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Dependence of hydraulic conductivity on effective confining pressure in rocks and concretes

Thursday, 2 June 2022 10:10 (1h 10m)

The geological disposal of radioactive waste is designed to confine radioactive nuclides for a long period of time based on the concept of a multiple barrier system consisting of engineered and natural barriers. In this study, the hydraulic conductivity of mudstone and granite as natural barrier materials and high strength and ultra low permeability concrete (HSULPC) as engineered barrier materials were measured using the transient pulse method. The results showed that both materials have low permeability, and the effective confining pressure dependency and hysteresis were also observed. Therefore, the coefficient of effective confining pressure dependency was introduced to discuss quantitatively. The results showed that there is a difference in the hysteresis between rock and concrete, and SEM observations were carried out on HSULPC to investigate whether there is a difference in the porosity affecting permeability. It was pointed out that the skeletal structure of HSULPC was not easily deformed and there were few flat cracks. It was also suggested that hydration reactions in the unhydrated part of HSULPC may have promoted the closure of voids and cracks during the permeability test. These results suggest that HSULPC exhibits significant hysteresis. Therefore, HSULPC is expected to stabilize at a low hydraulic conductivity after being buried in the ground and subjected ground pressure.

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References

Time Block Preference

Time Block A (09:00-12:00 CET)

Participation

Online

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