

**Post-closure related
responsibilities and plans
of license holders and
authorities in Finland**
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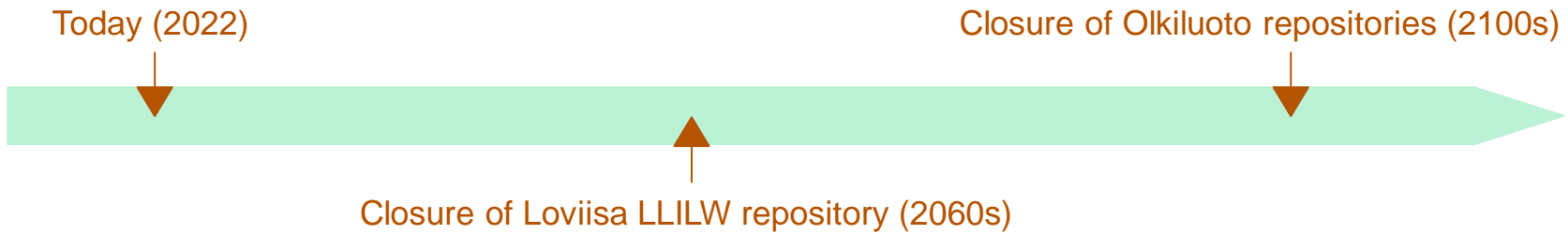
07/11/2022 VTT – beyond the obvious

Agenda

1. Background of the KYT CloMap project
2. Post-closure monitoring
3. Post closure knowledge preservation
4. Transfer of ownership and post closure responsibilities
5. Stakeholder involvement in closure-related topics
6. Conclusions

Background

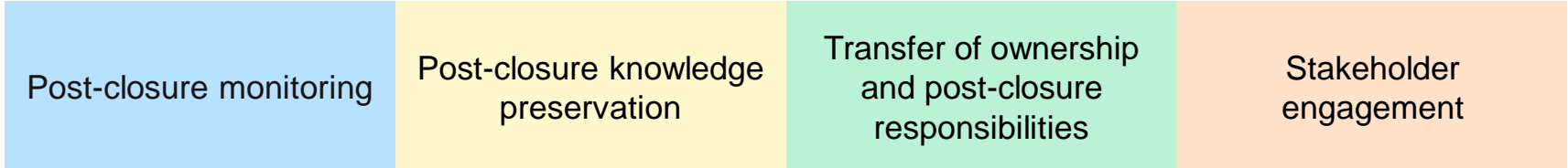
- Final phases of radioactive waste disposal programs are the closure and post-closure phases
- Closure of Finnish nuclear waste repositories is upcoming in Loviisa LLILW in 2060s and for SNF after 2100s
 - Still relatively far in the future, but knowing what is upcoming is vital to start planning with sufficient time



KYT CloMap

■ Phase 1:

- Closure- and post-closure related legislation and regulation were reviewed
 - 25 closure-related requirements identified
 - Handling of the identified obligations by responsible organisations was explored
 - Four issue categories were identified:



■ Phase 2:

- Licence holders, STUK and TEM were asked for more details on their handling of the issue categories
- Stakeholder survey about closure-related topics was launched

Post-closure monitoring requirements

- Five requirements regarding post-closure monitoring identified, e.g.:
 - STUK YVL D.5 815 §: *A precondition for the permanent closure of a disposal facility is that STUK has approved the plan concerning the closure, which shall include:
[...]*
 - c. *a plan for the potential post-closure monitoring measures and a proposal for the restriction zone with prohibition on measures referred to in Section 85 of the NED.*
 - STUK YVL D.5 402 §: *The disposal of nuclear waste involves the following implementation stages:
[...]*
 - i. *post-closure monitoring measures of the disposal facility where required*
 - *Nuclear energy act 32 §: [...] the disposal of nuclear waste and the decommissioning of a nuclear facility have been carried out in accordance with Section 33, and the party with a waste management obligation has paid a lump sum to the State for the monitoring and control of the nuclear waste,*

Post-closure monitoring open issues

Licence holders:
Possible post-closure monitoring as a part of the
closure plan

STUK:
Needs to approve the closure plan
TEM:
Responsible for implementing any possible monitoring

- Handling of responsible organisations regarding monitoring-related issues was assessed:
 - Responsible: Mainly license holders
 - Detailed plans for post-closure monitoring are not available
- Discussions with responsible organisations:
 - License holders:
 - Post-closure monitoring is not required for long-term safety and no concrete plans exist.
 - Responsibility is on the State after facility closure; any monitoring needs are paid upfront
 - STUK:
 - Post-closure safety cannot rely on post-closure monitoring, but it could be used for example for other purposes
 - The state (TEM) will make a decision whether it is needed
 - Post-closure monitoring plan must be included in the closure plan
 - TEM:
 - No plans for post-closure monitoring anywhere as of now. Planned to be created a decade before closure of Loviisa
 - Closure plan could be used as a starting point for post-closure monitoring plans

Post-closure knowledge preservation requirements

- Five requirements regarding knowledge preservation identified, e.g.:
 - *STUK Y/4 29 §: The licensee shall maintain a record of the disposed waste that includes waste package specific data on the waste type, radioactive substances, location within the emplacement rooms and other information deemed necessary by the authority. The waste records shall be submitted to the Radiation and Nuclear Safety Authority (STUK) in a format approved by it. The Radiation and Nuclear Safety Authority arranges the permanent keeping of records of information concerning the disposal facility and disposed waste.*
 - *Nuclear Energy Decree 79 c §: The National Nuclear Waste Management Programme referred to in section 27b of the Nuclear Energy Act shall include at least the following information:
 - 5) *plans relating to the post-closure period of the disposal facility, the period during which the monitoring of the disposal shall be continued as well as the long-term measures through which the continuity of knowledge of the facility shall be assured**

Post-closure knowledge preservation open issues

- No concrete plans on knowledge preservation
 - STUK would ultimately be responsible in creating the permanent keeping of information
 - No decision on what knowledge should be preserved, how or for how long
- Discussions with responsible organisations
 - License holders:

Licence holders:

- Collect and preserve data during operations
- Provide the collected data to STUK and the State

STUK and TEM:

- Responsible for ensuring long-term knowledge preservation

- STUK follows international discussion and is interested, e.g., in the NEA KIF
- Operational phase information is being archived by STUK and will be transferred to the National Archives later
- TEM:
 - No plans for post-closure knowledge preservation exist yet. Would be created a decade before closure of the first repository

Transfer of ownership and post-closure responsibilities

- 11 related requirements, e.g.:
 - IAEA SSR-5: *Near surface disposal facilities are generally designed on the assumption that institutional control has to remain in force for a period of time. For short lived waste, the period will have to be several tens to hundreds of years following closure. Such controls will be either active or passive in nature...*
 - IAEA SSR-5: *Geological disposal facilities have not to be dependent on long term institutional control after closure as a safety measure). Nevertheless, institutional controls may contribute to safety by preventing or reducing the likelihood of human actions that could inadvertently interfere with the waste or degrade the safety features of the geological disposal system. Institutional controls may also contribute to increasing public acceptance of geological disposal*

Transfer of ownership and post-closure responsibilities related open-issues

- Licence holder can apply for termination of liability after disposal facilities are closed and STUK has approved the closure
 - Responsibility is shifted to the State
- Open issues remaining:
 - Lack of clearly defined information regarding transition from closure to post-closure phases
 - Who is responsible for active and passive site controls after closure?
 - Who is responsible for approving and overseeing possible retrieval of disposed spent fuel?
- Discussions with responsible organisations:
 - STUK:
 - Closure plan must include restriction zones and prohibition measures to the area
 - No detailed plans on durations of any post-closure activities have been made yet
 - The State has ultimate responsibility of the waste after closure
 - TEM
 - No plans for active and passive site controls after closure exist yet. Such plans are scheduled for a decade before the closure of the first repository

Stakeholder engagement related guidance and expectations

- 2011/70/EURATOM Article 10: *Member States shall ensure that the public be given the necessary opportunities to participate effectively in the decision-making process regarding spent fuel and radioactive waste management in accordance with national legislation and international obligations.*
- The municipality of Eurajoki has stated: *They expressed a desire to be included in all discussions about changes in plans considering nuclear waste management within their municipality and that information about the nuclear waste repository, even information that everything is working as intended, is provided to them routinely and automatically*

Stakeholder engagement open issues

- Outcomes of dialogue with public stakeholders relating to post-closure topics is not available and it is unclear whether stakeholder engagement on these topics has occurred.
- Discussions with responsible organisations
 - License holders:
 - No discussions about post-closure related topics have been held with stakeholders.
 - Common principles have been defined with STUK and TEM
 - STUK:
 - No direct discussions with public stakeholders
 - All licensing steps are open for public hearings

Survey

- Survey with closure and post-closure related questions was launched and aimed at local residents
- Published in a local newspaper
- Sent to TVO and Fortum
- Limited responses
- No real conclusions could be made but some interesting results nonetheless

2. joulukuuta 2022 LÄHIS-SUOMI

UUTISET RAUMA JA ALUE

Uusi-Cuomi Raumalla 24.8.2022

Kohderyhmä, joka on tärkeä tavoittaa

ILKKAJOUKUS

Näyttökuvan valokuvassa kahdeksan vuotta vanha Yli-Valon linna näkyy lähtien ja muista kunnista. Yli-Valon linna on Rauman kaupungin keskeinen nähtävyys. Rauman kaupunki on suunnitellut linnan uudelleenrakennuksen ja linnan ympärille uuden kaupungin. Rauman kaupunki on suunnitellut linnan uudelleenrakennuksen ja linnan ympärille uuden kaupungin. Rauman kaupunki on suunnitellut linnan uudelleenrakennuksen ja linnan ympärille uuden kaupungin.

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2. joulukuuta 2022 LÄHIS-SUOMI

RAUMA JA ALUE UUTISET

Millaisia terveisiä lähettäisit ydinvoimasta jälkipolville jopa tuhansien vuosien päähän?

Tutkijat kartoittavat paikallisia näkemyksiä loppusijoitustojen sulkeamisesta ja siitä, miten "ydinperinnöstä" tulisi kertoa.



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Survey results

- Five main question areas:
 1. Site controls for nuclear waste repositories
 2. Knowledge preservation
 3. Closure methods, performance and implementation
 4. Transfer of ownership of nuclear waste repositories after closure and post-closure responsibilities
 5. Post-closure monitoring at nuclear waste repositories
 - 1. How important are each of the topics on a scale from 1 to 5?
 - 2. What is your level of understanding on each of the topics on a scale from 1 to 5?
 - 3. On which of the topics would you be interested in getting more information?
 - 4. For which of the topics do you wish to have an influence in decision making?
 - 5. Have you been kept informed on any of the nuclear waste repository closure topics by STUK or license holders?
- Respondents on average did not want to have influence on decision making on any topics
 - Most yes-answers on 1. Site controls
 - Most no-answers on 3. Closure methods

Conclusion and path forward

- Limited amount of post-closure related planning exists
 - Main reason seems to be that 1) post-closure activities are not required for long-term safety and 2) closure of repositories is still far away in the future

- Leaving planning until facility closure is imminent may not be ideal
 - If technological gaps related to post-closure activities are present, they should be researched well in advance to the closure of first repositories in 2060s
 - Information that could be preserved for future is being generated now, preservation mechanisms (particularly social) cannot be created overnight

- SAFER2028 application on knowledge preservation

The End

Sources

Appendix Survey results Q5

How important are each of the following nuclear waste repository closure topics to you on a scale from 1 to 5?	1	2	3	4	5
<u>Site controls for nuclear waste repositories</u> (e.g., active controls such as security guards, passive controls such as signs and markers, durations of site controls)	0%	0%	30%	40%	30%
<u>Knowledge preservation</u> (what information about contents and designs of nuclear waste repositories to preserve? who has access to preserved information? Etc.)	0%	0%	10%	30%	60%
<u>Closure methods, performance and implementation</u> (i.e., systems used to physically seal nuclear waste repositories after operations)	0%	0%	10%	10%	80%
<u>Transfer of ownership of nuclear waste repositories after closure and post-closure responsibilities</u> (which State agency is responsible for oversight of post-closure site control or monitoring programmes? how are retrieval or mitigation actions authorised? Etc.)	0%	0%	0%	10%	90%
<u>Post-closure monitoring at nuclear waste repositories</u> (what are the plans for post-closure monitoring? Who will have access to the results of post-closure monitoring? Etc.)	0%	0%	20%	40%	40%

Appendix Survey results Q6 and Q7

What is your level of understanding on each of the above nuclear waste repository closure topics on a scale from 1 to 5	1	2	3	4	5
Site controls for nuclear waste repositories	10%	10%	50%	30%	0%
Knowledge preservation	10%	30%	30%	20%	10%
Closure methods, performance and implementation	10%	20%	10%	50%	10%
Transfer of ownership of nuclear waste repositories after closure and post-closure responsibilities	20%	20%	40%	10%	10%
Post-closure monitoring at nuclear waste repositories	30%	20%	40%	10%	0%

On which of the nuclear waste repository closure topics would you be interested in getting more information?	Yes	No
Site controls for nuclear waste repositories	70%	30%
Knowledge preservation	60%	40%
Closure methods, performance and implementation	80%	20%
Transfer of ownership of nuclear waste repositories after closure and post-closure responsibilities	80%	20%
Post-closure monitoring at nuclear waste repositories	100%	0%

Appendix Survey results Q8 and Q9

For which of the nuclear waste repository closure topics do you wish to have an influence on decision-making?	Yes	No
Site controls for nuclear waste repositories	40%	60%
Knowledge preservation	30%	70%
Closure methods, performance and implementation	10%	90%
Transfer of ownership of nuclear waste repositories after closure and post-closure responsibilities	30%	70%
Post-closure monitoring at nuclear waste repositories	30%	70%

Have you been kept informed on any of the nuclear waste repository closure topics by STUK or the nuclear waste licence holders (Posiva, TVO or Fortum) in Finland?	Yes	No
Site controls for nuclear waste repositories	60%	40%
Knowledge preservation	30%	70%
Closure methods, performance and implementation	70%	30%
Transfer of ownership of nuclear waste repositories after closure and post-closure responsibilities	20%	80%
Post-closure monitoring at nuclear waste repositories	10%	90%