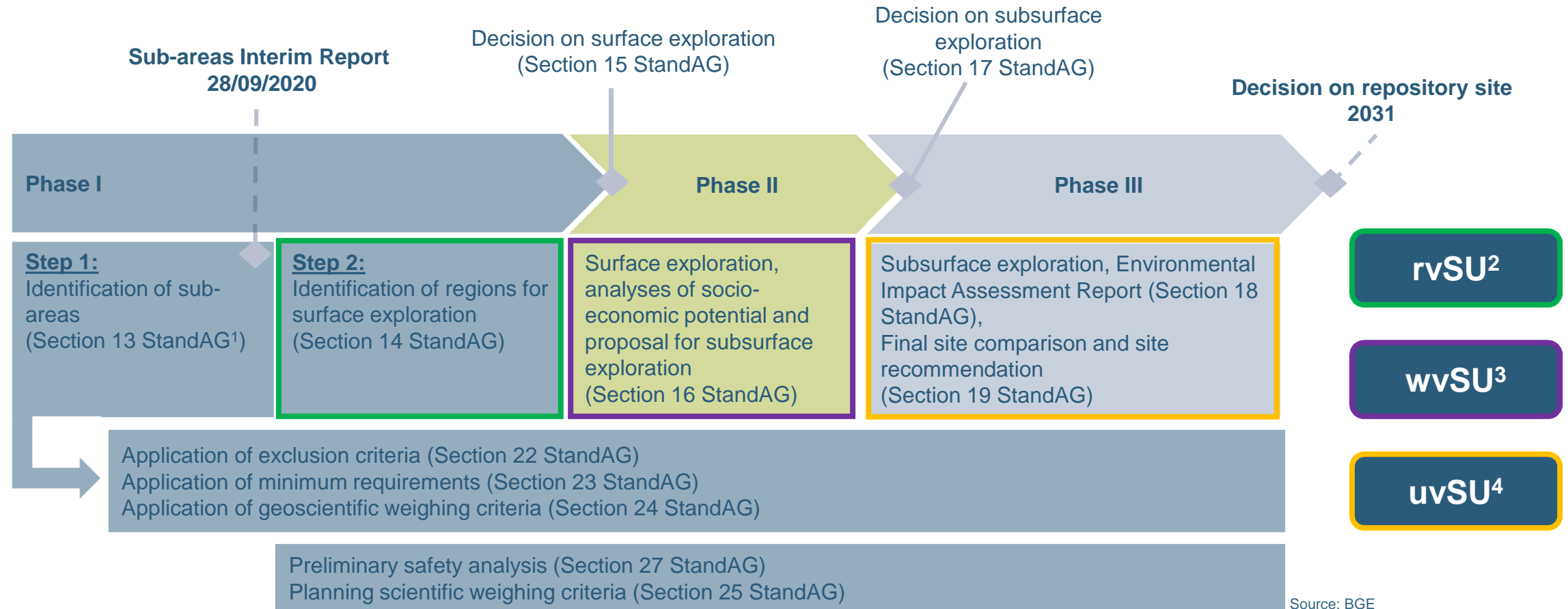


# Preliminary safety analysis in the high-level radioactive waste site selection procedure in Germany

Interdisciplinary research symposium  
on the safety of nuclear disposal practices 2021

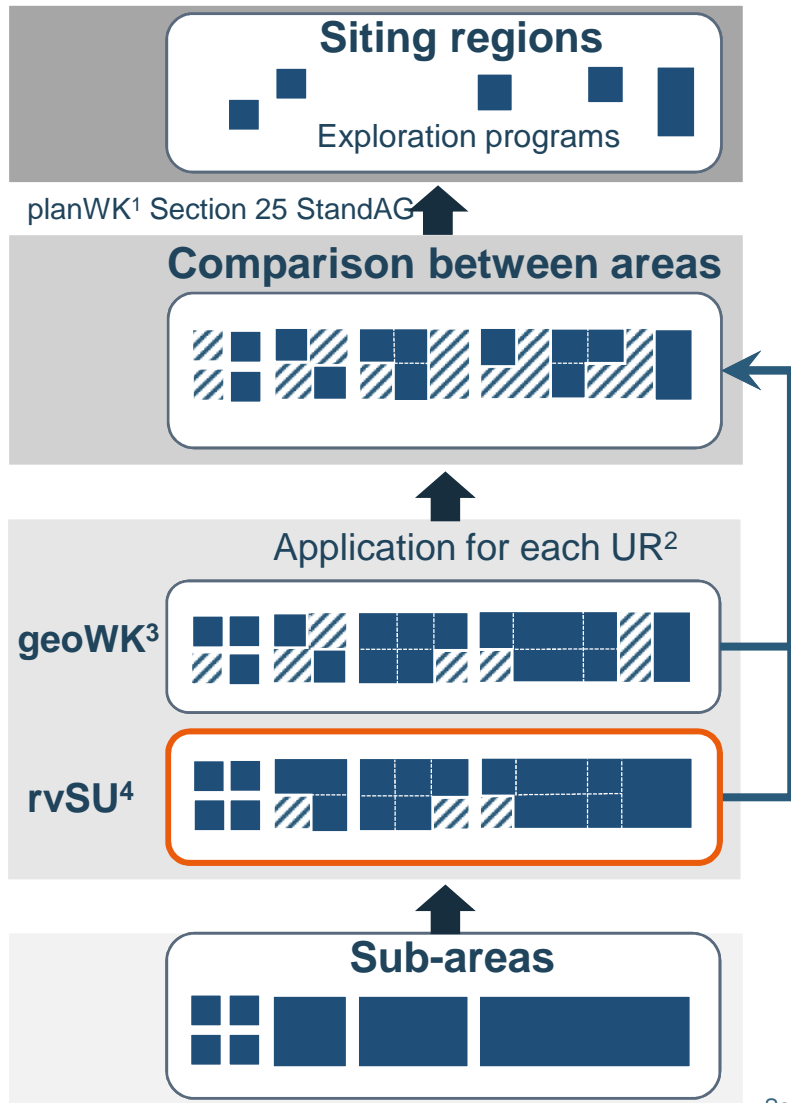
Eva-Maria Hoyer, Phillip Kreye, Thomas Lohser, Wolfram Rühaak  
10. – 12.11.2021, Berlin

# Implementation of the German Site Selection Procedure



<sup>1</sup>StandAG: Standortauswahlgesetz vom 5. Mai 2017 (BGBl. I S. 1074), das zuletzt durch Artikel 1 des Gesetzes vom 7. Dezember 2020 (BGBl. I S. 2760) geändert worden ist  
<sup>2</sup>rvSU: representative preliminary safety analysis, Section 14 StandAG  
<sup>3</sup>wvSU: further developed preliminary safety analysis, Section 16 StandAG  
<sup>4</sup>uvSU: comprehensive preliminary safety analysis, Section 18 StandAG

# Preliminary Safety Analysis



## Preliminary Safety Analysis (Section 27 para. 1 and 2 StandAG )

- (1) Subject [...] is the assessment of the extent to which **safe containment** of the radioactive waste can be expected by exploiting the geological conditions [...]
- (2) The preliminary safety analyses [...] shall consider the repository system in its entirety and assess its safety [...]

<sup>1</sup>planWK: planning scientific weighing criteria

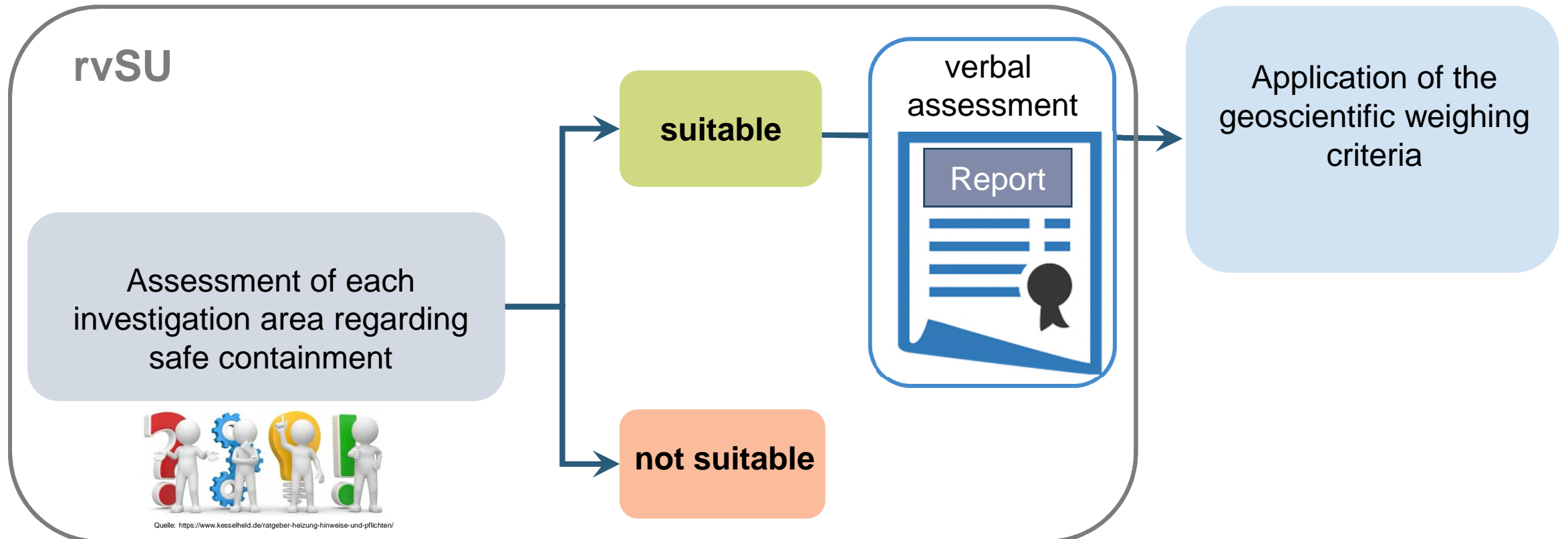
<sup>2</sup>UR: investigation area

<sup>3</sup>geoWK: geoscientific weighing criteria

<sup>4</sup>rvSU: representative preliminary safety analysis

Source: BGE

# Goal of the Representative Preliminary Safety Analysis



Source: BGE





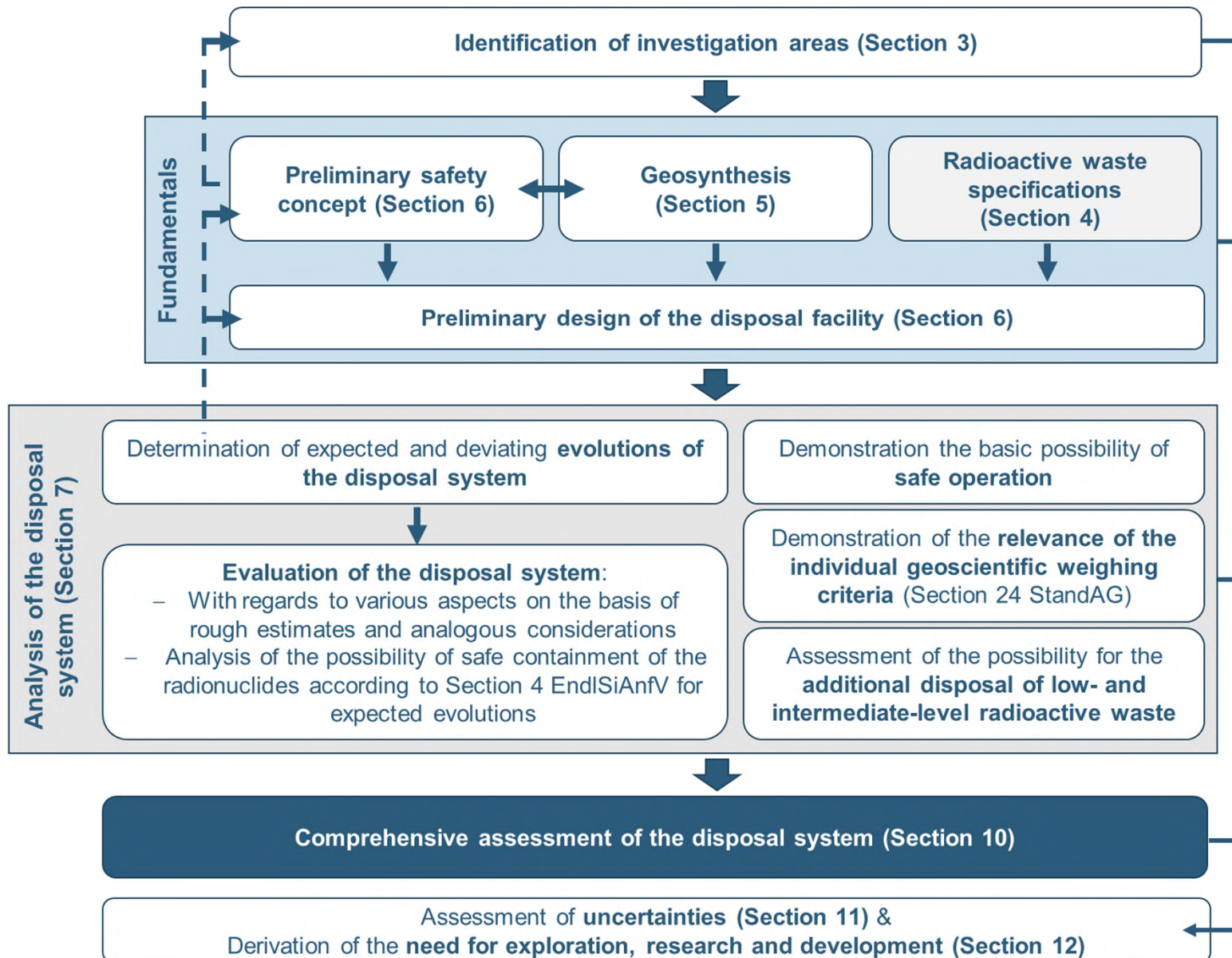
Interdisciplinary  
research symposium  
on the safety of nuclear  
disposal practices



BUNDESGESELLSCHAFT  
FÜR ENDLAGERUNG

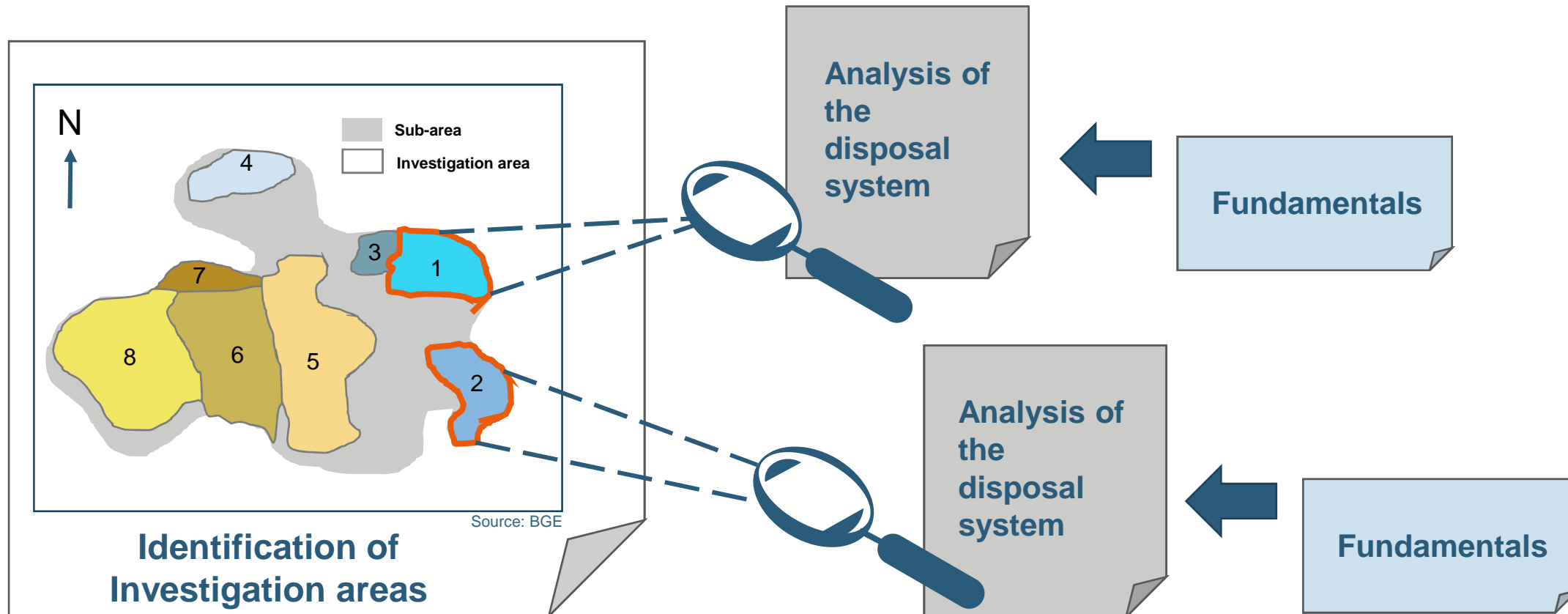
# Content of the representative preliminary safety analysis

pursuant to the  
**Disposal Safety  
Analysis Ordinance**  
– EndlSiUntV<sup>1</sup>

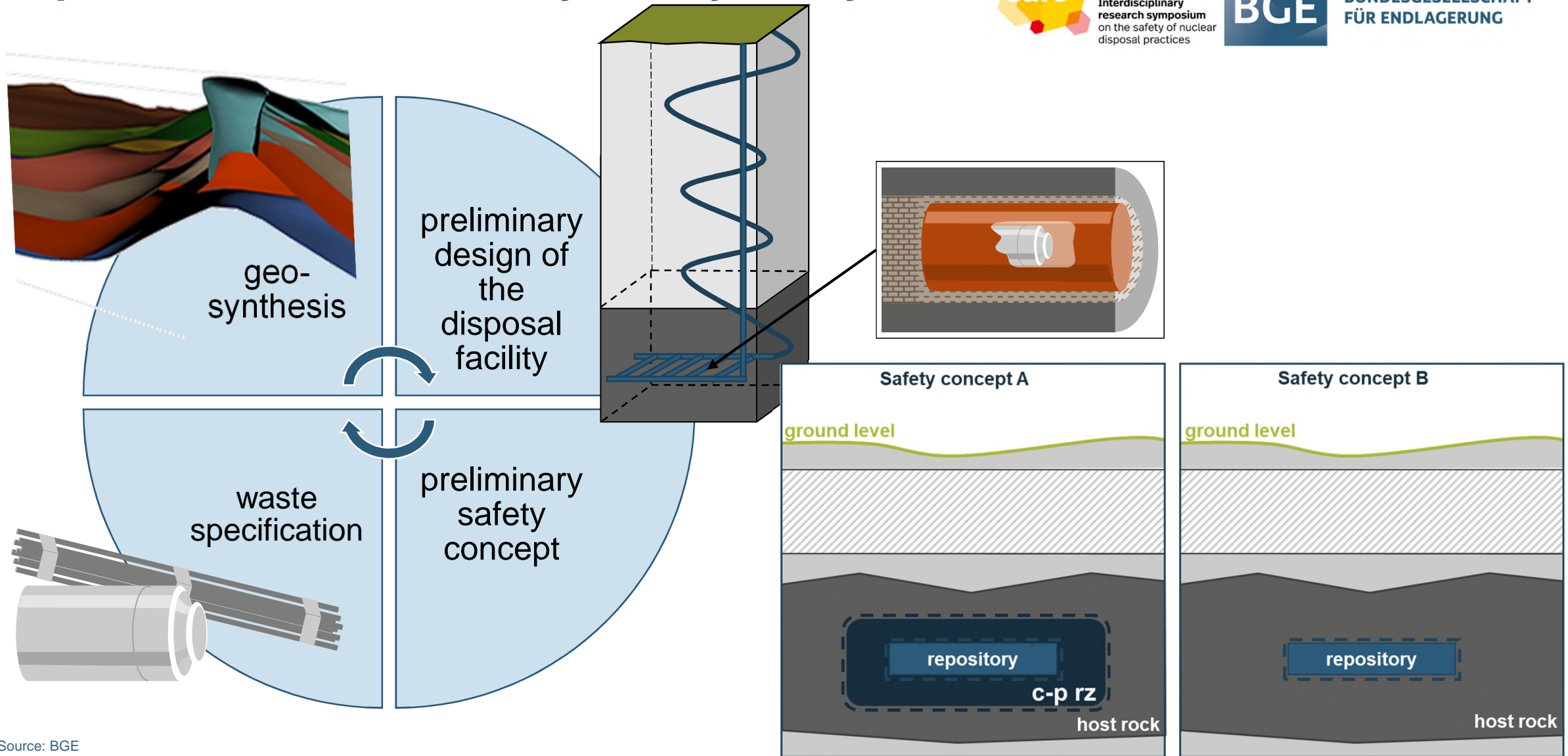


Source: BGE

# Representative Preliminary Safety Analysis



# Representative Preliminary Safety Analysis

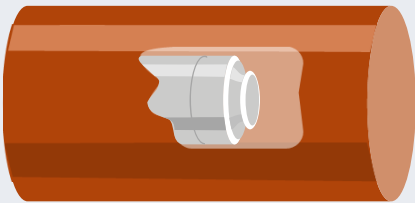


Source: BGE

# Safety Concept (Claystone)

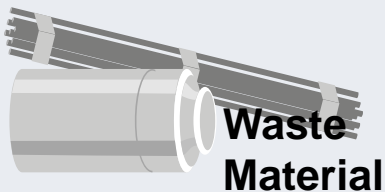
## Safe Containment (§ 4 EndlSiAnfV)

### Canister



secure and complete  
**enclosure** for at least  
500 a after sealing

long-term **fixation** of  
radionuclides

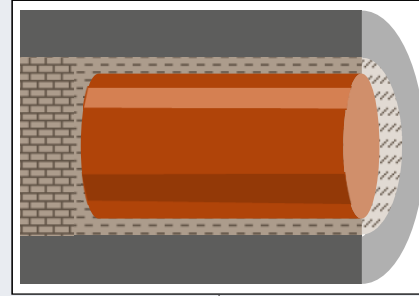


**Waste  
Material**

**protection**

**Backfill and Sealing**  
in the host rock

**limiting  
radionuclide-  
transport**



very low hydraulic  
conductivity, retardation  
(by sorption) of  
radionuclides, favorable  
geochemical properties,  
long-term stability

**host rock**  
(→ c-p rz)

essential barrier

c-p rz: containment-providing rock zone

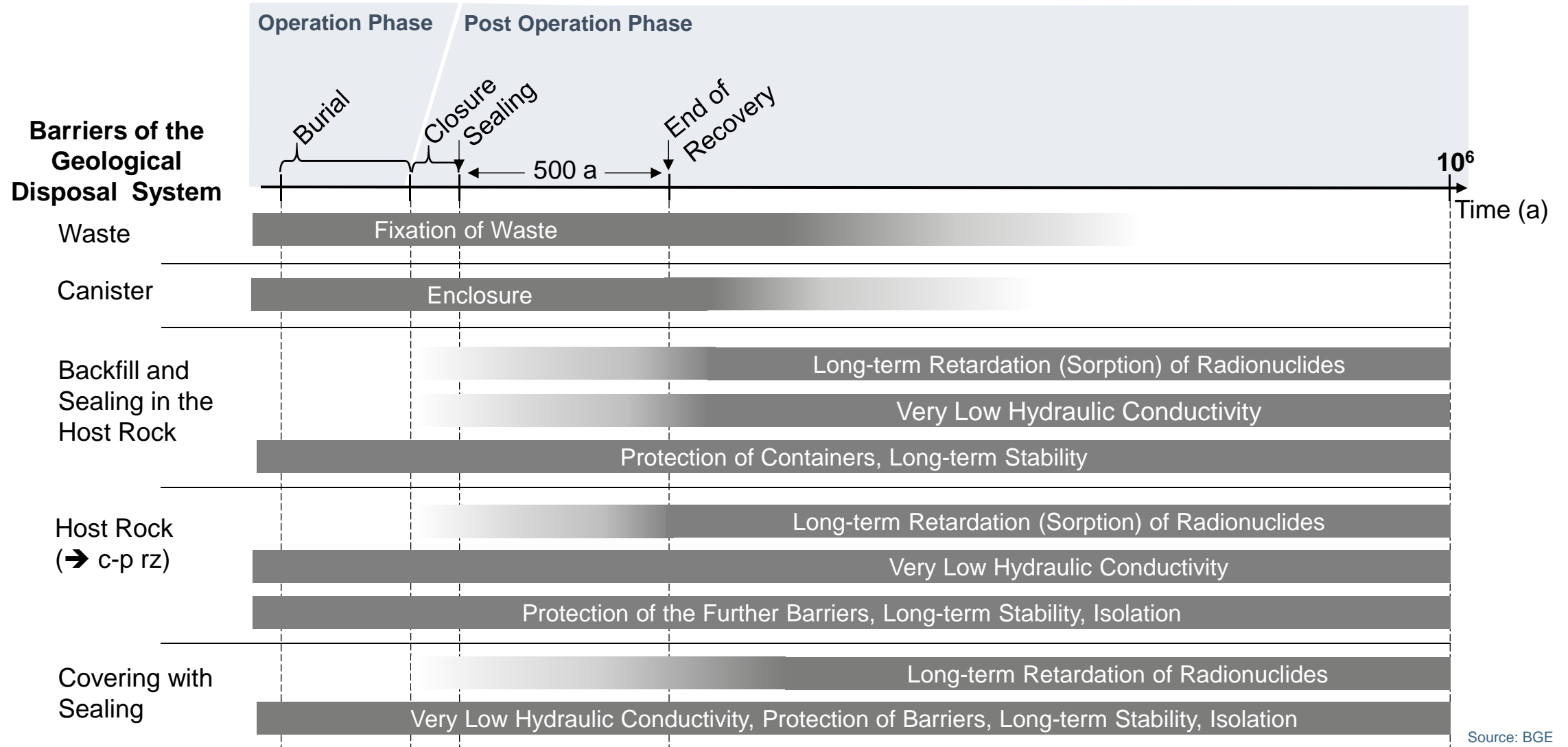
**Covering**  
including (shaft-  
or ramp-)  
**Sealing**

very low  
hydraulic  
conductivity,  
retardation of  
radionuclides,  
favorable  
geochemical  
properties, long-  
term stability

**protection**



# Interaction of Barriers during Time (Claystone)



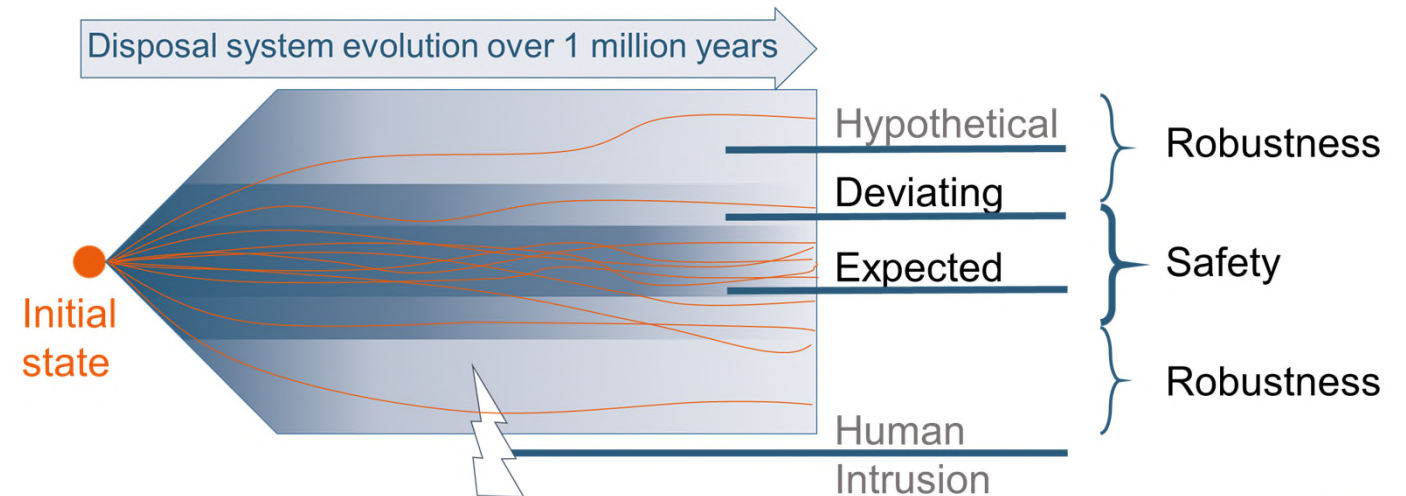
Source: BGE

# Representative Preliminary Safety Analysis – Analysis of the disposal system



Includes among others:

- Consideration of the **future evolutions** of the repository system (utilizing **Features, Events & Processes**-catalogs, scenario development)



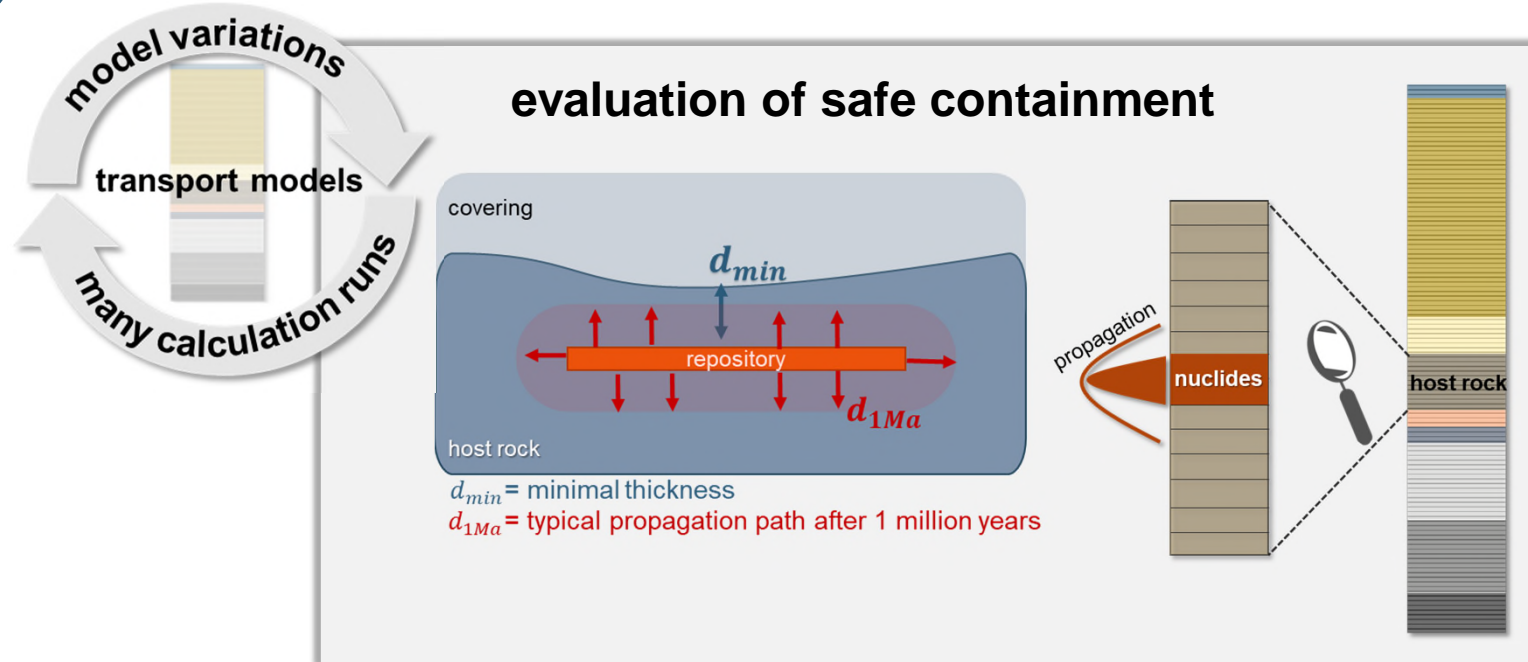
Source: BGE

➤ Please visit our poster: Development of a database for the Analysis of the disposal system

# Representative Preliminary Safety Analysis – Analysis of the Disposal System

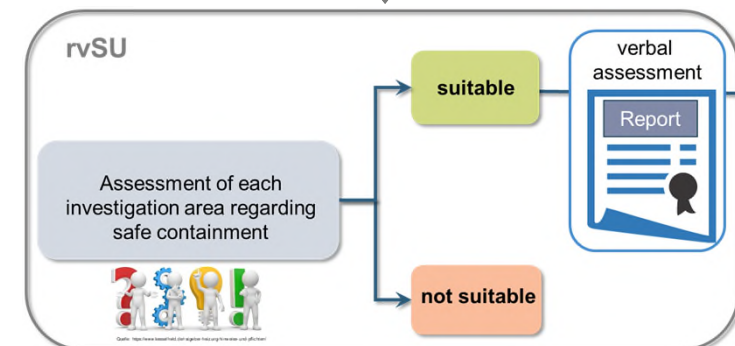
Includes among others:

- Consideration of the **future evolutions** of the repository system - utilizing catalogs of features & processes for a scenario development
- Evaluation of the disposal system with regards to the **safe containment** of the radionuclides (compliance of the mass and the number of atoms criterion)
- Evaluation and prioritization of the **geoscientific weighting criteria**



Source: BGE

Requirement for likely evolutions: in total less than  $10^{-4}$  and per year less than  $10^{-9}$  of both mass and number of radionuclides is allowed to leave the essential barrier.



Source: BGE

## Specific challenges are for instance

- Combination of geoscientific and technical related aspects with respect to safety
- Detailed inventory of the radioactive waste
- Repository design (which level of detail is the right one?)
- Planning of the additional MAW/LAW repository
- Specification of the allowed maximum canister temperatures
- Canister development
- Derivation of the numerical model cases
- Numerous tasks are highly connect among themselves





## **BUNDESGESELLSCHAFT FÜR ENDLAGERUNG**

**Wolfram Rühaak**  
Sicherheitsuntersuchungen

Eschenstr. 55, 31224 Peine

**[www.bge.de](http://www.bge.de)**  
**[www.einblicke.de](http://www.einblicke.de)**



**@die\_BGE**