Radiation Safety Institute of Canada
Institut de radioprotection du Canada

Switzerland's Deep Geological Repository: Planning for Radioactive Waste Over Generations

Guest: Susanne Pudollek (Deputy Head of Repository Safety and Inventory at Nagra)

Host: Lynn MacDonald

February 5, 2026

Good Science in Plain Language®

Land Acknowledgement

Webinar Functionality

Audio and video

- During the presentation, from the presenters only
- Captions: More>Language and speech>Turn on live captions

Use the Chat feature to talk to discuss with everyone

Use Q&A feature to ask questions for Q&A portion

Posted on webinar page

- Video, answers to questions, copy of the slides

Follow up email will be sent

- Topics covered, time of attendance

In This Session

Canada's Deep Geological Repository Program

Switzerland's Deep Geological Repository Program

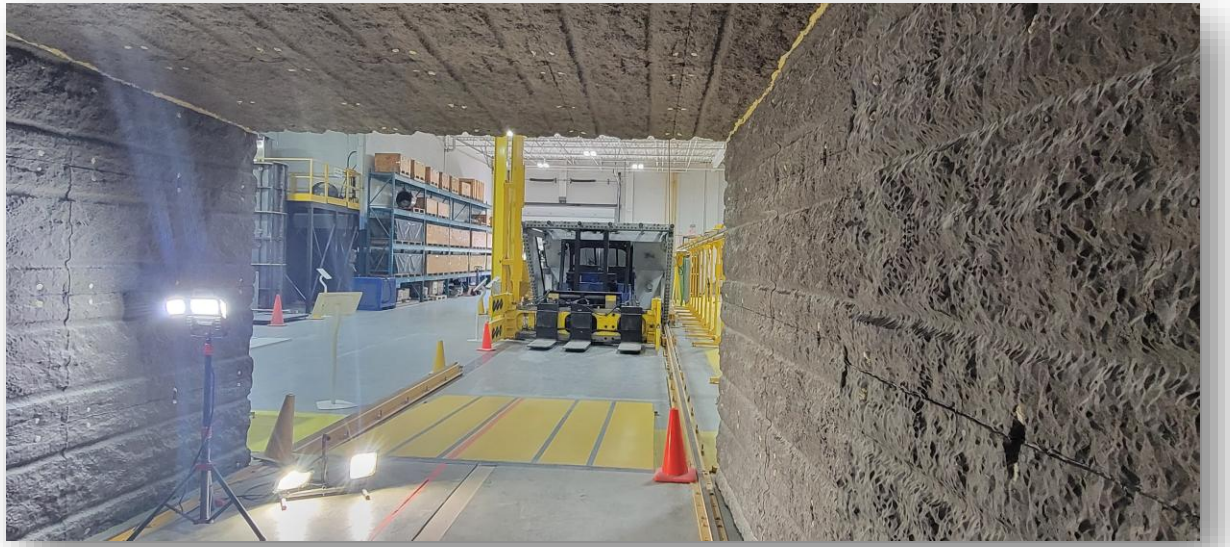
- Switzerland & Legal Aspects
- Nagra
- Nuclear Facilities & Radioactive Waste
- Project History
- Project Cornerstones
- Current Concept
- Ensuring Long-term Safety

Movement break

- Charlmane Wong, Ji Hong Tai Chi & Qi Gong Richmond Hill

Canada's DGR

- NWMO
- DGR for
  - Used nuclear fuel
  - Intermediate- and high-level radioactive waste
- Wabigoon Lake Ojibway Nation / Township of Ignace
- Initial Project Description now posted to Impact Assessment Agency of Canada website
- Aim to be operational in early 2040s



Images courtesy of Nagra

THE PROJECT OF THE CENTURY

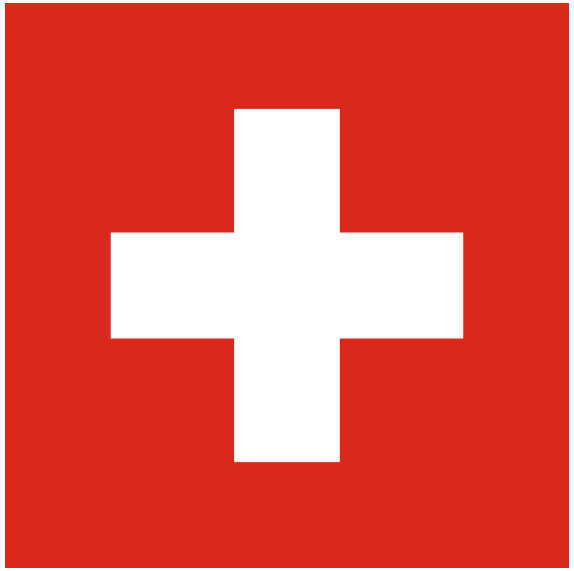
SAFE DISPOSAL OF RADIOACTIVE WASTE IN SWITZERLAND

Radiation Safety Institute of Canada, 05.02.2026

Susanne Pudollek – Deputy Department Head Repository Safety & Inventory

nagra.

SWITZERLAND



- Federal Republic
- 4 linguistic & cultural regions
  - German, French, Italian, Romansh
- Tradition of **multilingualism & cultural pluralism**
- Swiss nationhood described as **«nation of volition»**
- Strong common history of **federalism & direct democracy**

LEGAL ASPECTS

- Guiding Principle:

❖ **Polluter pays.**

- Nuclear Energy Law:

❖ **Radioactive waste has to be disposed off in geological repositories.**

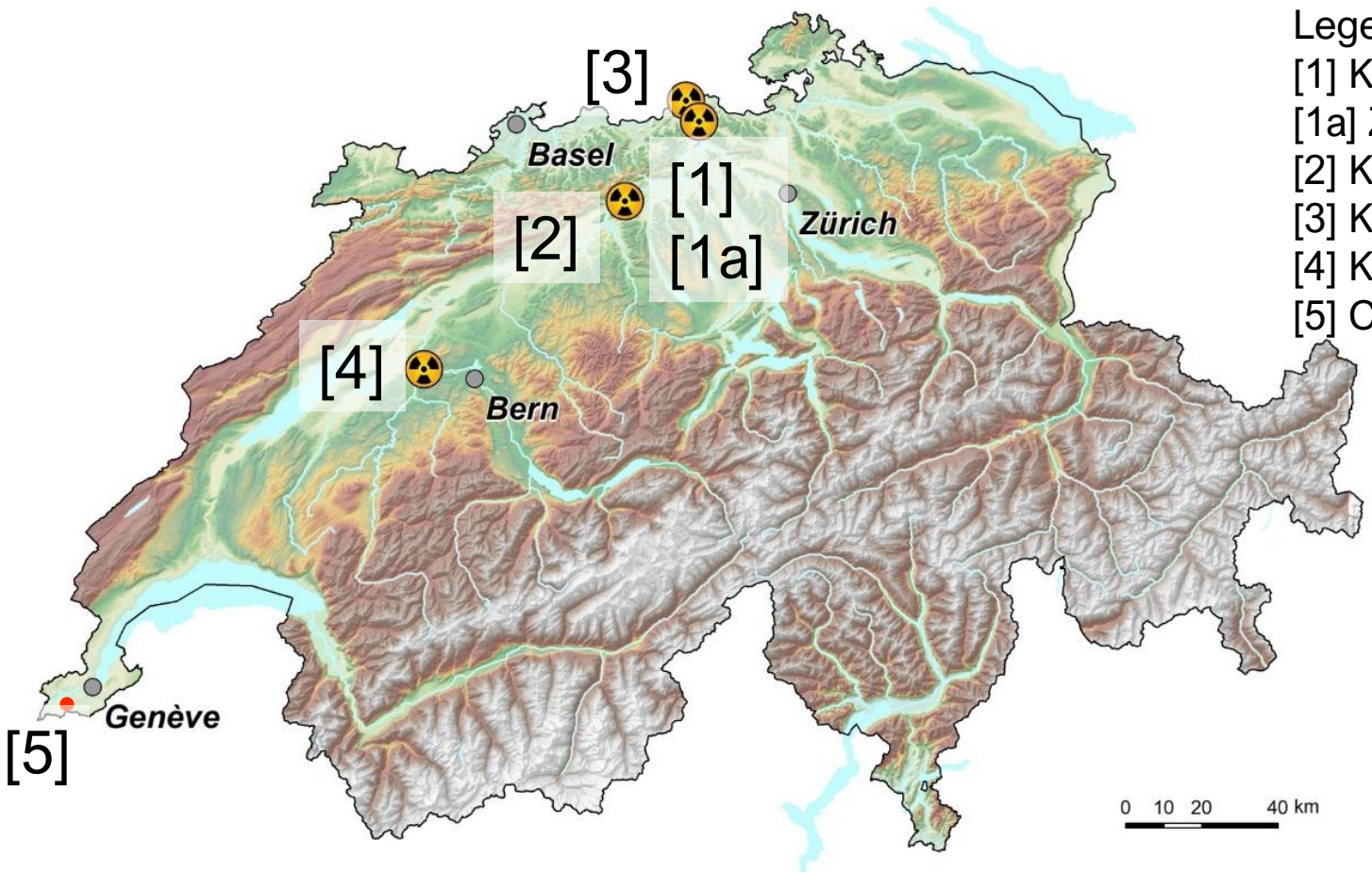
NAGRA – NATIONAL COOPERATIVE FOR DISPOSAL RAD. WASTE

- Founded 1972
- Owned by the waste producers
  - NPP-Owners Axpo, Alpiq, KKG, BKW
  - and the Swiss state

Mission:

Dispose of
Swiss radioactive waste.

NUCLEAR FACILITIES



Legend:
[1] KKB Beznau I & II: PWR (UO_2 & MOX)
[1a] Zwilag & PSI
[2] KKG Gösgen: PWR (UO_2 & MOX)
[3] KKL Leibstadt: BWR (UO_2)
[4] KKM Mühleberg: BWR (UO_2) – in decommissioning
[5] CERN

NUCLEAR FACILITIES – NUCLEAR POWER PLANTS

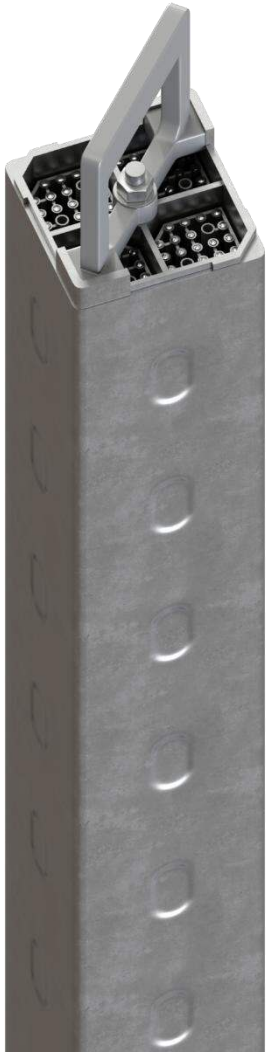
NPP Mühleberg © BKW

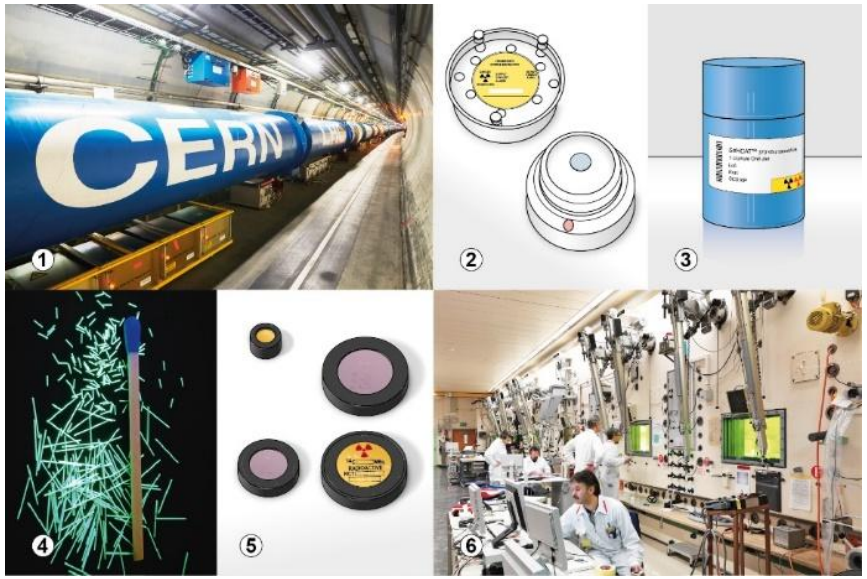
NPP Gösgen © KKG

NUCLEAR FACILITIES – HOT CELLS @ PAUL-SCHERRER-INSTITUTE

RADIOACTIVE WASTE

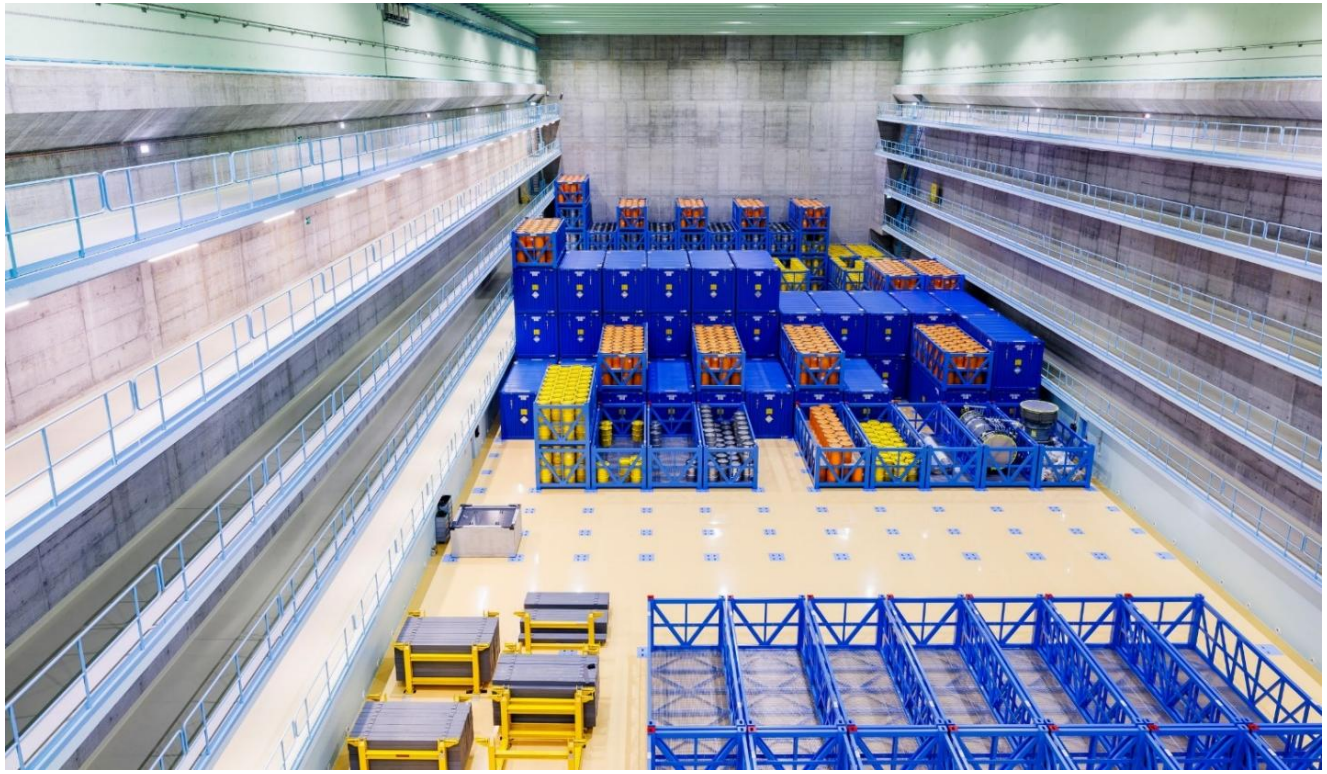
- Low/Intermediate Level Waste
  - NPPs
  - MIR
    (Medicine, Industry,
    Research)
- High Level Waste
  - Spent Fuel
  - Vitrified waste from
    reprocessing





CENTRAL INTERIM STORAGE - ZWILAG

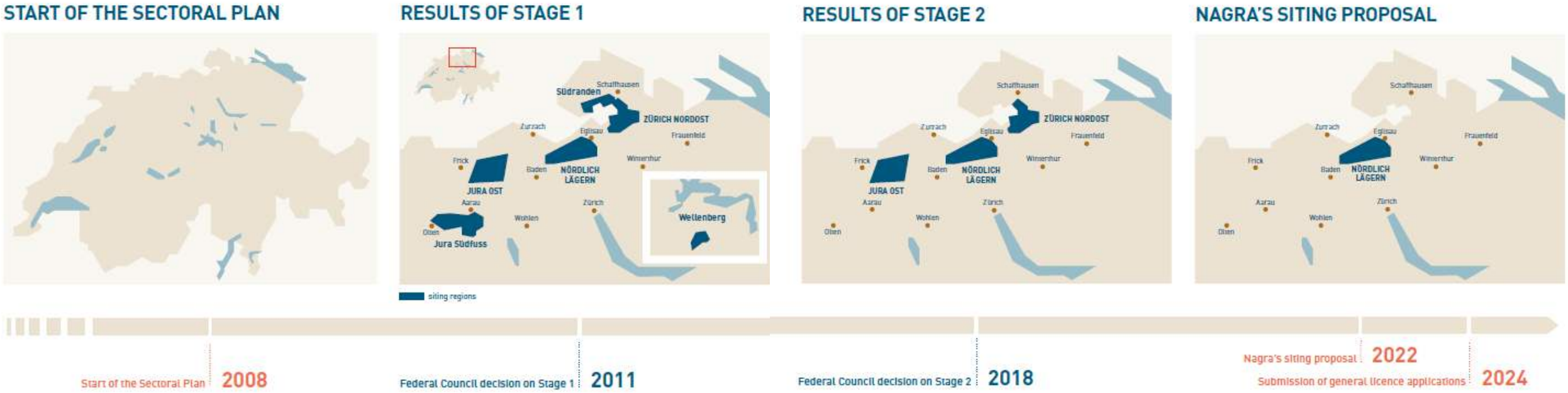
Transport/Storage Casks (HLW) © Zwilag



L/ILW interim storage © Zwilag

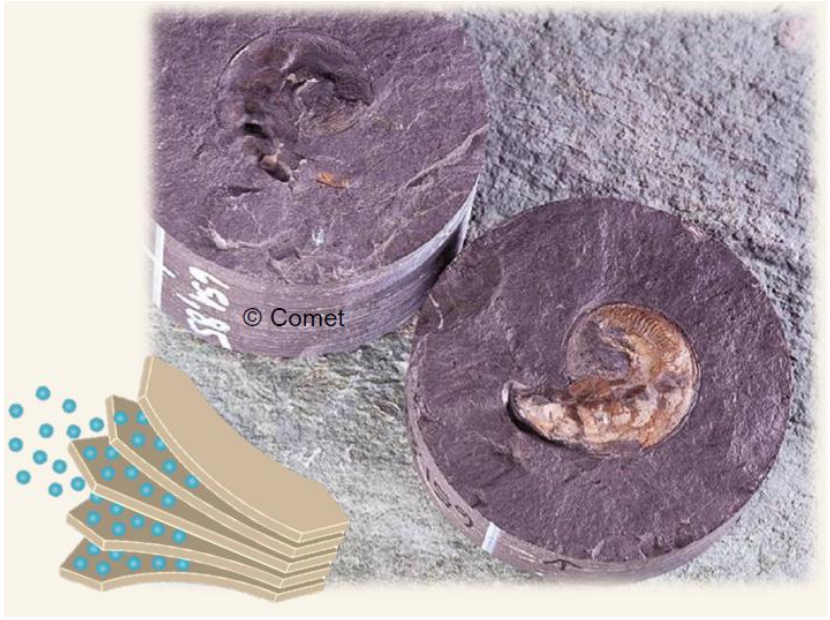
SITE SELECTION - HISTORY

- Proof of Disposability accepted
  - L/ILW - 1988/94
  - HLW - 2006

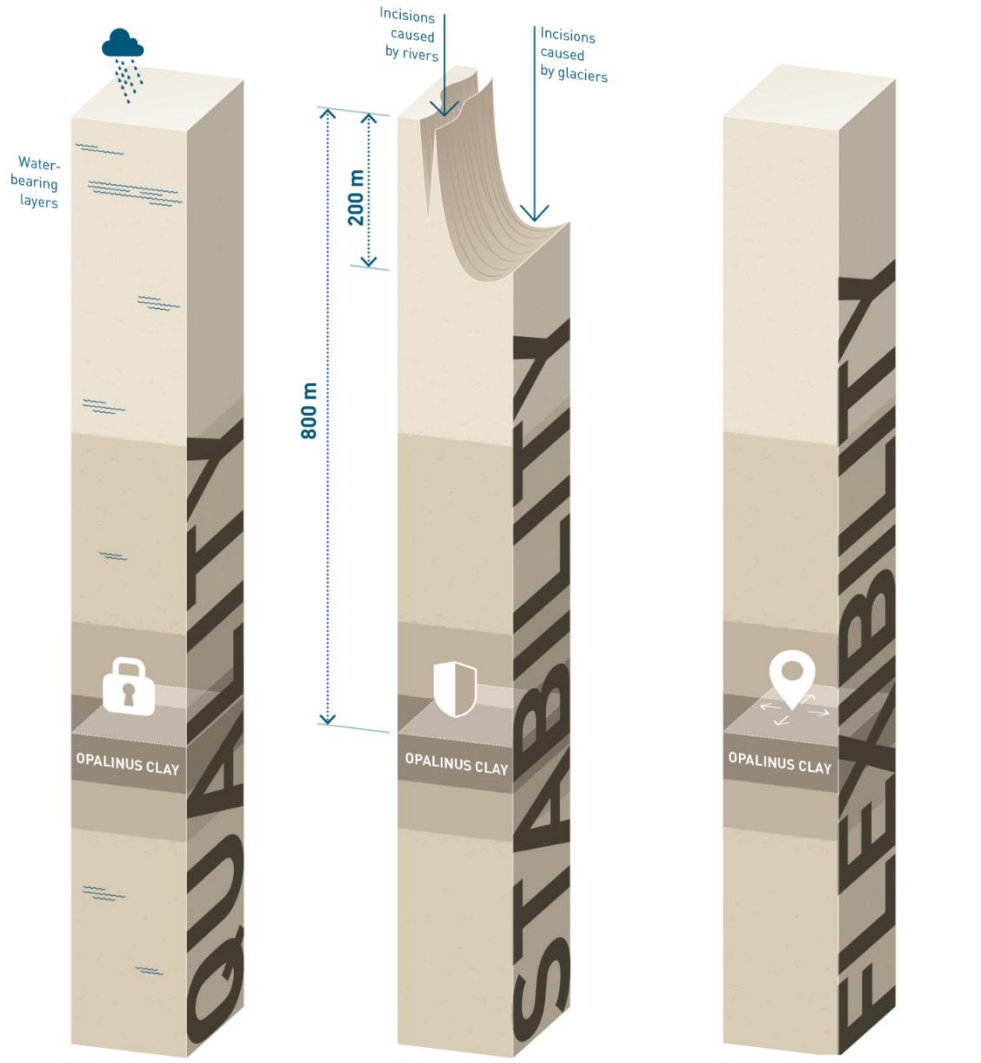


HOST ROCK OPALINUS CLAY @ SWITZERLAND

- Swellable clay minerals
- Sorption capacity
- Very low permeability
- Homogenous layer



NÖRDLICH LÄGERN – PROPOSED SITE

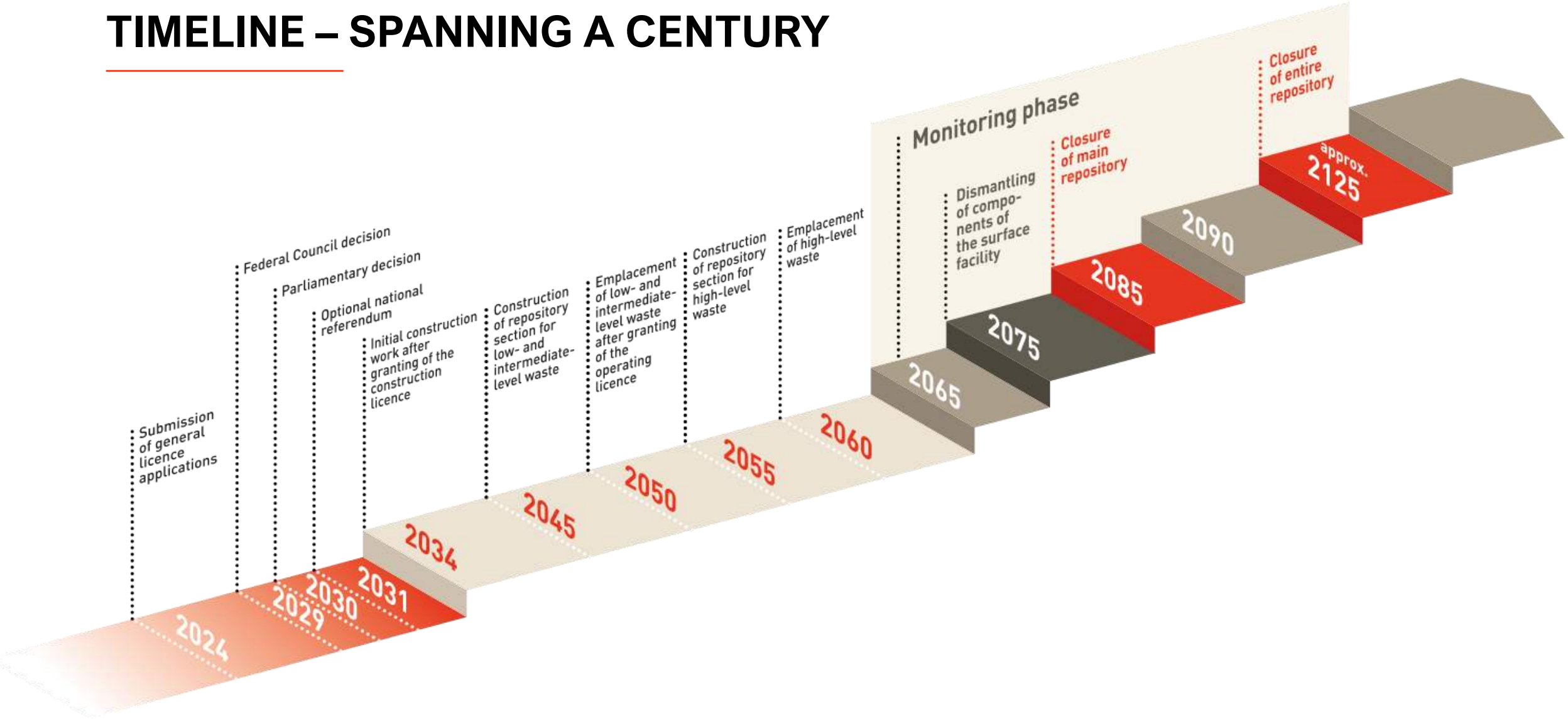


THE GEOLOGICAL BARRIER IN NÖRDLICH LÄGERN HAS THE BEST WASTE CONTAINMENT CAPACITY.

IN NÖRDLICH LÄGERN, THE LONG-TERM STABILITY OF THE GEOLOGICAL BARRIER IS GREATEST.

NÖRDLICH LÄGERN HAS THE LARGEST SUITABLE AREA, THUS PROVIDING THE GREATEST FLEXIBILITY FOR THE LAYOUT OF THE REPOSITORY.

TIMELINE – SPANNING A CENTURY



GENERAL LICENSE APPLICATION

§

Nuclear Energy Law

Art. 12 *To build a nuclear facility (e.g. a geological repository) one needs a general licence of the federal council*

- **Demonstration of Disposal Feasibility** for all waste categories already **accepted**

Culmination of site selection → choice of the site

Political decision for the project at the chosen site

3 CORNER STONES OF THE PROJECT

COMMUNICATION

- Live transparent communication
- Engage & foster open dialogue
- Provide Information

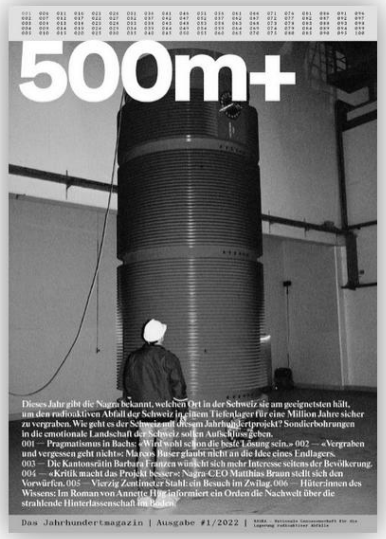
- Public participation is part of the site selection process

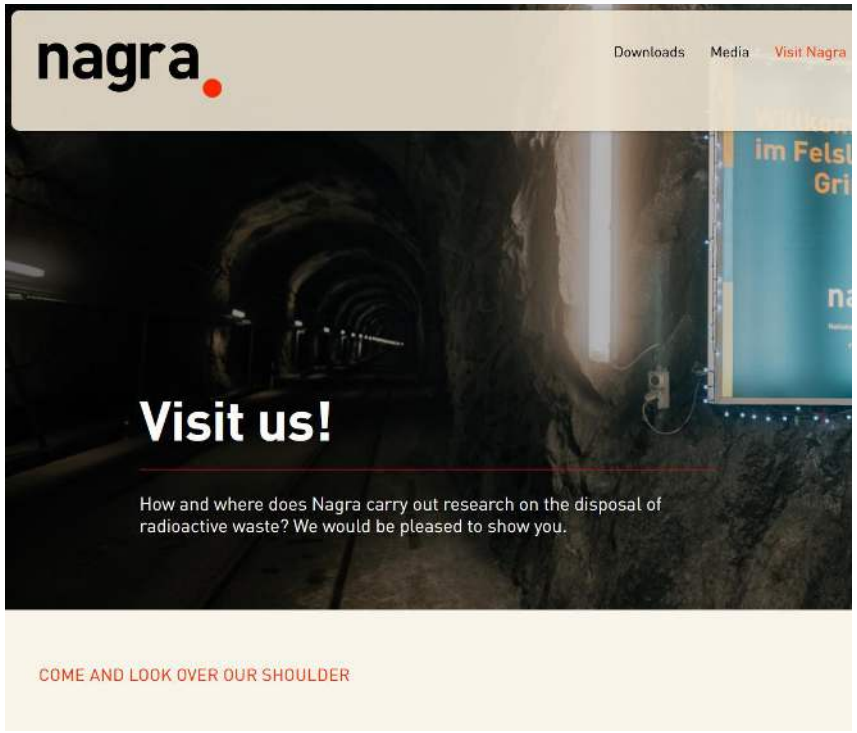
Ausgabe #4/2025

Ausgabe #3/2024

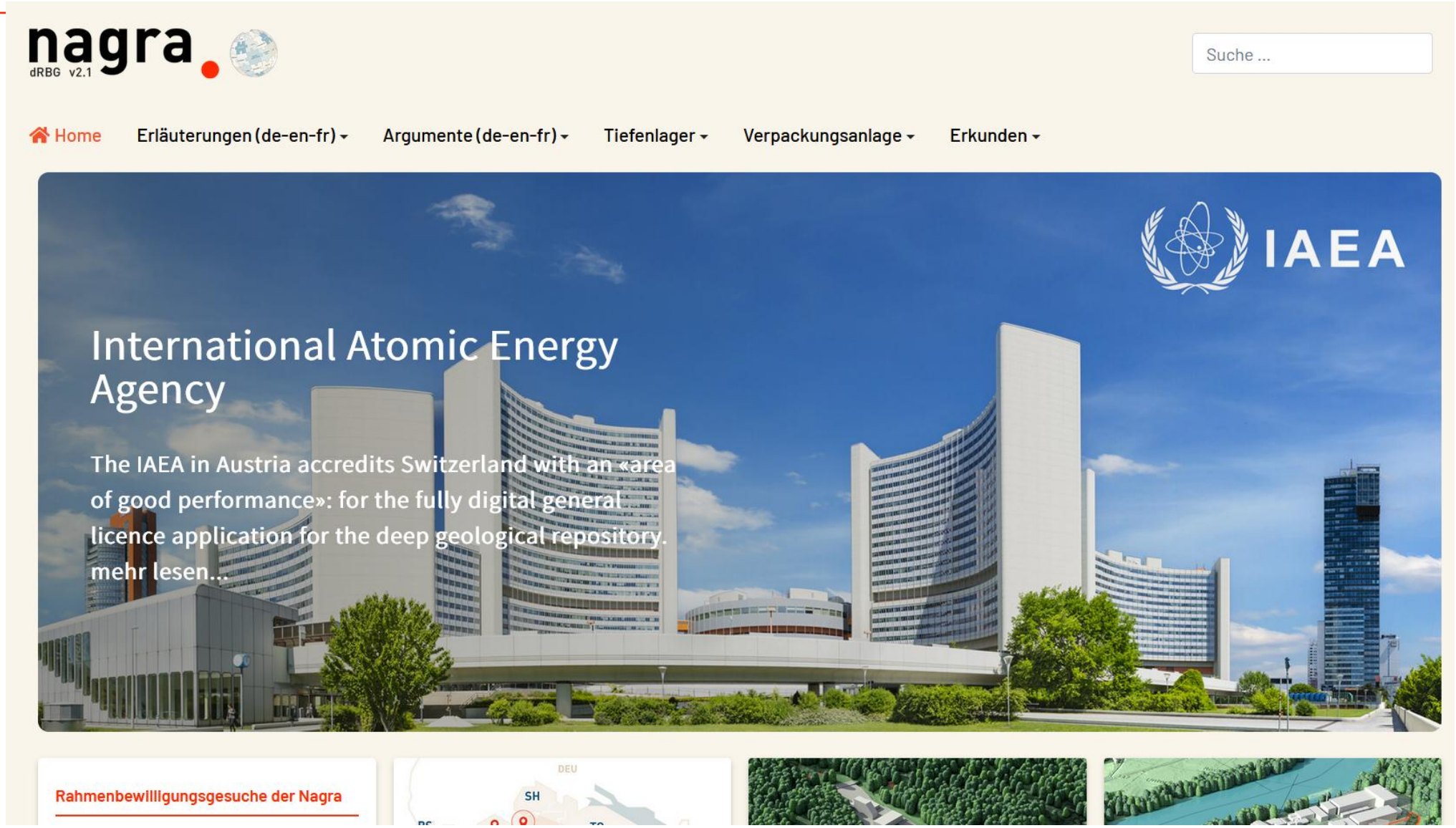
Ausgabe #2/2023

Ausgabe #1/2022

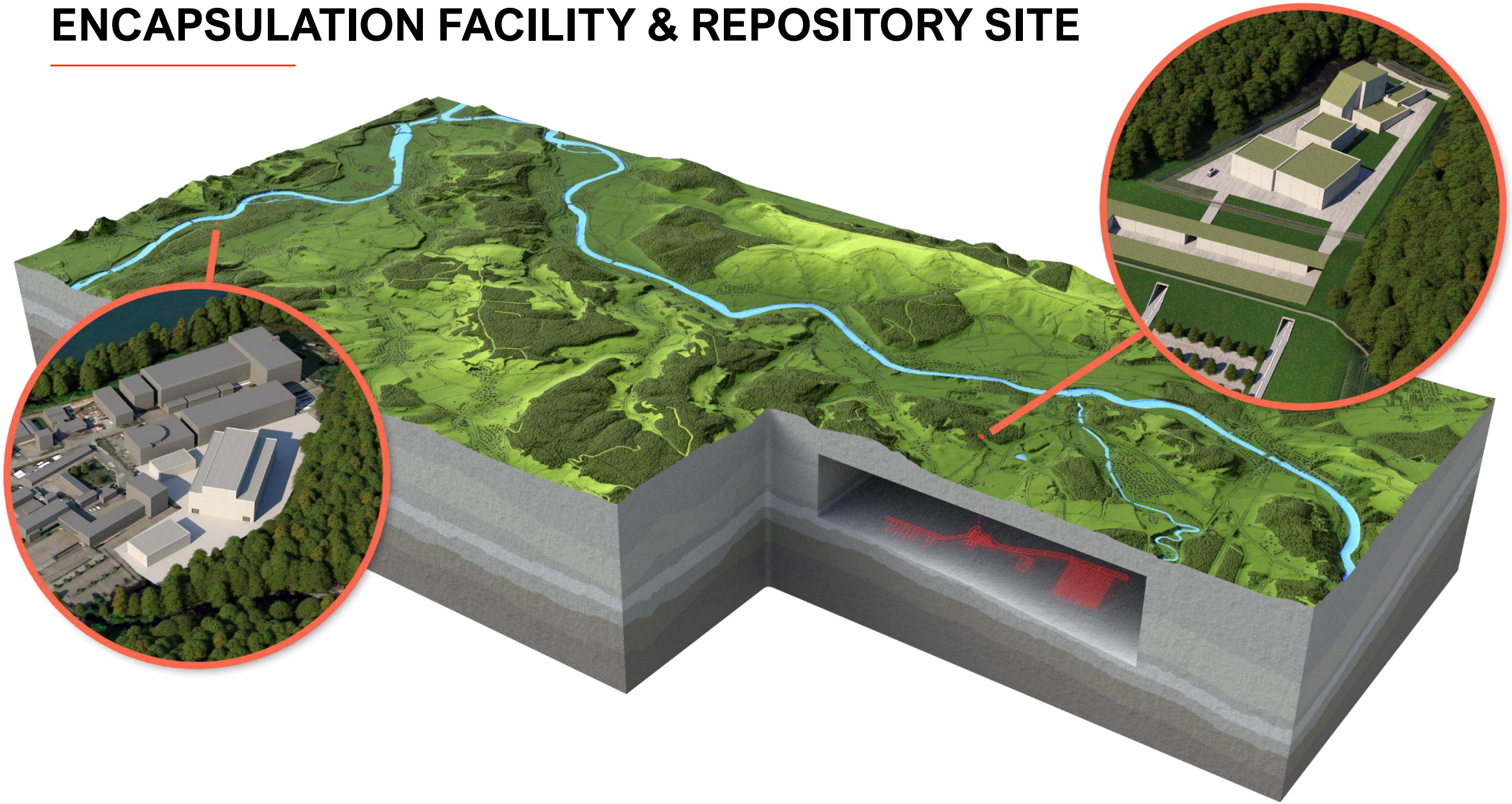




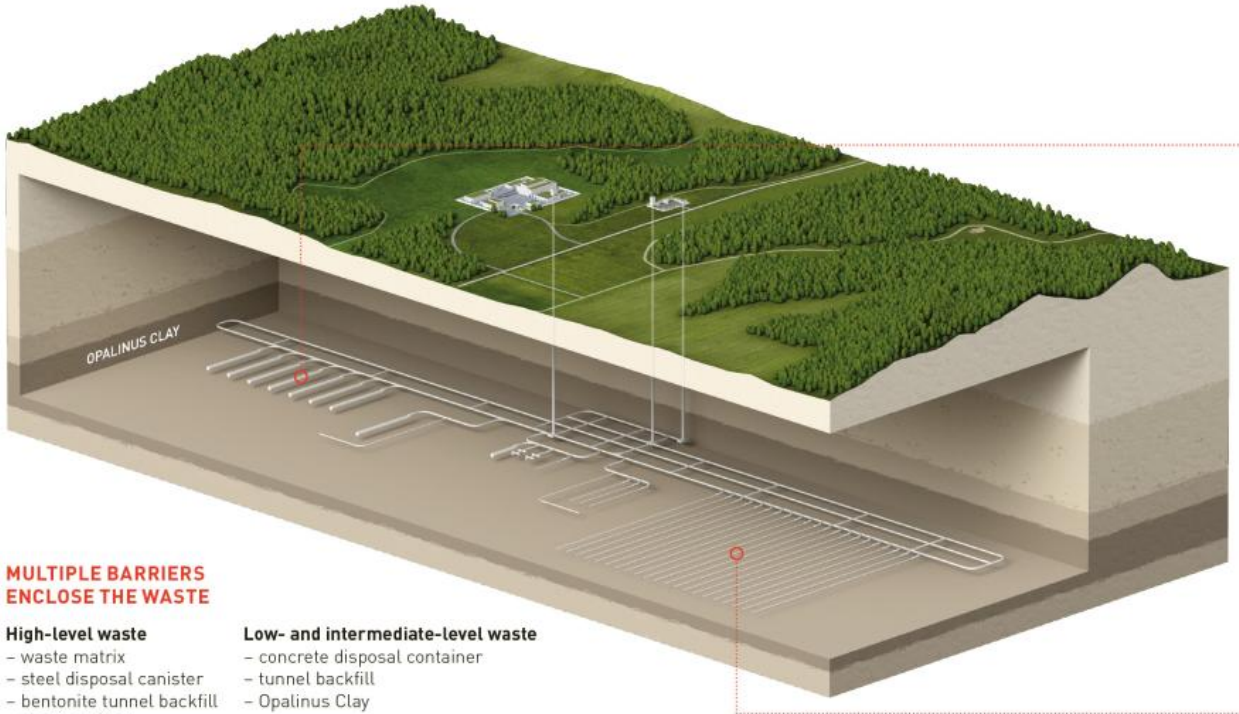
TRANSPARENT COMMUNICATION – DRBG.CH



ENCAPSULATION FACILITY & REPOSITORY SITE



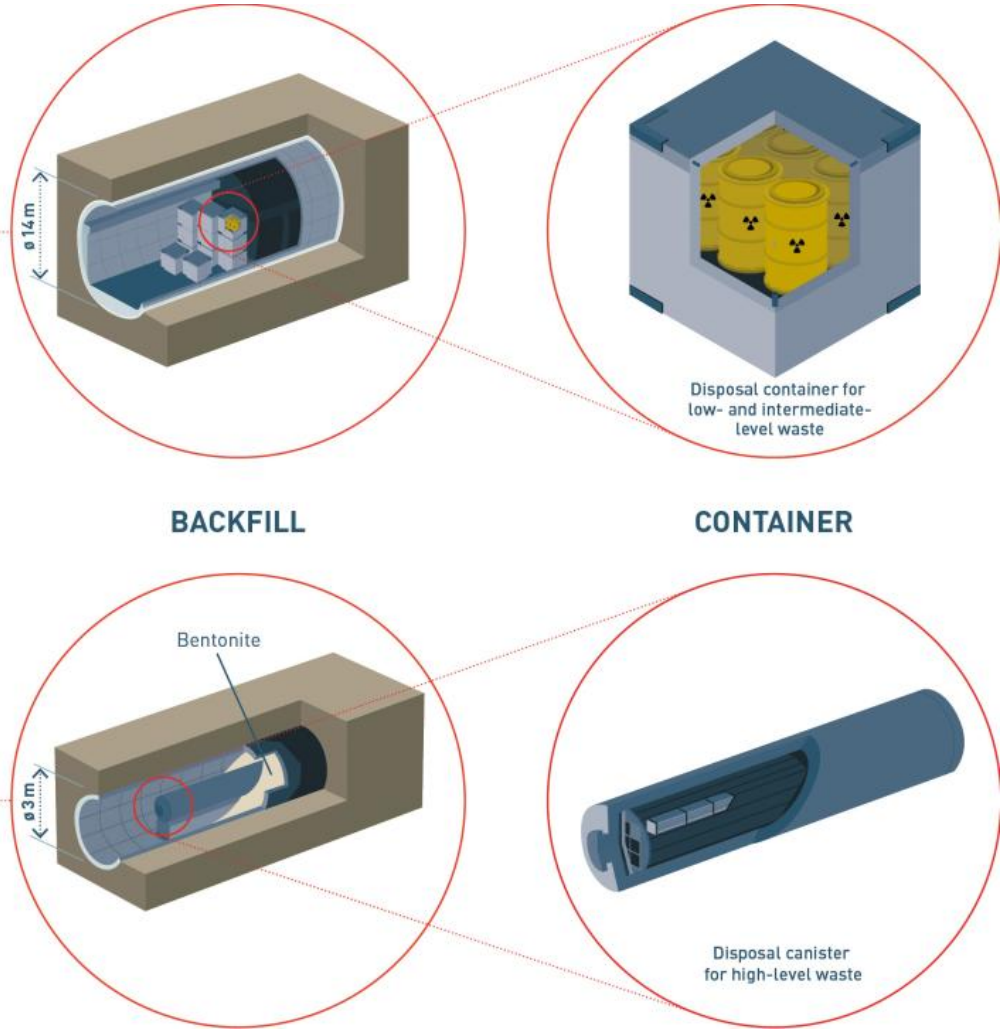
CURRENT PRELIMINARY DISPOSAL CONCEPT



MULTIPLE BARRIERS ENCLOSE THE WASTE

High-level waste
- waste matrix
- steel disposal canister
- bentonite tunnel backfill
- Opalinus Clay

Low- and intermediate-level waste
- concrete disposal container
- tunnel backfill
- Opalinus Clay



SAFETY CASE

Objective

- Deep geological disposal of radioactive waste has to ensure the long-term protection of humans and the environment from the effects of ionising radiation, without imposing undue burdens and obligations on future generations.

Criteria

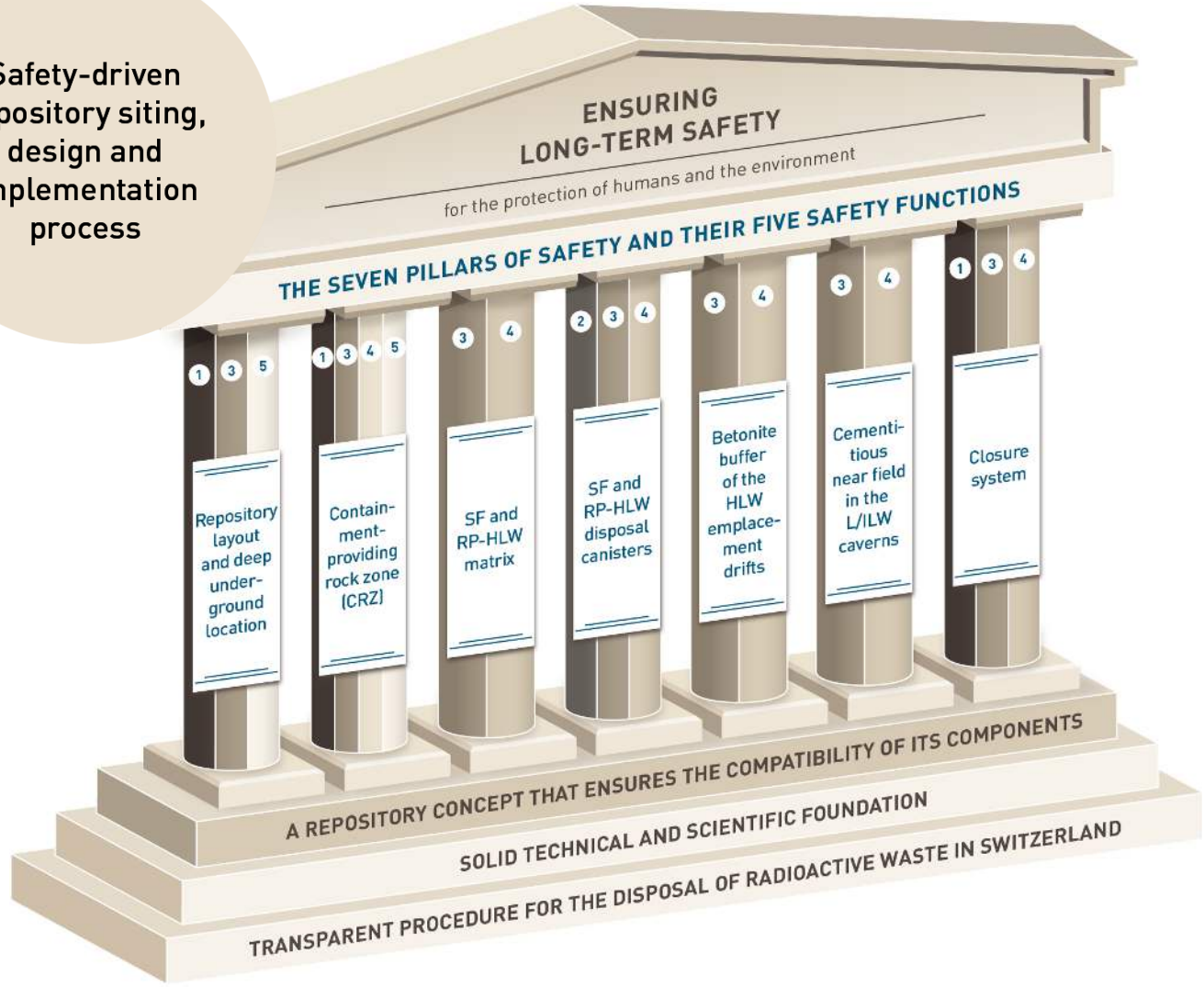
a) Any future evolution of a deep geological repository must not lead to the release of radionuclides causing an individual dose exceeding 0.1 mSv per year.

b) During the assessment period, the radiological consequences of inadvertent human intrusion into the deep geological repository has to be assessed.

c) After the end of the assessment period, the effects on the surface must not be significantly higher than the average current radiation exposure of the Swiss population.

ENSURING LONG-TERM SAFETY

Safety-driven repository siting, design and implementation process



- Development by Nagra over the past 20 year:
  → Stable and mature safety and repository concepts
  → Passive and complementing multi-barrier system

- In line with international guidance and experience

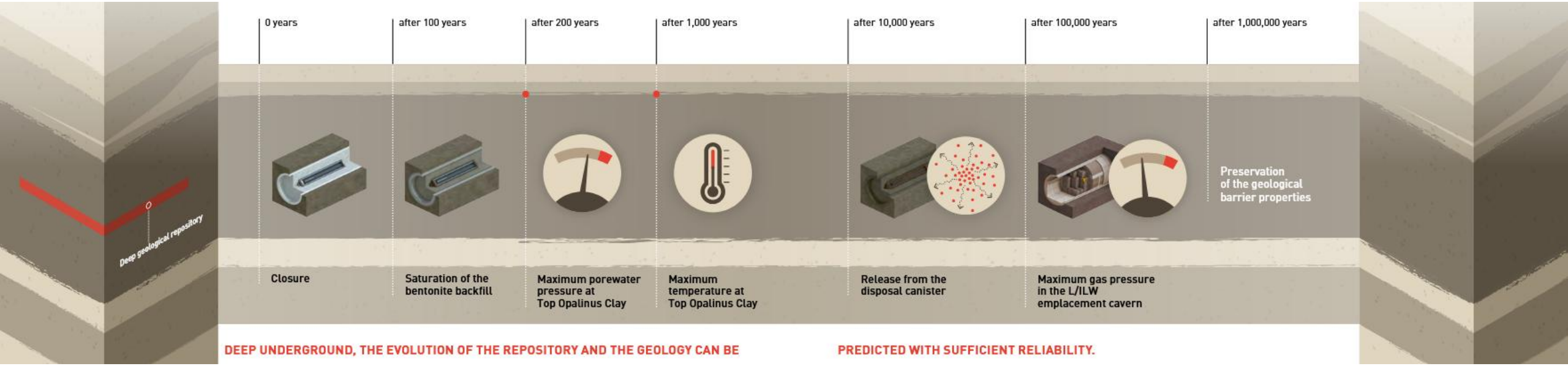
SAFETY FUNCTIONS

1. **Isolation** of the radioactive waste from humans and the environment
2. **Complete containment** of radionuclides for a period of time
3. **Immobilisation, retention, and slow release** of radionuclides
4. **Compatibility** of the components of the repository system
5. **Long-term stability** of the multi-barrier system regarding long-term geological and climatic evolution

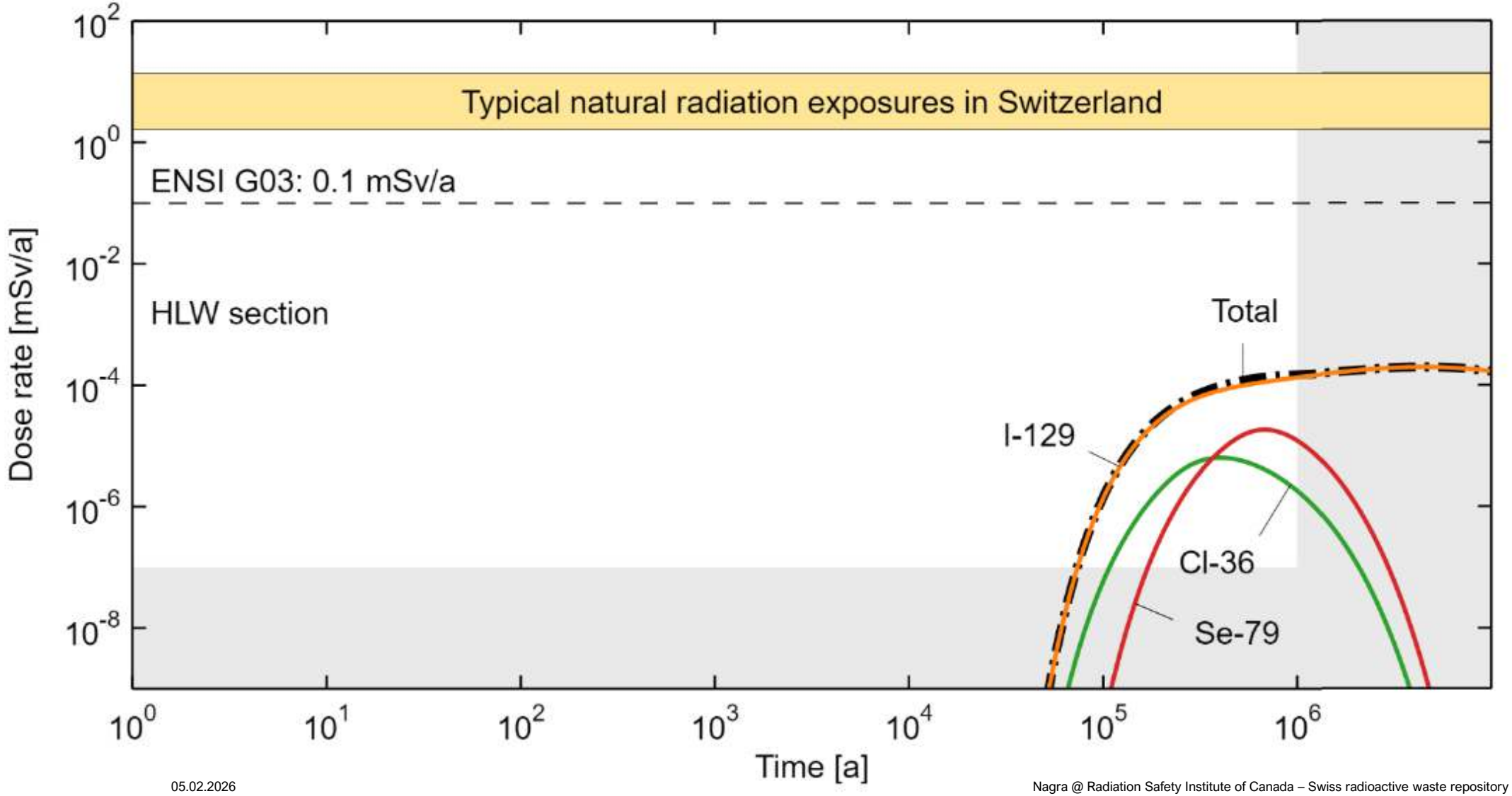
TECHNICAL & SCIENTIFIC FOUNDATION

UNCERTAINTIES AT THE EARTH'S SURFACE ARE TAKEN INTO ACCOUNT BY MEANS OF UNFAVOURABLE ASSUMPTIONS

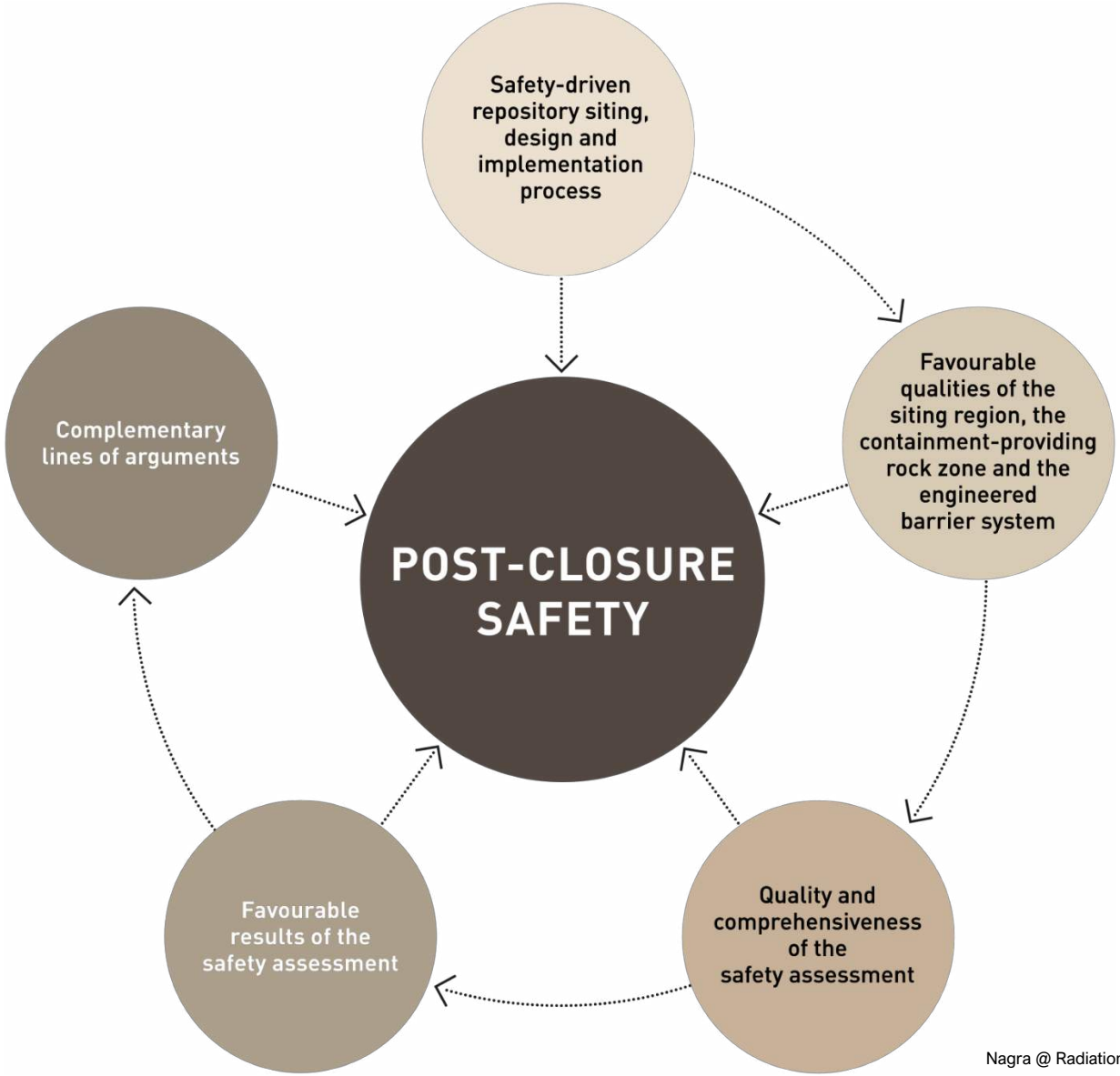
TECHNICAL & SCIENTIFIC FOUNDATION



RADIOLOGICAL CONSEQUENCES – REFERENCE CASE



ENSURING LONG-TERM SAFETY



THANK YOU FOR YOUR INTEREST!

QUESTIONS?

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Thank you for listening!

www.radiationsafety.ca

1-800-263-5803

info@radiationsafety.ca

Wellness Break

Ji Hong Tai Chi & Qi Gong, Richmond Hill, ON

Resources

- https://nagra.ch/en/why-nagra/
- https://www.ch-info.swiss/en/edition-2025/edition-2025/deckblatt-ausgabe-2025
- https://www.nwmo.ca/
- https://www.cnsc-ccsn.gc.ca/eng/waste/deep-geological-repositories/