



Contribution ID: 1071

Type: **Poster Presentation**

Waste Rock and Bentonite Mixtures for Gas Management within Low Heat Generating Waste Geological Disposal Facilities

Wednesday, 24 May 2023 10:30 (1h 30m)

The geological disposal facility (GDF) is the most common planned method for the disposal of radioactive waste. GDFs utilise a multi-barrier concept designed to prevent the release of radionuclides into the surrounding environment, collectively known as the engineered barrier system (EBS). The EBS is a key component for GDF safety as it slows the inflow of water to limit corrosion, protects the structural integrity of the container, and prevents radionuclides from being released into the environment.

The EBS also manages gases that are produced in the GDF during container corrosion and waste degradation, providing pore-space and passively controlling gas release to limit pressures and reduce the risk of gaseous radionuclide release. This project explores use of bentonite clay and waste rocks (WR) from quarries, excavated GDF rocks and re-use of other materials for the EBS. Their use as an EBS material would lower the environmental footprint and prevent these materials from filling landfills. We are assessing whether WR/bentonite mixtures meet criteria for EBS usage, including mechanical strength, fluid/gas permeability, microbial activity for gas consumption and the long term performance of these re-used materials. This is being conducted through a series of laboratory based and modelling techniques.

The use of bentonite in the EBS is internationally supported by several waste management organisations due to its high adsorption capacity, swelling properties and its low hydraulic conductivity. The addition of WR aggregate provides increased mechanical strength, improves gas permeability and increases the potential to host communities of gas-consuming microbes. This poster showcases the results from initial mechanical tests.

Participation

In-Person

References

MDPI Energies Student Poster Award

Yes, I would like to submit this presentation into the student poster award.

Country

United Kingdom

Acceptance of the Terms & Conditions

[Click here to agree](#)

Energy Transition Focused Abstracts

Primary author: Ms MOUAT, Elise (The University of Edinburgh)

Co-authors: Dr MOLNAR, Ian (The University of Edinburgh); Prof. CHRISTOPHER, McDermott (The University of Edinburgh); Prof. NGWENYA, Bryne (The University of Edinburgh); Mr TOWLER, George (Quintessa); Dr BIRD, Clare (Stirling University)

Presenter: Ms MOUAT, Elise (The University of Edinburgh)

Session Classification: Poster

Track Classification: (MS01) Porous Media for a Green World: Energy & Climate