



VTT

KYT Closure Workshop

**Mapping of Closure-Related Issues in Radioactive
Waste Repository Programs**

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VTT – beyond the obvious

Welcome!

- Thank you for attending.
- We are looking forward to some interesting discussions covering many aspects of radioactive waste repository closure; please participate actively.
- The agenda includes invited presentations and breakout rooms.
- This workshop and resulting memorandum (or report appendix) are KYT CloMap Project milestones.
- Please have cameras off and microphones muted during presentations, but on when speaking.
- Hold questions until the end of each presentation; feel free to make comments and pose questions through the chat function anytime.
- Raise a virtual hand to let us know you want to contribute.
- Workshop presentations and discussions sessions will be recorded to aid preparation of input to the project report.
 - *recordings will **not** be made publicly available*

Agenda

- 09:00-09:20 Welcome & Introduction (Tim Schatz, VTT)
- 09:20-09:35 Regulatory Views on Radioactive Waste Repository Closure
(Kai Hämäläinen, STUK)
- 09:35-09:55 Closing LILW Repositories in Finland (Jussi-Matti Mäki, Fortum)
- 09:55-10:15 Closing the HLW Repository in Finland (Johanna Hansen, Posiva)
- 10:15-10:20 *break*
- 10:20-10:40 Repository Monitoring Strategies: Outcomes from MODERN 2020
(Johan Bertrand, ANDRA)
- 10:40-11:00 Lessons and Innovations from Oil and Gas Well Sealing (Christian Rosnes, Interwell P&A)
- 11:00-11:20 Current Trends in Mine Closure Management (Tommi Kauppila, GTK)
- 11:20-11:50 Breakout Room Discussions
- 11:50-11:55 Key takeaways from breakout room discussions
- 11:55-12:00 Adjournment

Breakout Rooms

- After the presentations by the invited speakers, participants will be split evenly and somewhat randomly into two breakout rooms.
 - Room 1 will be moderated by Paula Keto (VTT)
 - Room 2 will be moderated by Edgar Bohner (VTT)
- Framing questions
 - What are the biggest challenges regarding Closure activities for repository programs in Finland and abroad?
 - Which challenging aspects of Closure would most clearly benefit from further development, innovation or optimization?
- Key takeaways from the breakout rooms will be summarized at the end of the workshop.

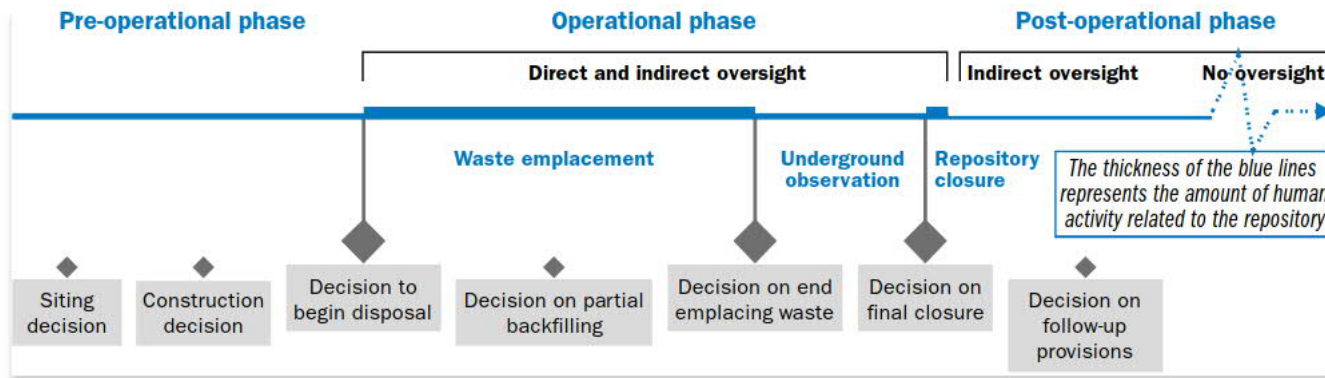


Project Overview

Introduction

- Currently in Finland, there are two low and intermediate-level waste (LILW) repositories in operation, one high-level waste (spent fuel) repository under construction and one very low-level waste (VLLW) near-surface repository in advanced planning.
- One day, in the somewhat distant future, these facilities will reach the end of their lifecycles.
- Closure is the final phase of actual repository operations and is intended to result in the repositories being permanently closed.

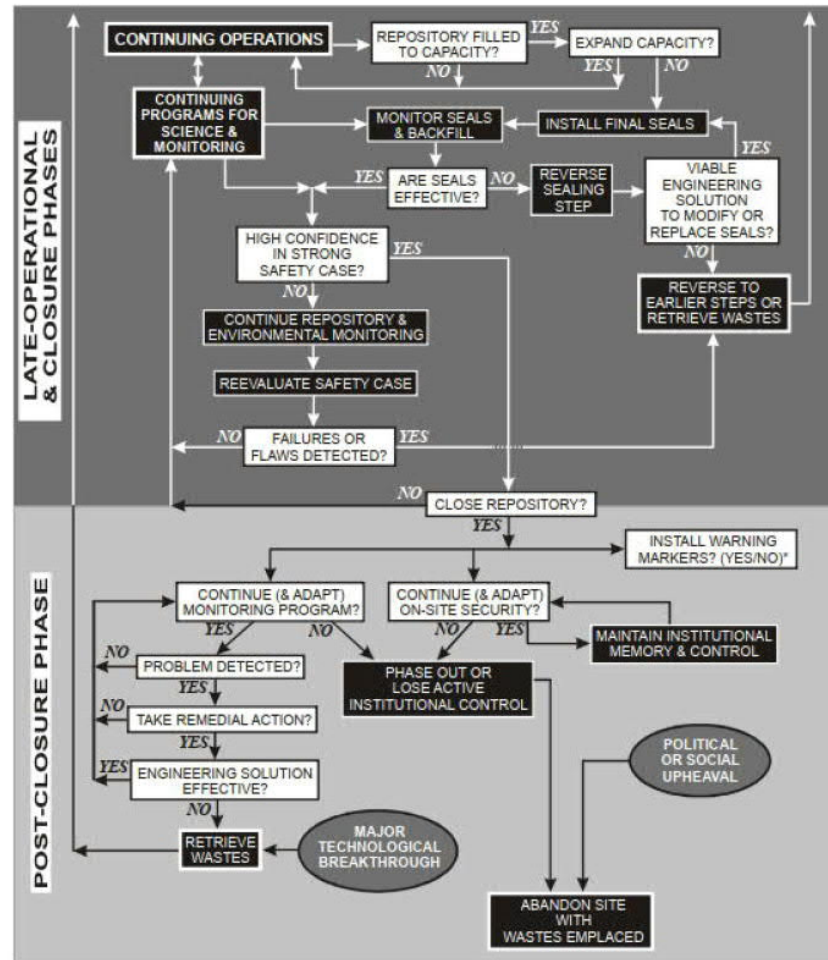
Repository Phases and Major Decision Points



NEA 2020

Closure Processes

- Designing, constructing and sequencing the final engineered barrier systems to shut remaining openings (tunnels, shafts, ramps, boreholes)
- monitoring and surveillance
- remediation; reversibility (retrieval)
- dismantling and decommissioning the surface facilities; restoring the surfaces of the sites to more natural conditions
- keeping and preserving records
- active control to passive control
- assigning roles and responsibilities for organizations involved with closure and post-closure activities



NAS 2003

Objectives

- Identify and describe the most critical decisions, activities, uncertainties and readiness regarding Closure planning for repository programs in Finland.
- Select the most prominent Closure issues for which further development, innovation or optimization would be most beneficial or most needed and document their technical requirements readiness, limitations and challenges.
- This project will initially focus on technical factors involved in closing underground facilities (but regulatory and socio-economic factors will not be ignored).

Approach

- In the first phase of the project, important Closure issues will be discussed and identified at the first expert workshop (TODAY!).
- These issues will be assessed and prioritized and described in more detail through subsequent discussions with workshop participants and other analysis.
- List of top issues and detailed descriptions will be subject to final review and comment from workshop participants (possibly in second workshop).

Schedule and Outcomes

- Project started in April 2021 and will end January 2022.
- Main outcome of this project is VTT Technical Report identifying and describing the most critical technical issues regarding Closure of radioactive waste repositories in Finland for which further development, innovation or optimization would be most beneficial or most needed.

Continuation (*preliminary ideas*)

- Develop a strategy and action plan for developing and implementing technical solutions, innovations or optimizations for those Closure issues identified as most critical.
- Carry out similar mapping for regulatory and socio-economic factors related to Closure.

Where are the biggest challenges in radioactive waste repository closure?

- Designing/constructing/emplacing/verifying final engineered barrier systems to shut/close/seal remaining openings (tunnels, shafts, ramps, boreholes). E.g., closure materials, plugs, seals.
- Design and planning of operational to post-closure monitoring systems and surveillance schemes.
- Dismantling and decommissioning the surface facilities and restoring/remediating the surfaces of the sites to more natural conditions.
- Knowledge management (generational handover, record preservation, etc).
- Implementing active and passive site controls.
- Possible remediation and/or reversibility (retrieval) actions.
- Assigning roles and responsibilities for organizations involved with closure and post-closure activities.
- Other?

Poll Question

- Please answer the previous question in an online poll at <https://www.menti.com/dxhnx2jqcx> (see chat for link).
 - you may choose up to three options
- Answers will be aggregated and shown during the breaks.

Thank you!