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*Supplement of*

## **Demonstrating the possibility of safe operation in the first phase of the site selection procedure in Germany**

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BUNDESGESELLSCHAFT  
FÜR ENDLAGERUNG

# safeND 2023

Demonstrating the possibility of safe operation in the first phase of the Site Selection Procedure in Germany

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15.09.2023, Berlin

# AGENDA

Demonstrating the possibility of safe operation in the first phase of the Site Selection Procedure in Germany

**01**

INTRODUCTION

**02**

METHODOLOGY WITHIN THE rvSU

**03**

SUMMARY





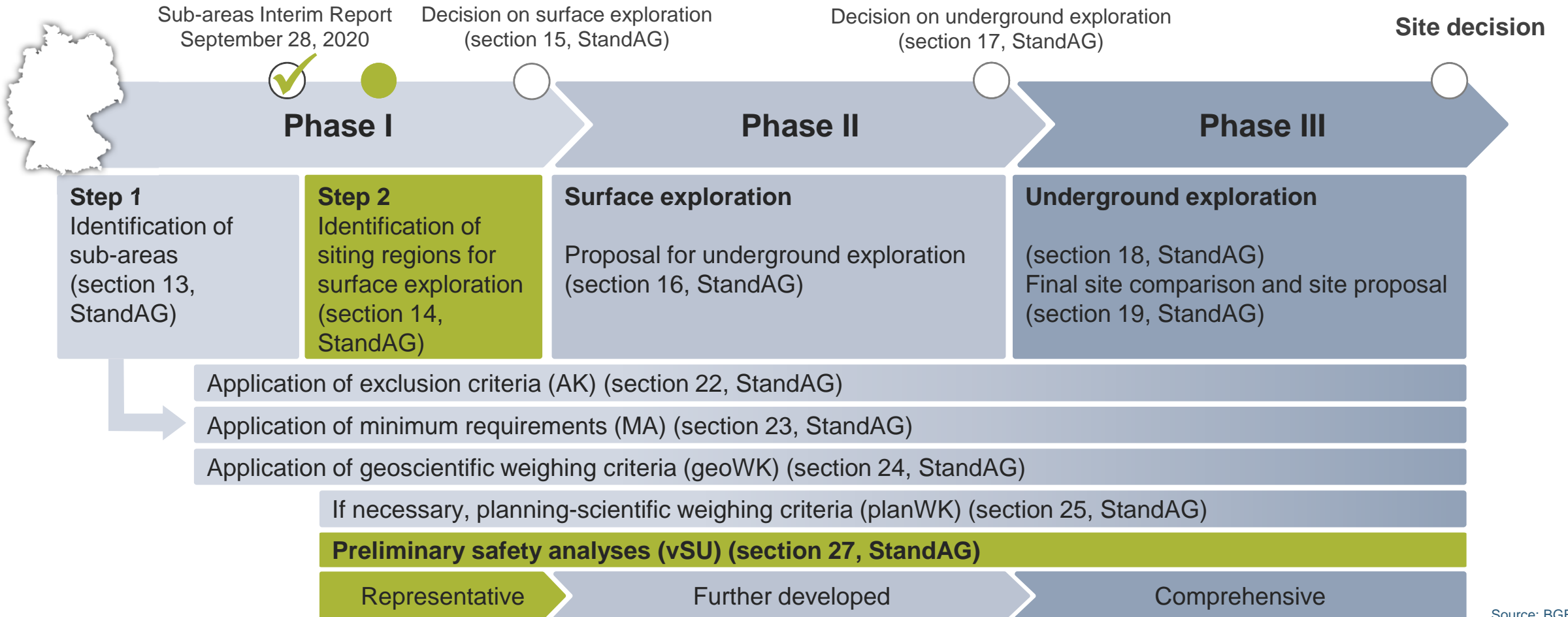
# INTRODUCTION

# 01



# SITE SELECTION PROCEDURE

## Sequence of procedure steps



# OPERATIONAL SAFETY IN THE FIRST PHASE OF THE SITE SELECTION PROCEDURE



## Excerpt from § 7 EndlSiUntV (Analysis of the disposal system)

(3) “The operational safety and the long-term safety of the disposal facility shall be analyzed according to §§ 8 and 9”

By derogation from para. 3, the following applies for Phase I:

(6) “For the representative preliminary safety analyses [...] the following procedure shall be adopted [...]:

4. the basic possibility of safe operation shall be demonstrated, but a complete operational safety analysis does not need to be performed”

## Excerpt from the final report of the “*Endlagerkommission*” (repository commission), K-Drs. 268, p. 293

“Within the framework of the safety investigations, investigations are also carried out with regard to the suitability of the location of the above-ground plants and with regard to operational safety. [...] The safety investigations on the above-mentioned points thus also have an influence on the site selection of the above-ground facilities.” (Translated from original)

# OPERATIONAL SAFETY IN THE SITE SELECTION PROCEDURE

## Levels of detail of the processing in the different steps of the process

- § 17 EndlSiAnfV: Full processing only required as part of the license application for a repository at a selected site
- § 8 EndlSiUntV: Operational safety analyses in Phase II and III
- § 7 (6) No. 4 EndlSiUntV: Demonstrating the possibility of safe operation in the Step 2 of Phase I
  - No complete safety analysis, content not clearly defined
  - Method is developed by BGE
  - Aspects from § 17 EndlSiAnfV and § 8 EndlSiUntV considered with limitations

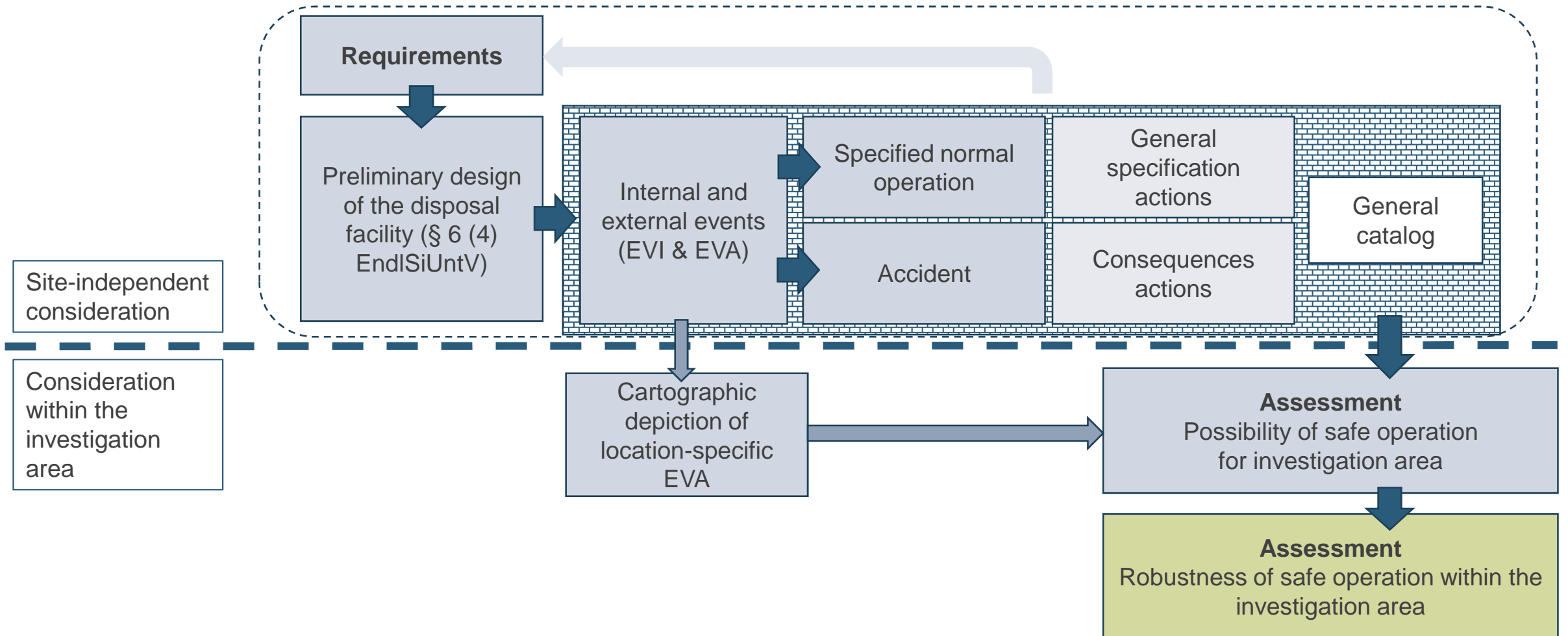




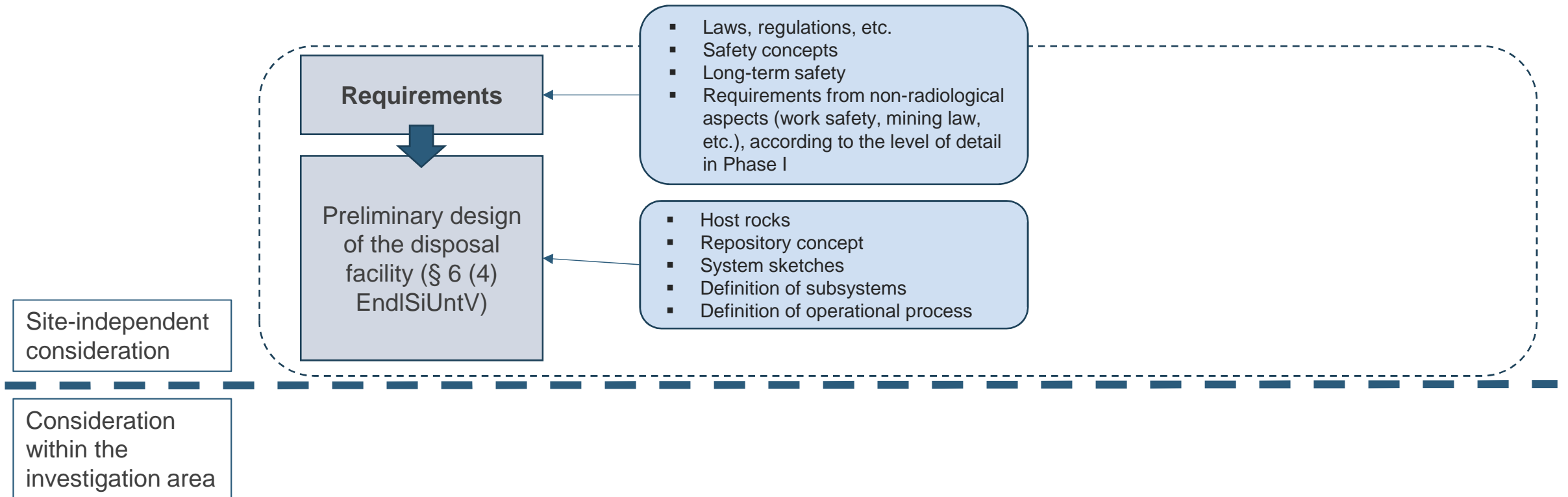
# METHODOLOGY WITHIN THE rvSU

# 02

# PROCEDURE TO DEMONSTRATE THE SAFE OPERATION IN STEP 2 OF PHASE I (1/3)

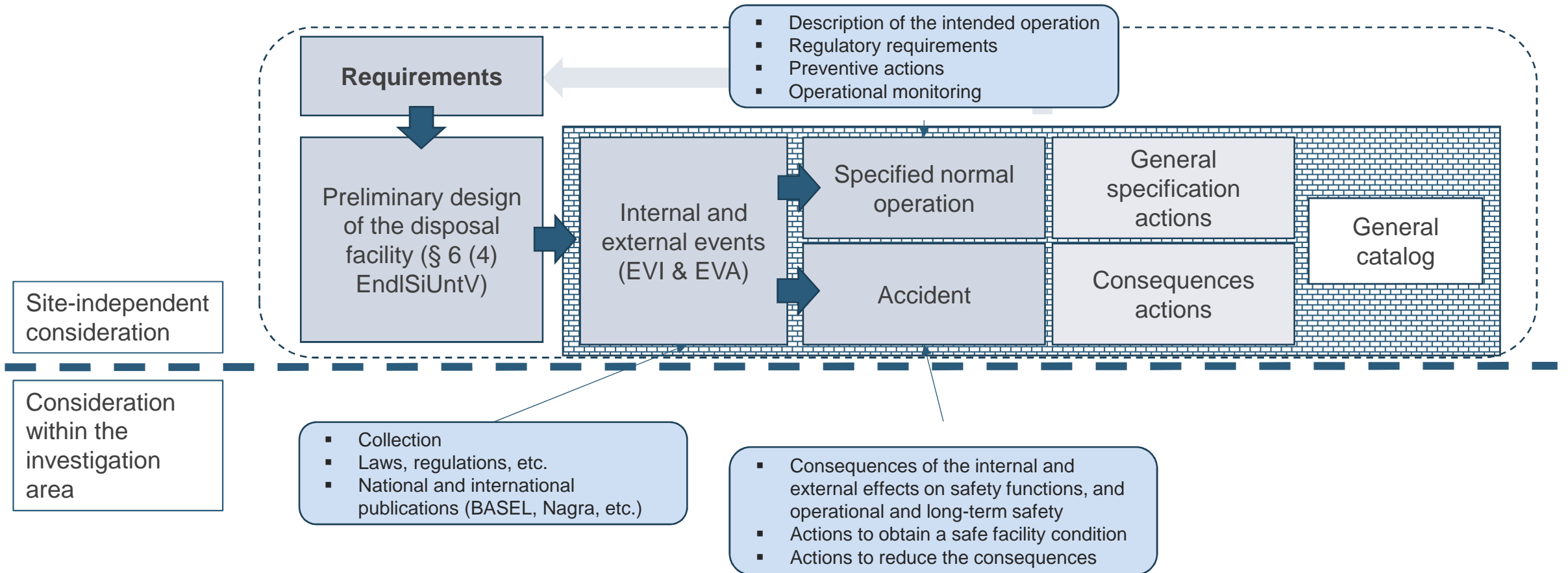


# PROCEDURE TO DEMONSTRATE THE SAFE OPERATION IN STEP 2 OF PHASE I (2/3)





# PROCEDURE TO DEMONSTRATE THE SAFE OPERATION IN STEP 2 OF PHASE I (3/3)



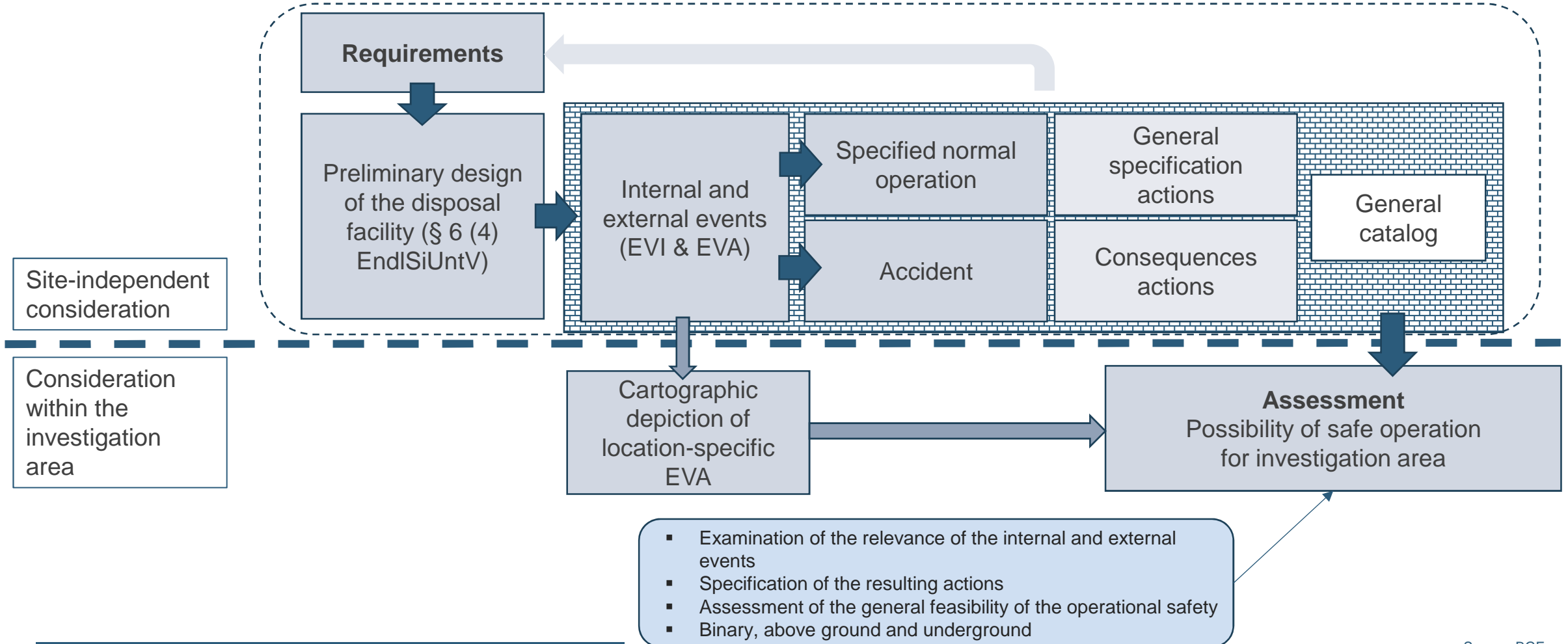
# GENERAL CATALOG FOR OPERATIONAL SAFETY (STATE OF WORK)

## Examples of internal and external events

- Internal events:
  - Failure of technical equipment
  - Release of radioactive substances
  - Explosion internal
- External events:
  - External power supply failure
  - Lightning strike
  - Flooding

# PROCEDURE TO DEMONSTRATE THE SAFE OPERATION IN STEP 2 OF PHASE I

## Consideration within the investigation area (1/2)





# CARTOGRAPHIC DEPICTION OF LOCATION-SPECIFIC EVENTS

## Definition of location-specific events

- External events
- Temporary occurrence in investigation areas
- Can be characterized site-specifically in Step 2 of Phase I
- Impacts on surface subsystems
- No consideration of rock mechanical impacts
  - Not characterizable in the investigation areas
  - Considered in repository design

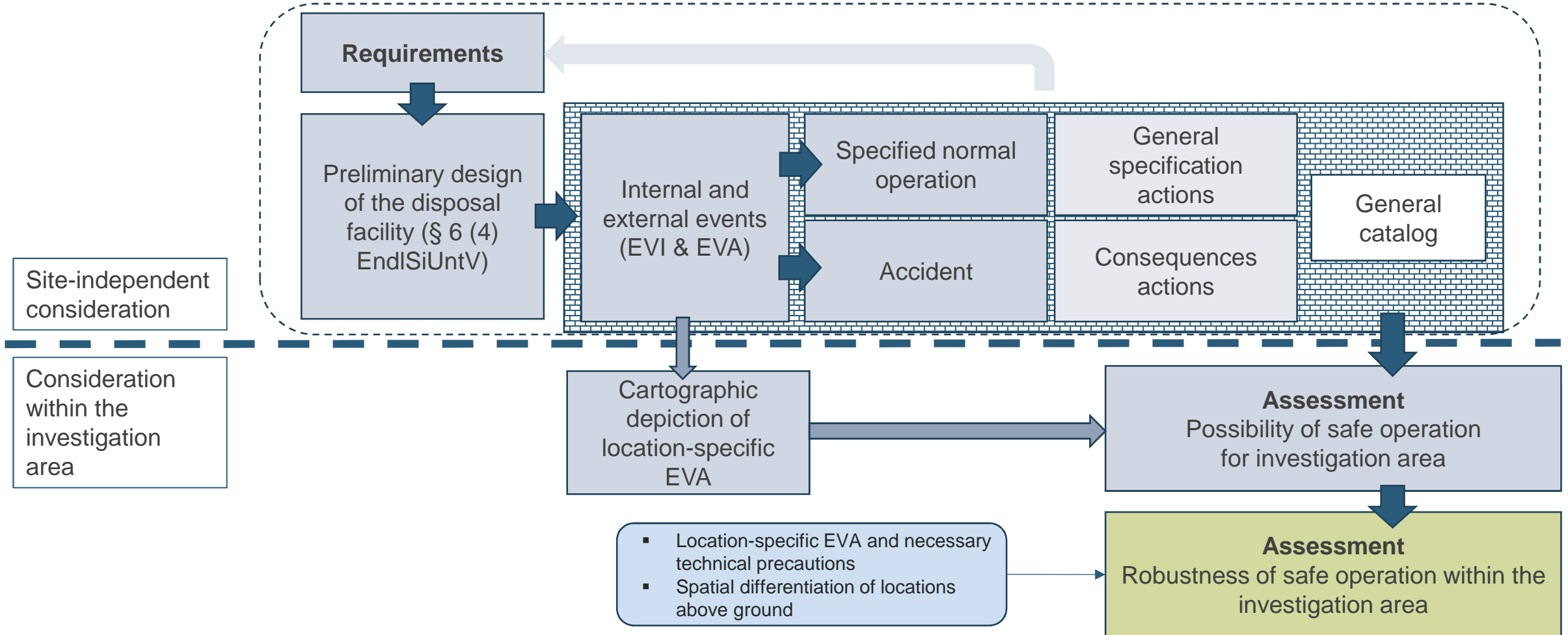
# GENERAL CATALOG FOR OPERATIONAL SAFETY (STATE OF WORK)

## External events – location-specific

- Failure external power supply
- Blowout
- Lightning strike
- Exposure to hazardous substances
- Earthquake
- Explosive pressure wave
- External fire
- Aircraft crash, accidental
- Flooding pit
- Rock mechanical impact
- Flooding
- Landslide
- Wind load
- Snow load
- Access of shaft water into the mine
- Access of solutions and natural gases
- Sinkhole
- Other site-related impacts

# PROCEDURE TO DEMONSTRATE THE SAFE OPERATION IN STEP 2 OF PHASE I

## Consideration within the investigation area (2/2)



# ASSESSMENT OF ROBUSTNESS OF OPERATIONAL SAFETY IN rvSU

- Spatial differentiation of locations above ground
- Assessment of robustness of operational safety as a basis for the balancing assessment of the investigation areas in rvSU
  - Method development not completed
- Cartographic representation of site-specific EVA as a basis
- “Investigation area certificate” for robustness of operational safety:
  - ✚ No site-specific events
  - ✚ Minor technical actions necessary
  - ▬ Occurrence of site-specific impacts
  - ▬ Extensive technical actions necessary

The background of the slide features three distinct mineral specimens resting on a reflective surface. The specimen on the left is a dark, rectangular block with a rough, porous texture. The central specimen is a large, clear, faceted crystal with sharp edges and a complex geometric structure. The specimen on the right is a dark, angular rock fragment with a rough, fractured surface. The entire scene is set against a light blue gradient background.

# SUMMARY

# 03



# SUMMARY

- Non-radiological aspects of operational safety not assessed in detail
  - Taken into account in repository design
- Location-independent “general catalog” contains events to be taken into account and corresponding actions
- Assessment of the basic possibility of safe operation
  - Binary
  - Above ground and underground
- Assessment of robustness operational safety
  - Spatial differentiation
  - Surface

# ABBREVIATIONS

<b>BASEL</b>	Project „Beurteilung der Abhängigkeiten zwischen dem sicheren Bau und Betrieb eines Endlagers für hochradioaktive Abfälle und der Langzeitsicherheit“
<b>BGE</b>	<i>Bundesgesellschaft für Endlagerung</i> – Federal Company for Radioactive Waste Disposal
<b>EndSiAnfV</b>	<i>Endlagersicherheitsanforderungsverordnung</i> – Disposal Safety Requirements Ordinance
<b>EndSiUntV</b>	<i>Endlagersicherheitsuntersuchungsverordnung</i> – Disposal Safety Analysis Ordinance
<b>EVA</b>	<i>Einwirkungen von außen</i> – External events
<b>EVI</b>	<i>Einwirkungen von innen</i> – Internal events
<b>rvSU</b>	<i>Repräsentative vorläufige Sicherheitsuntersuchung</i> – Representative preliminary safety analyses
<b>UR</b>	<i>Untersuchungsraum</i> – Investigation area

# REFERENCES

- BT-Drs. 18/11398: Gesetzentwurf der Fraktionen CDU/CSU, SPD und BÜNDNIS 90/DIE GRÜNEN: Entwurf eines Gesetzes zur Fortentwicklung des Gesetzes zur Suche und Auswahl eines Standortes für ein Endlager für Wärme entwickelnde radioaktive Abfälle und anderer Gesetze, Deutscher Bundestag, Drucksache 18/11398 vom 07.03.2017
- EndSiAnfV: *Disposal Safety Requirements Ordinance* – Endlagersicherheitsanforderungsverordnung vom 6. Oktober 2020 (BGBl. I S. 2094)
- EndSiUntV: *Disposal Safety Analysis Ordinance* – Endlagersicherheitsuntersuchungsverordnung vom 6. Oktober 2020 (BGBl. I S. 2094, 2103)
- K-Drs. 268: Abschlussbericht der Kommission Lagerung hoch radioaktiver Abfallstoffe. Kommission Lagerung hoch radioaktiver Abfallstoffe. Berlin, 5. Juli 2016



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Die Newsletter der BGE



# SAVE THE DATE



**25-28**  
**NOVEMBER**  
**2024**

**9<sup>th</sup> International Conference on Clays  
in Natural and Engineered Barriers for  
Radioactive Waste Confinement**

25<sup>th</sup> - 28<sup>th</sup> November 2024  
supporting programme: 24<sup>th</sup> & 29<sup>th</sup> November

**Hannover/Germany at  
HCC Hannover Congress Centrum**  
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plenary sessions · parallel sessions · poster presentations  
networking events · scientific supporting programme and lively discussions

Organised by **BGE** **BUNDESGESELLSCHAFT  
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In cooperation with **BGR** **Bundesanstalt für  
Geowissenschaften  
und Rohstoffe**

**9<sup>TH</sup> Clay CONFERENCE**