Safeguards Usability of Monitoring for Safety at the Olkiluoto Repository Site

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ABSTRACT

•**Monitoring for Safety**

- is required by IAEA safety standard SSR 5.
- is carried out at the Olkiluoto repository since 2003.
- is not required for safeguards declarations, but the programme is described in Design Information and its updates.

•This poster demonstrates possibilities to detect undeclared activities, i.e. clandestine tunnelling in the vicinity of the repository.

•It is recommended to use the monitoring results for national safeguards findings and conclusion in the state-level assessment by the IAEA.

BACKGROUND

•Nuclear material will be placed in “difficult-to-access” or even “impossible to access and re-verify” conditions in the repository.

•Indirect methods (depending on correct choice of instruments) may increase confidence about the absence of undeclared activities.

•The multi-disciplinary monitoring system uses several types of sensors and data processing that are not defined for safeguards purposes.

•In order to avoid expensive repetition of the on-going work it is recommended to analyze monitoring reporting instead of developing independent data collection systems for the IAEA safeguards.

•The time period for maintaining the equipment and continuing site monitoring at the long-term storage is one of the major challenges.

MULTI-DISCIPLINARY PROGRAMME

ROCK MECHANICS

•Rock mechanics monitoring concentrates on the assessment of tectonic movement and bedrock stability in Olkiluoto and the surrounding area.

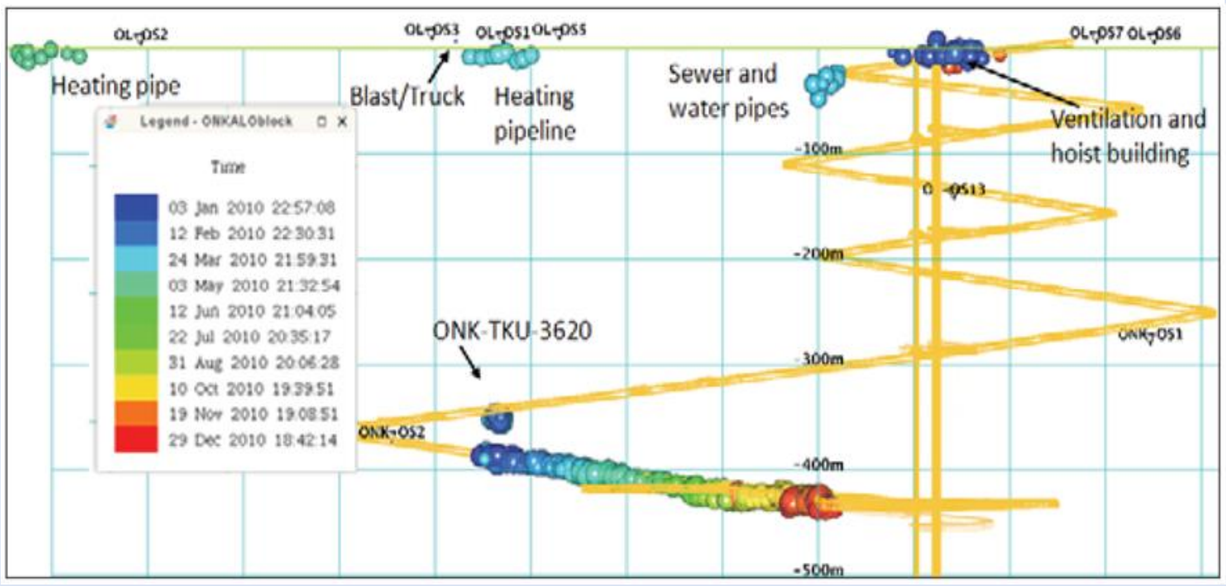
•The tectonic movement of bedrock is monitored by GPS measurements of the relative positions of fixed pillars, and the post-glacial isostatic uplift by precise levelling.

•The facility is under continuing construction and thus the maintenance needs continuing 3 D monitoring for the safety for underground works.

•In the underground premises, the stability of the excavated rock spaces is monitored by visual observation of spalling and by using extensometry to investigate rock stress redistribution in newly excavated spaces and the possible reactivation of bedrock structures at fracture zone intersections.

•Microseismic monitoring is currently the only part of the monitoring programme whose results the operator submits for safeguards purposes.

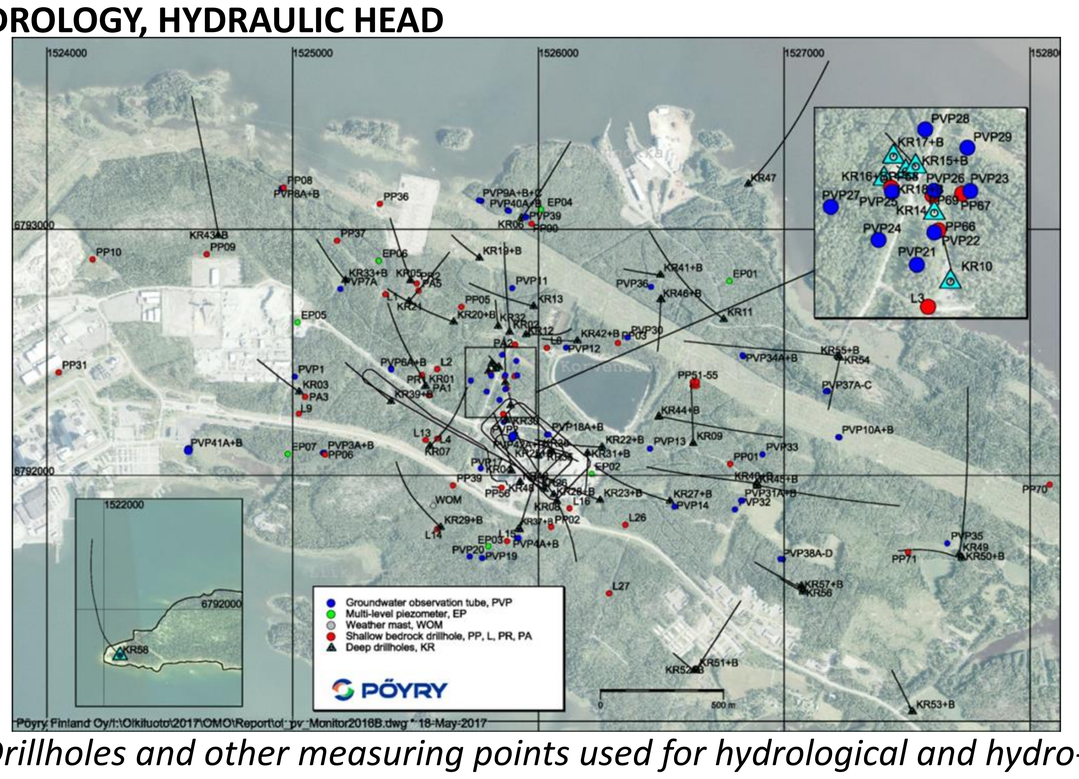
• Locations of near-by seismic event and their origins and source mechanism have also been included in the annual updates of the Design Information to demonstrate blasting works and construction activities.



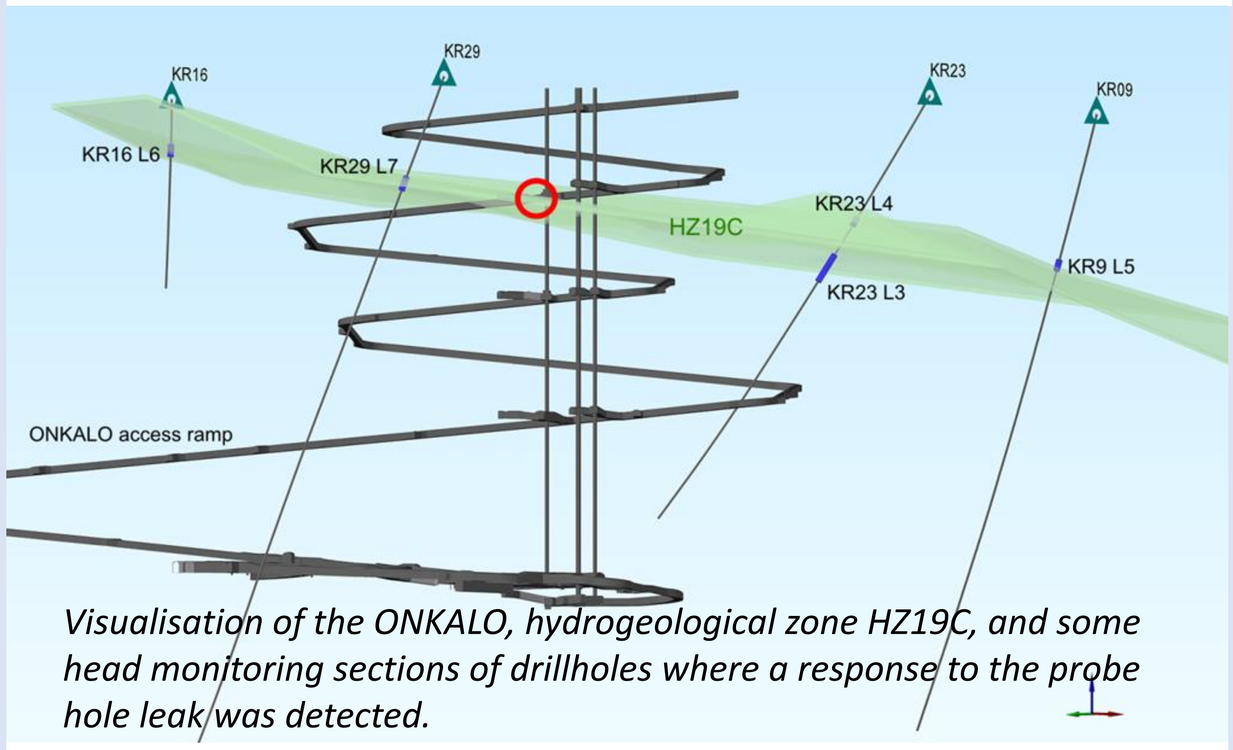
Microseismic events detected in the ONKALO block in 2010.

MULTI-DISCIPLINARY PROGRAMME

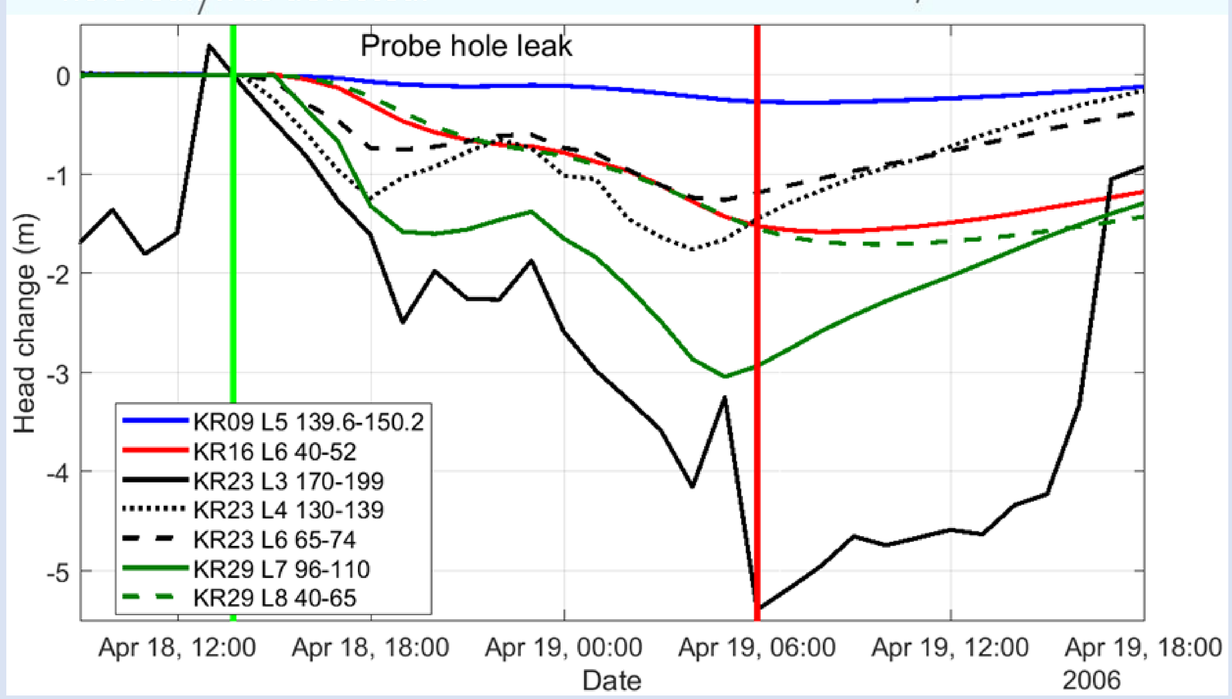
HYDROLOGY, HYDRAULIC HEAD



Drillholes and other measuring points used for hydrological and hydro-geological monitoring in Olkiluoto



Visualisation of the ONKALO, hydrogeological zone HZ19C, and some head monitoring sections of drillholes where a response to the probe hole leak was detected.



Change of head in some monitored drillhole sections during a leak from a probe hole intersecting the HZ19 system.

CONCLUSIONS

•Microseismic monitoring is already applied by the national safeguards to locate excavations done using blasting.

•Hydraulic head monitoring gives immediate responses once a monitored hydrogeological zone is penetrated in the crystalline bedrock.

• In addition, the monitoring of water temperature and chemistry in boreholes and in tunnels may give indications about undeclared activities but with slow responses.

•Full report STUK-TR 28.