

PROJECT DESCRIPTION

SKB

Äspö Hard Rock Laboratory,
Sweden

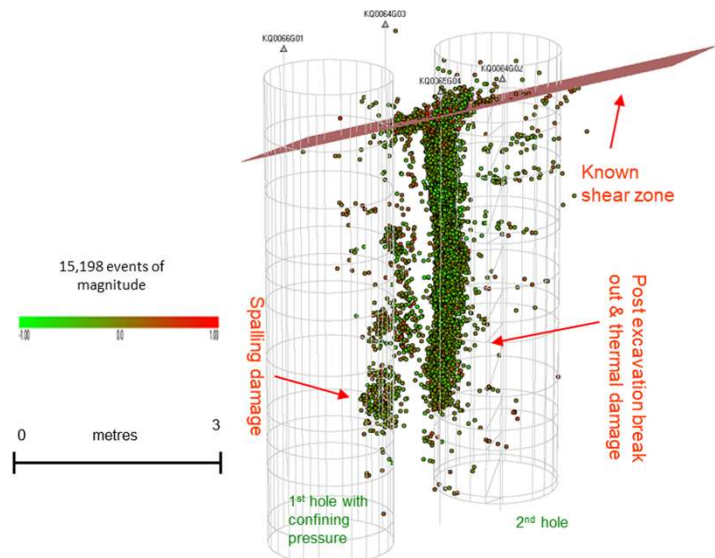


ICL carried out the acoustic monitoring of a series of tests at SKB's Äspö Hard Rock Laboratory to demonstrate the effect of confining pressure in a nuclear repository deposition hole on the propagation of micro-fractures, assess spalling prediction capability and investigate the effect of thermal loads on the EDZ. The overall objective was determining an optimal deposition hole density in the design of a permanent storage for high-level radioactive waste.

Different monitoring methodologies were used, combining passive and active Acoustic Emission monitoring.

ITASCA'S ROLE

ICL designed a 24-piece ultrasonic acquisition system, with ray paths skimming the borehole EDZ, in four vertical arrays providing acoustic emission (AE), ultrasonic surveys and data processing via InSite. Two 1.8m diameter vertical deposition holes, of 5m depth, were drilled in isotropic, fractured diorite, forming a pillar, one confined with a 0.8MPa internal pressure and both were subjected to heating in two phases.

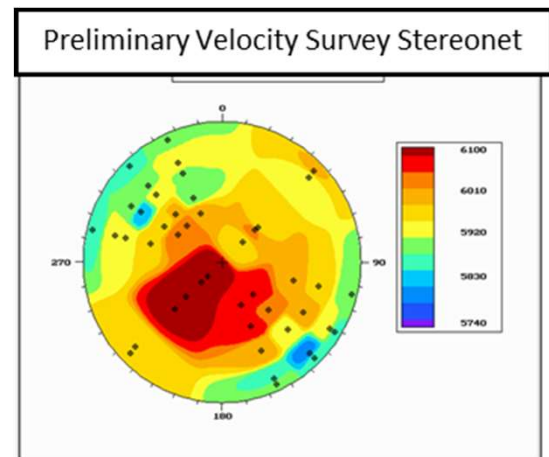


PROJECT RESULTS

Pre-excavation testing established the velocity profile and calibration of the receiver array allowed passive monitoring, data acquisition and auto-processing. Data was leached and parsed for noise before locating events spatially and temporally. Manual picking as part of waveform analysis allowed more detailed data interpretation.

Outcomes:

- Assessing the effects of drilling and heating on the micro-fracturing of the pillar
- Identifying possible reduction in fracturing due to the confining pressure
- Optimal deposition hole density constrained.
- Spalling prediction model re-evaluated.



ICL20-POW-SKB Pillar01