Plugs with the characteristic materials (salt concrete and Sorel concretes) must be tested in situ. • Techniques for the monitoring of the indicators must be developed which allow the demonstration of the long term functionality of the plugs	
Topic 3.9 Impact of hydrogeochemical evolution on long-term performance of bentonite buffer under saline conditions	
• Understanding the long-term changes of mineralogy and permeability of compacted bentonites in a salt environment must be improved • Reliability of reactive transport modeling through compacted bentonite in salt formations must be based on a better experimental bases	

Added value of the SRA to the IGD-TP participants

Key Topic (SRA, section 3) • GRS-Topics	Potential Partners
Topic 3.10 Description of seals and plugs systems and modelling of their long-term behaviour with assessment of the consequences on long-term safety	
• Understanding of long-term chemical evolution of geotechnical materials and its influence on hydraulic and retardative properties. • Understanding of the velocity of alteration processes in relation to the expected long-term evolution of the repository • Behaviour of specific materials in saline conditions (saturated, non-saturated) • Impact on long-term safety of repository in rock salt	ANDRA, SKB, NAGRA, others?
Topic 3.11 Evolution of cement-based seals	
• Geochemical modeling of corrosion processes of cementitious materials needs to be improved on an experimental bases	NAGRA, PSI, SKB, POSIVA, SCK/CEN, Universities
• Corrosion velocity predictions must be improved by determining reliable diffusion coefficients as a basis for the modelling of diffusive fluid migration through seals	
• Predictions of long term changes of porosity and permeability due to corrosion processes must be based on suitable experiments and the development of adequate modeling tools	

Added value of the SRA to the IGD-TP participants

Key Topic (SRA, section 3) • GRS-Topics	Potential Partners
Topic 3.14 Lab and modelling work on salt backfill long-term behaviour	
• The implementation of self sealing salt backfill (SVV) should be pursued • Still missing hydro-mechanical data must be determined: compaction behaviour at specified humidities, hydraulic properties evolving • Modelling of THMC-processes in SVV plugs must be improved	NRG, (US-DOE, SANDIA)
Topic 3.15 Effects of iron-bentonite interaction	NAGRA, ENRESA
Still unknown, cannot yet be predicted	
Topic 3.16 Sharing of knowledge of container materials behaviour	
• Participation as observer	?
Topic 6.1 Monitoring strategies	ANDRA, DBE, NAGRA, POSIVA, SCK-CEN, SKB
• Develop strategy for repository in rock salt	NRG, SANDIA
Topic 6.4 Monitoring of EBS during operations	?

How can the participants contribute to the deployment?

- GRS volunteers to actively contribute to the working groups
- GRS is interested in specific topics mentioned in the SRA and volunteers for some of them to overtake the leadership (see tables before)

Thank you very much!