

Blue Ribbon Commission
Open Meeting, Eurajoki

Finnish Experience: Facility Design and ONKALO

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POSIVA



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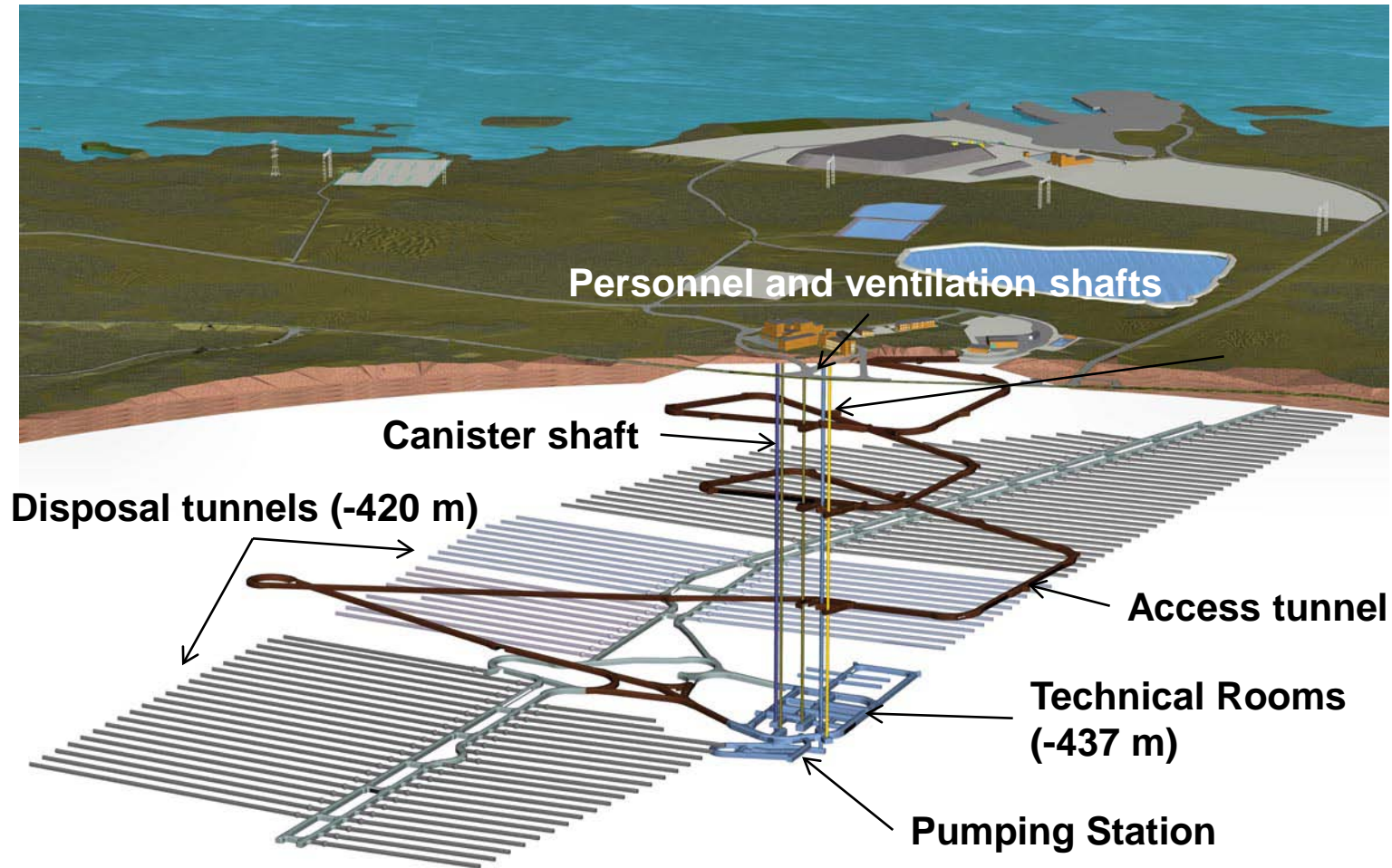
Location of ONKALO



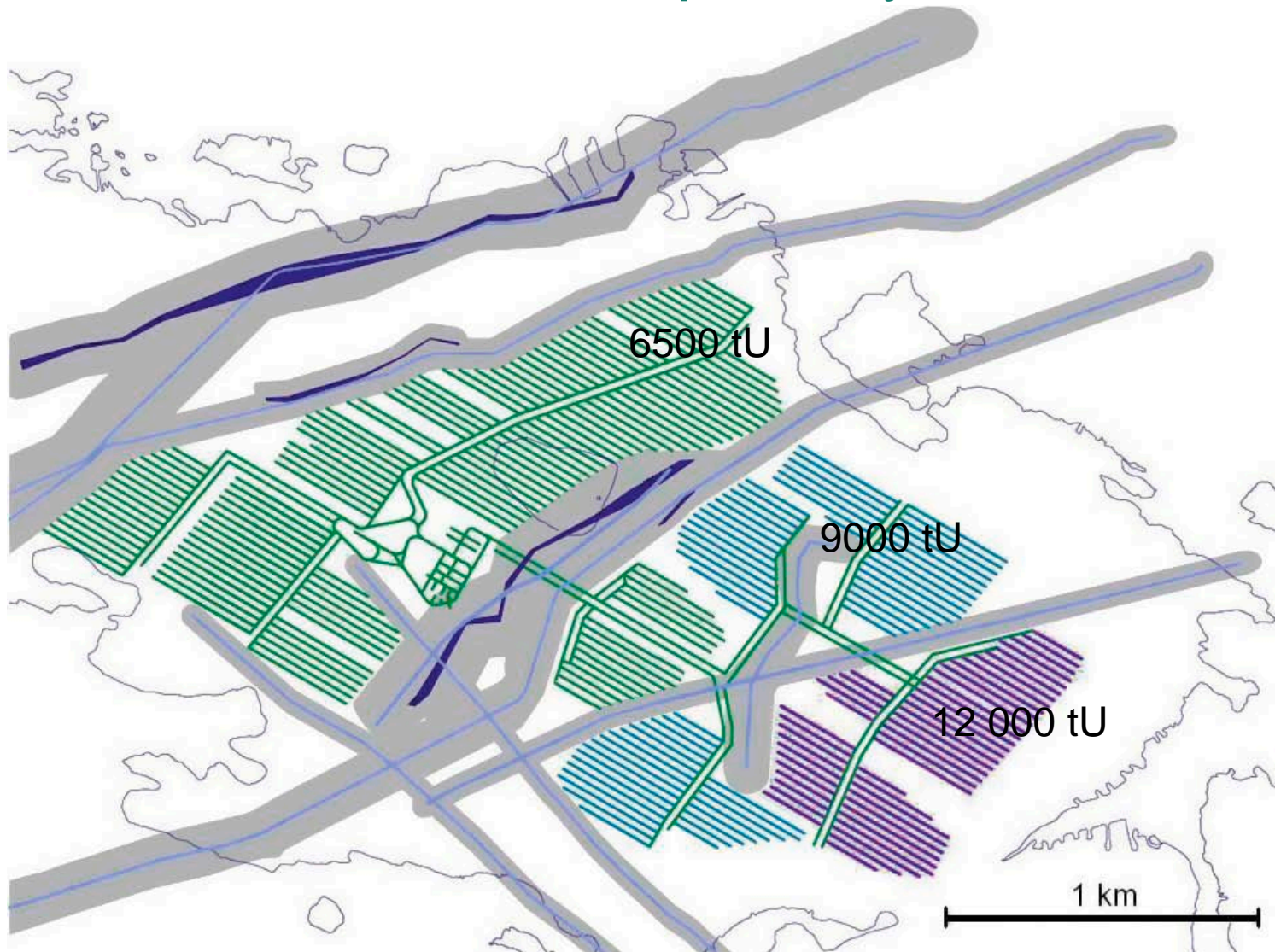
Facility design - progress in steps

- 2001-2003 Preliminary Design, Phase 1
 - Connection of ONKALO and deep repository before the start of construction.
 - Adapting the facility design to land use and infrastructure of Olkiluoto
- 2004-2006 Preliminary Design, Phase 2
 - Optimisation of facility design to Olkiluoto
 - Guidance of the design and implementation of ONKALO
 - Basic report material for safety assessment studies
- 2007-2009 Outline plan (update EIA)
 - Basic design material for license application
 - Basic material for assessments for long-term safety and operational safety
 - Basis for development of procurement procedures (canisters, bentonite, etc.)
- 2009-2012 Preparing Construction Licence Application

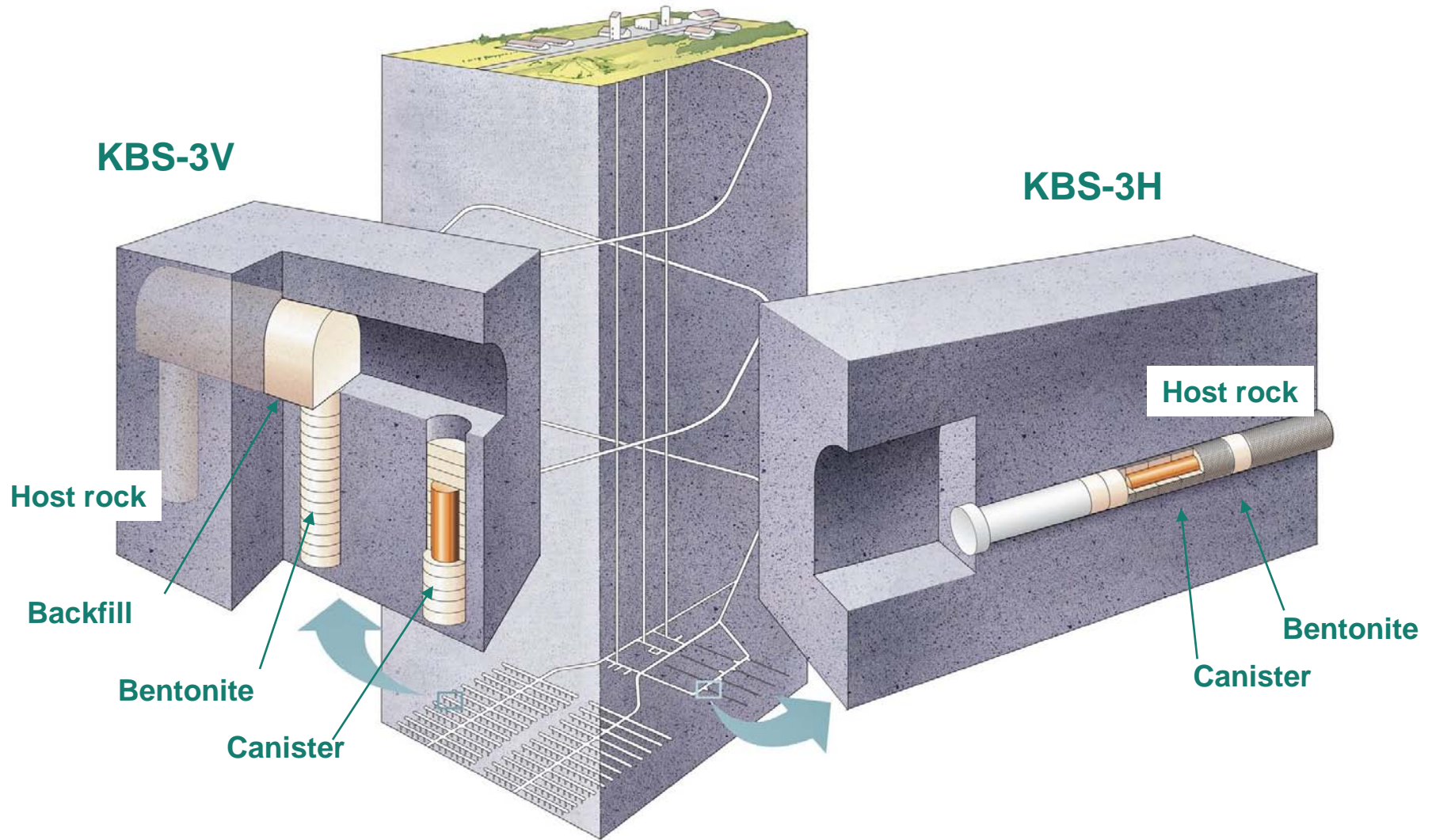
Repository Design



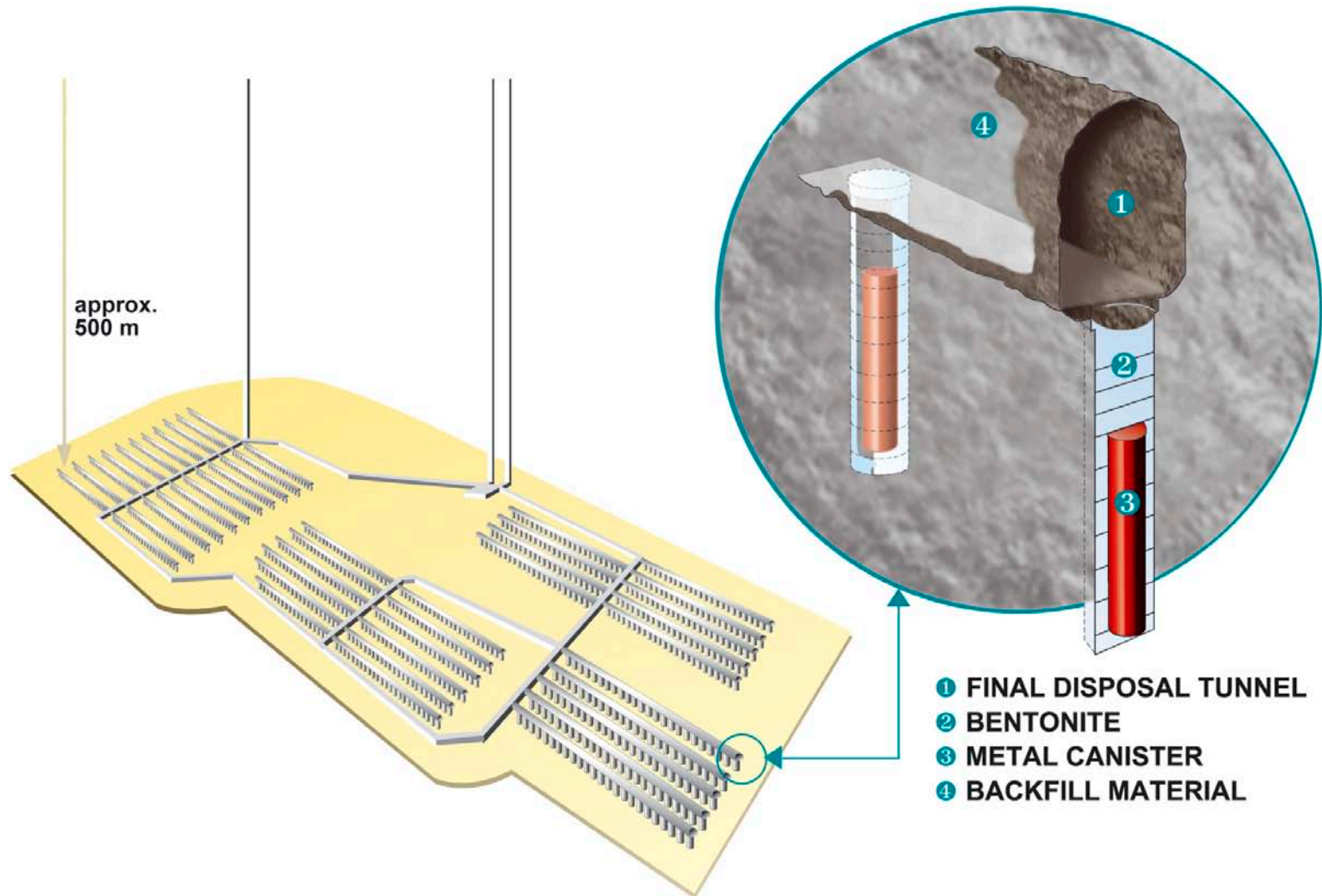
Extension of the final repository



KBS-3 disposal concept: alternatives

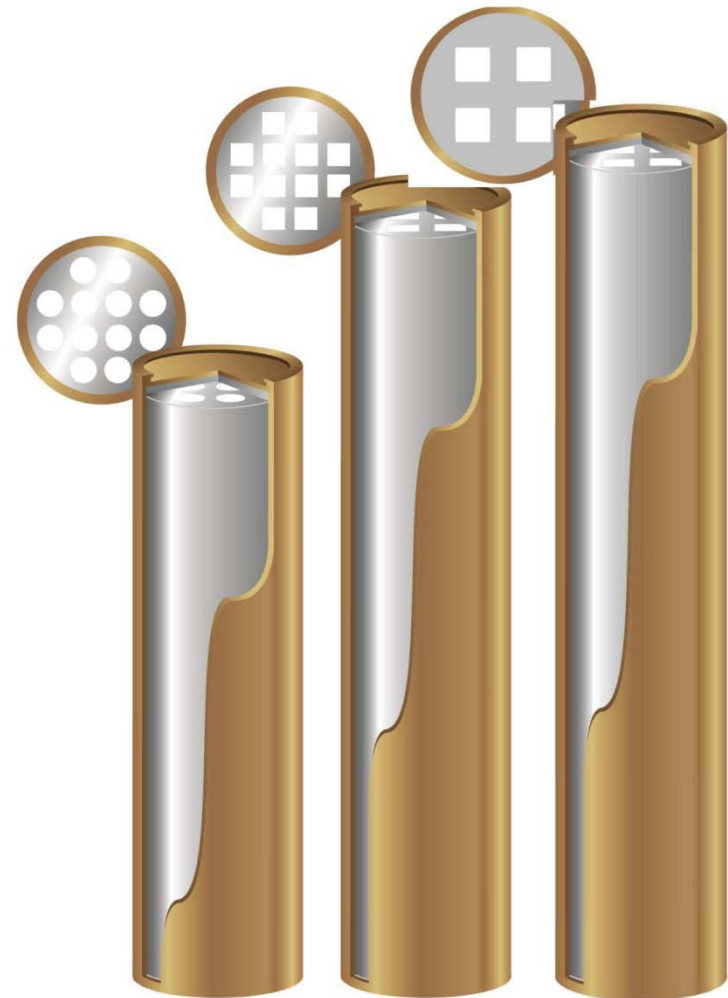


Isolation principle

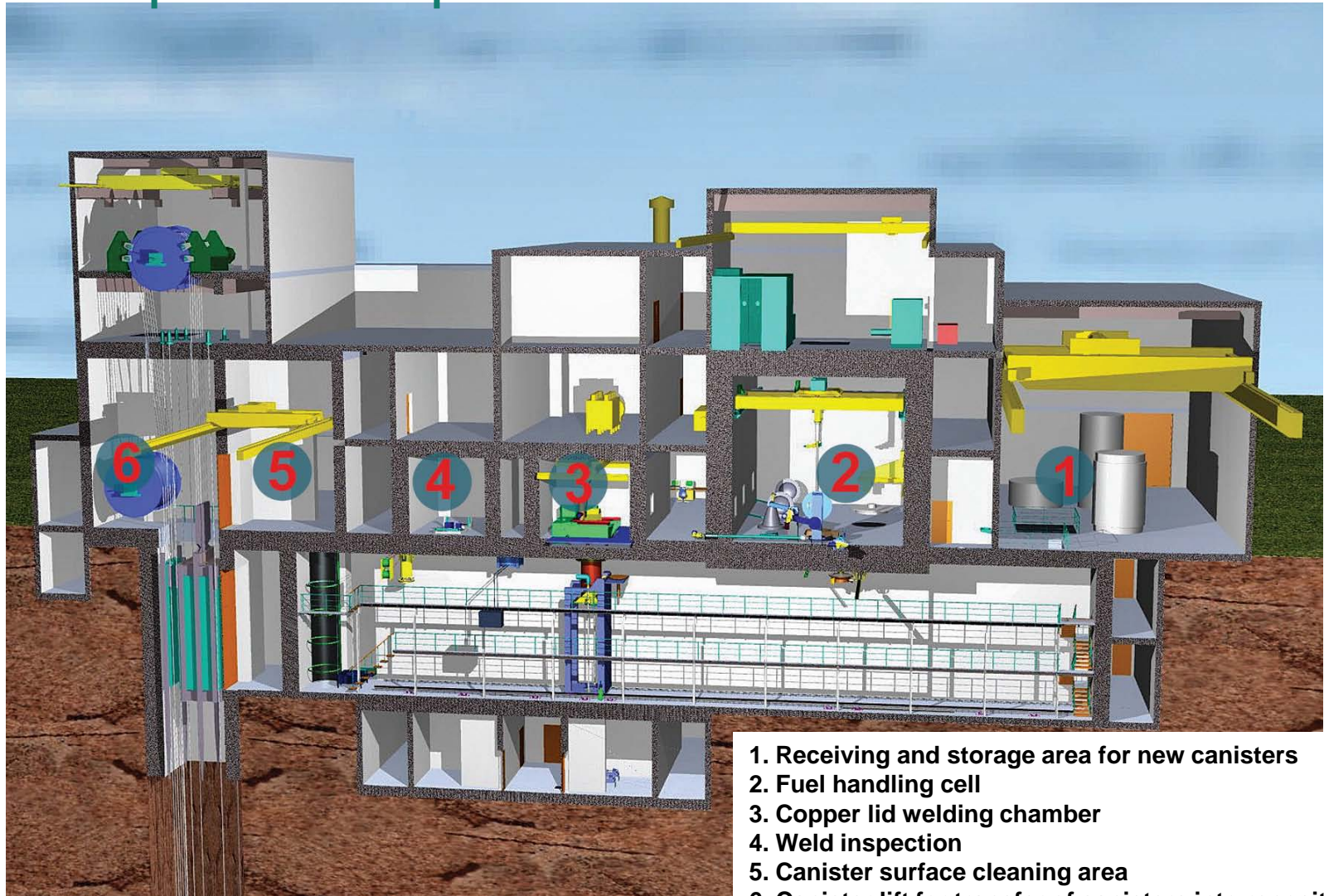


Encapsulation technology: Canister design

- Copper canister
 - Long-term tightness
 - Wall thickness 50 mm
 - Length 3.6 m; 4.7 m; 5.2 m
 - Diameter 1.052 m
- Cast iron insert
 - The weight-carrier
 - Nodular graphite, optimized in strength and ductility
 - For 12 fuel assemblies
 - 4 fuel assemblies for OL3
- Development of acceptance criteria
- Materials and main dimensions are fixed, details are to be specified
- Total amount of canisters about 2800
 - LO about 700,
 - OL1-2 about 1200,
 - OL3 about 900



Encapsulation plant



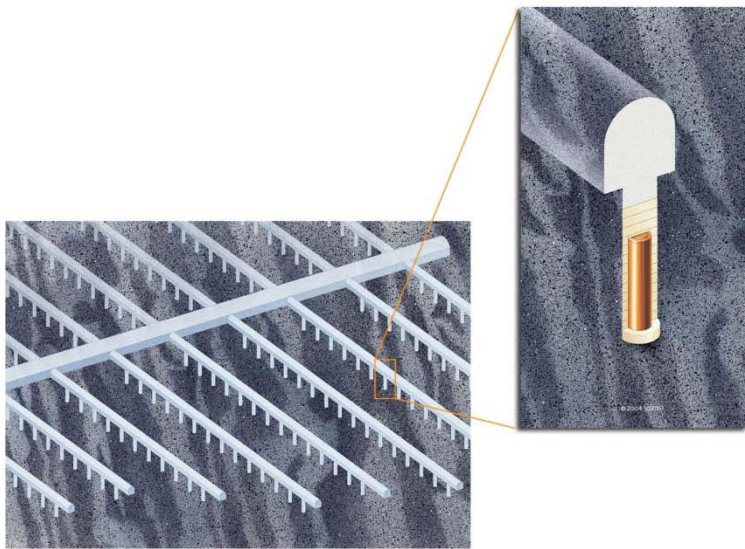
1. Receiving and storage area for new canisters
2. Fuel handling cell
3. Copper lid welding chamber
4. Weld inspection
5. Canister surface cleaning area
6. Canister lift for transfer of canisters into repository

Current tasks in design and development of technology

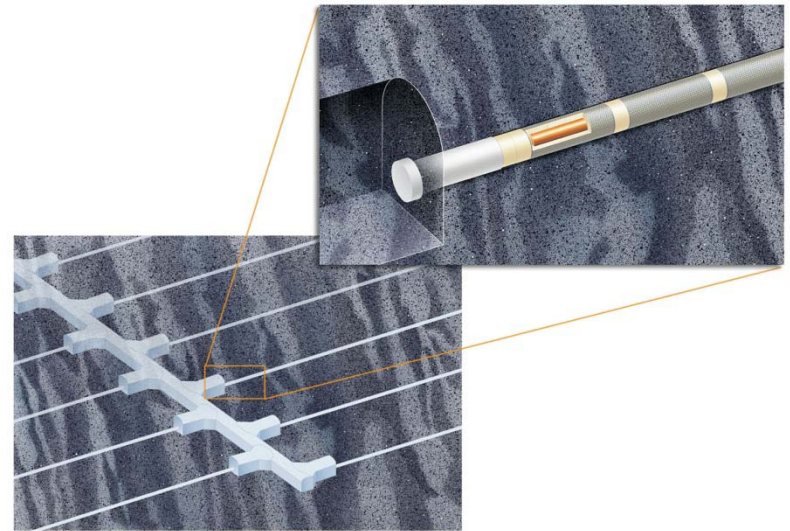
- Main Tasks
 - Design and implementation of ONKALO URCF
 - Encapsulation technology
 - Design of canister and manufacturing technology
 - Sealing of canister and NDE
 - Design of encapsulation facility
 - Repository technology
 - Design of repository (thermal dimensioning, lay-out)
 - Development of disposal technology (backfilling, handling of canister)
- Supporting Tasks
 - Transportation of spent fuel
 - Safeguards issues for ONKALO
 - Cost estimates
 - Assessment of operational safety of disposal facility

Disposal concept alternatives

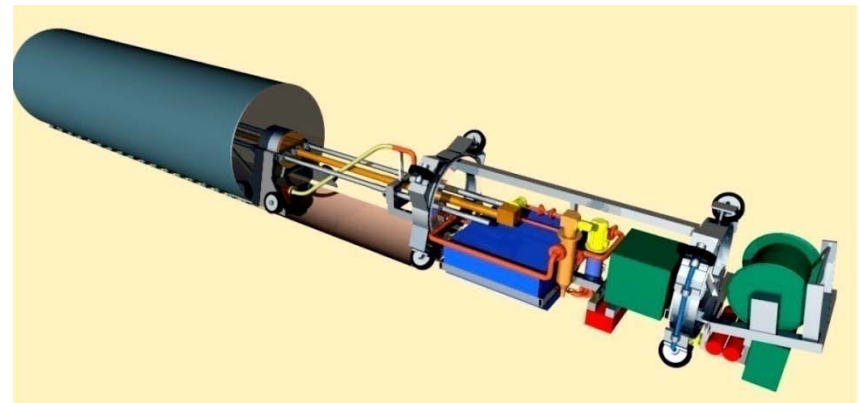
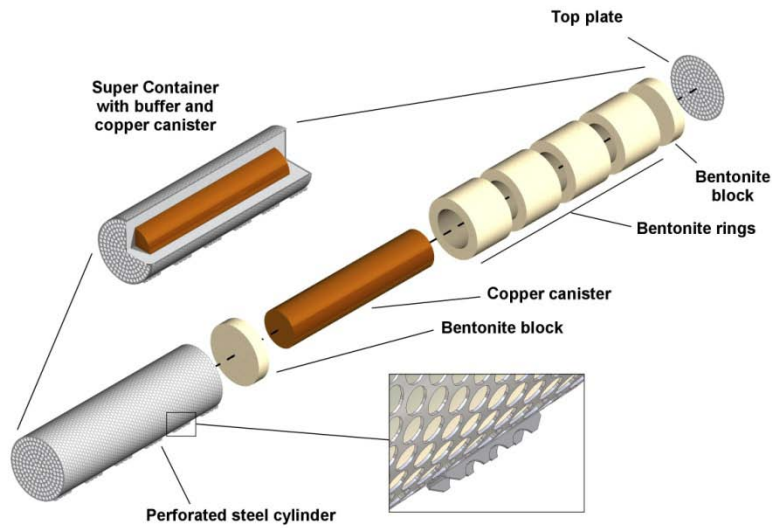
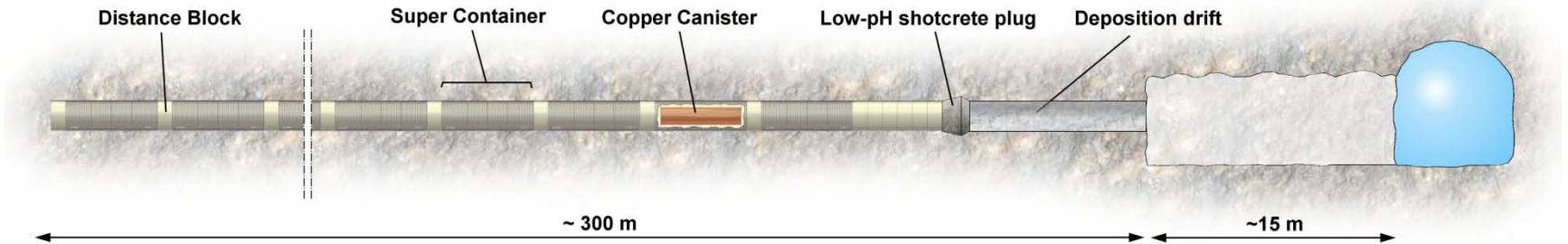
Vertical emplacement



Horizontal emplacement



R&D of KBS-3H

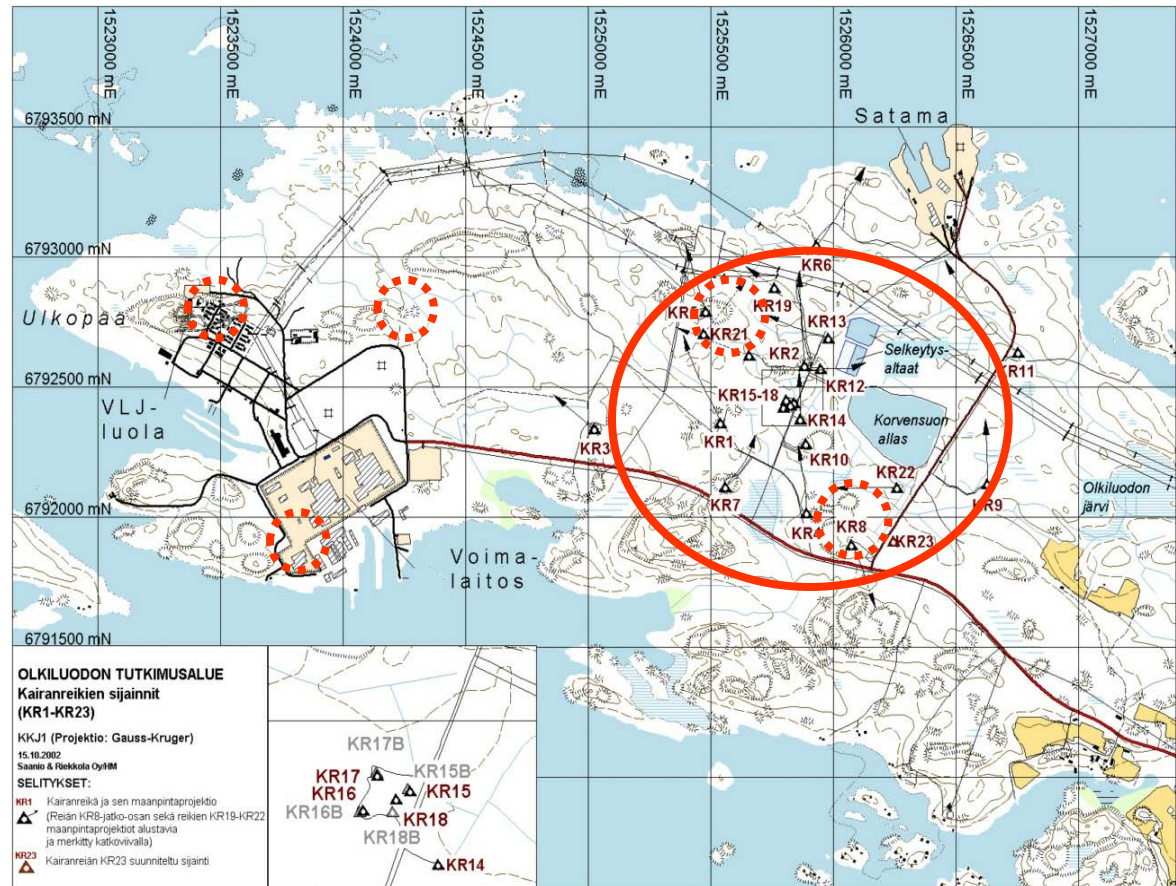


Role of Underground Characterisation and Research Facility ONKALO

- ONKALO is a site-specific underground characterisation facility to verify the suitability of the bed rock for final disposal
 - Research is being carried out in different depths during the building of ONKALO
 - Final confirmatory research will be done at final disposal depth
- Objective is to take advantage of ONKALO during the building and use of the final disposal facilities
 - Design, construction conform to nuclear installation standards
- ONKALO provides the opportunity to practice the implementation of final disposal
 - The technology for final disposal can be tested in authentic circumstances

Decision on design options and location of ONKALO

- Ramp option was selected in Spring 2002
- For location several alternatives were studied
- Location "KR8" was selected in Spring 2003



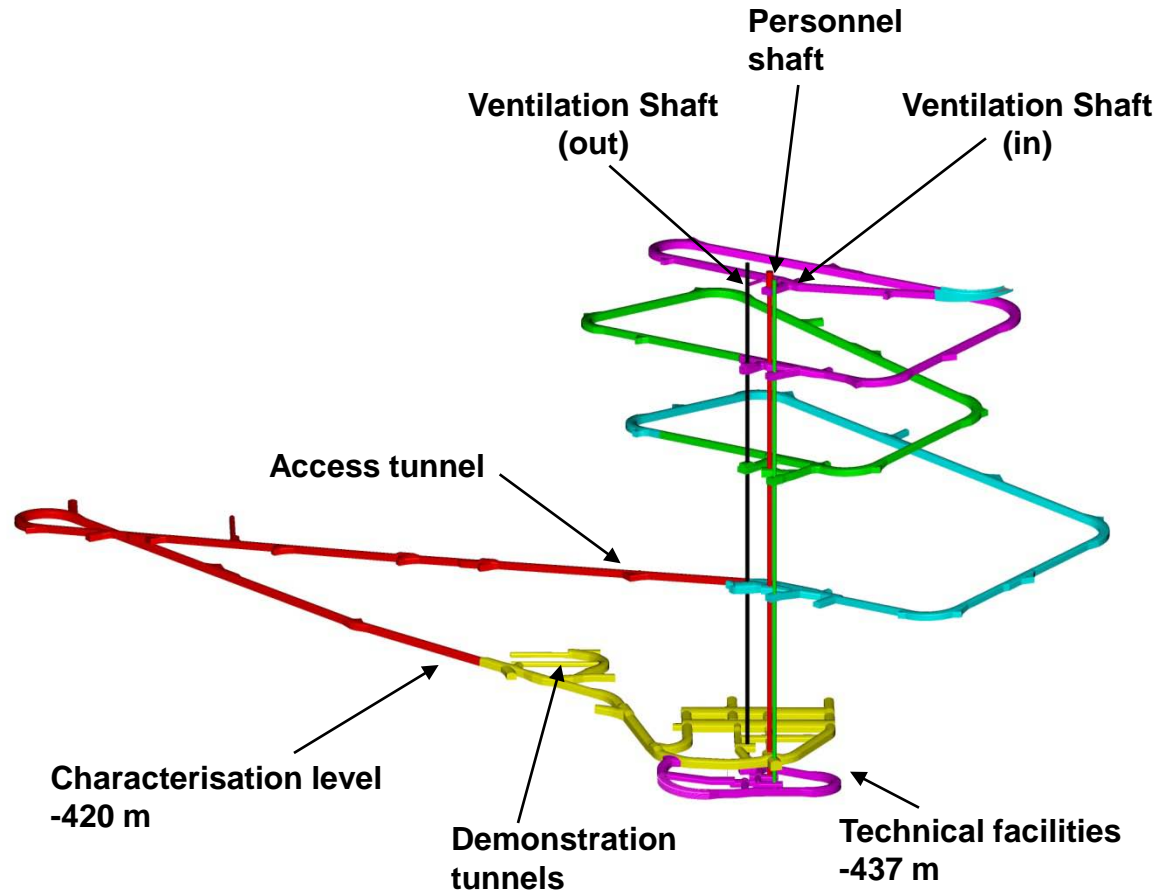
ONKALO layout and technical information

TECHNICAL INFORMATION

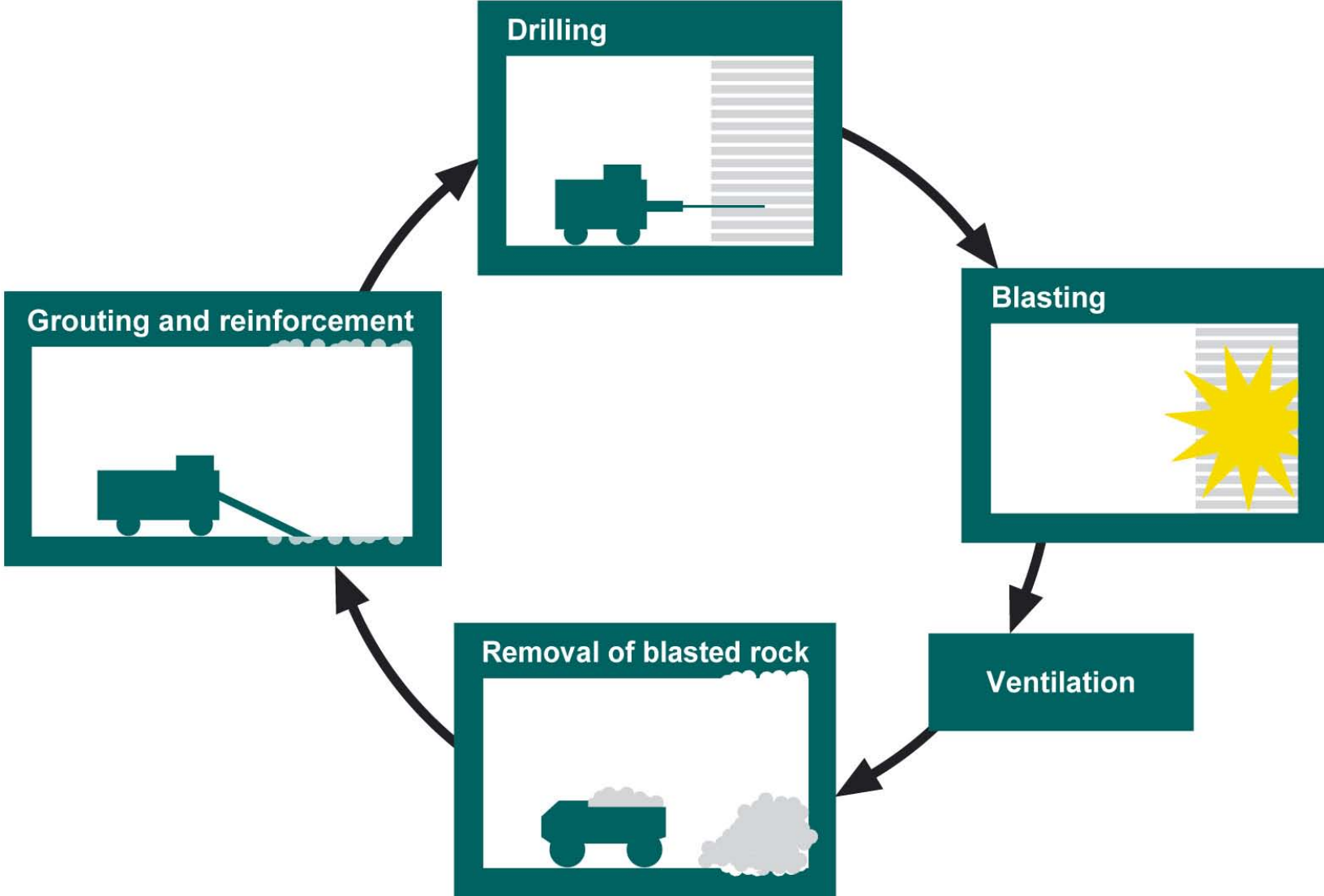
- Excavation volume
365,000 m³
- Access tunnel
 - Length 5 km
 - Inclination 1:10
 - Size 5.5 x 6.3 m
- Total length of tunnels and shafts 9,5 km
- Shafts 3.5, 4.5 & 3,5 m

TIME-TABLE

- Start summer at 2004
- Research depth at 2009
- excavation complete at 2011



Tunnel excavation cycle



ONKALO construction started in 2004



ONKALO construction site in summer 2009



Opening the tunnel in 2004



Entrance to the ONKALO



Drilling jumbo



Tunnel



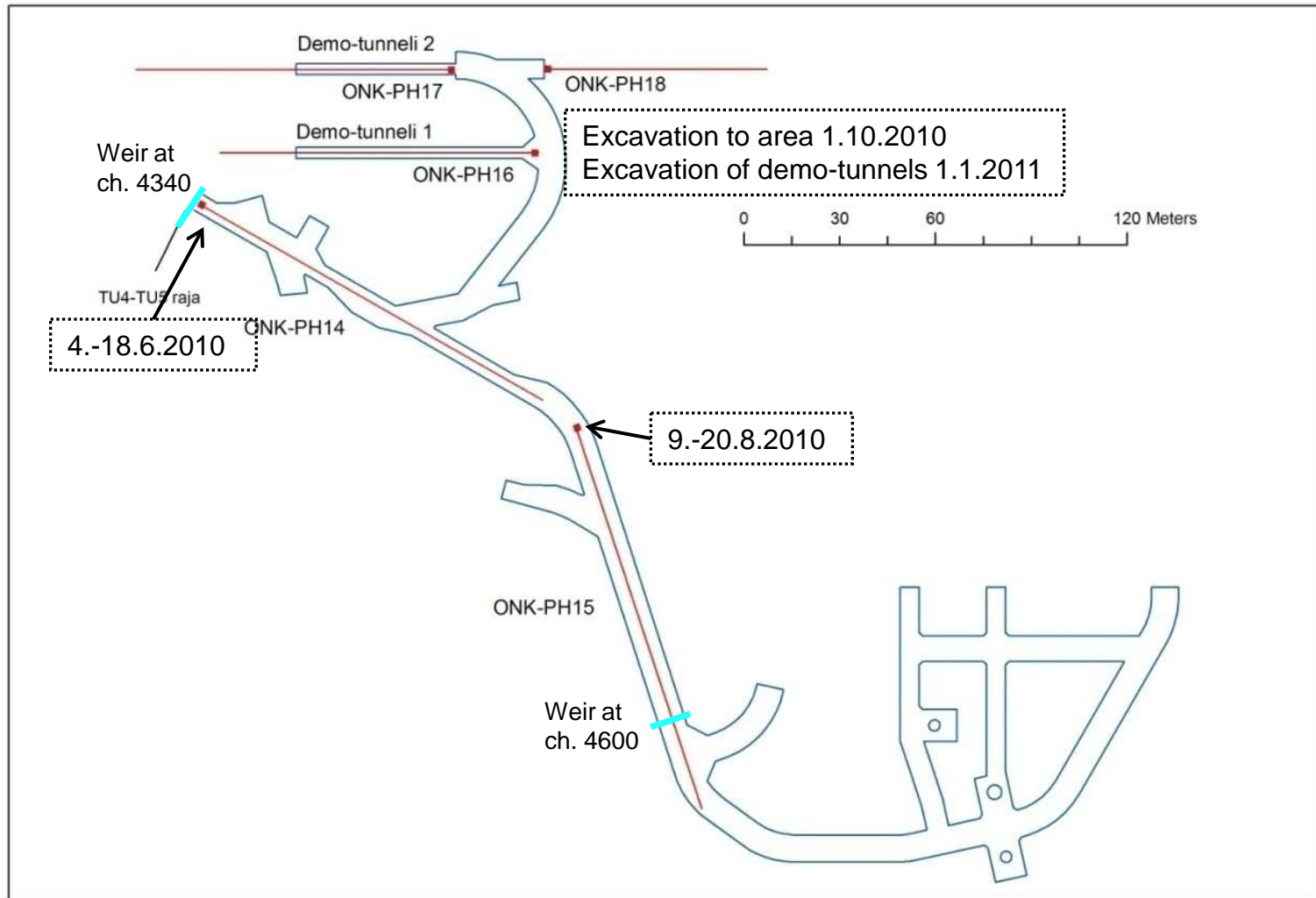
Roof



Ventilation shaft (out)



RESEARCH AT DEPTH -420...-437 M











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