



Features, events and processes (FEP) analysis of the interactions between repository monitoring systems and multi-barrier systems

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Abstract. In line with the European waste directive 2011/70/EURATOM, the European Joint Programme on Radioactive Waste Management (EURAD) was launched in June 2019. EURAD aims to make a step change in European collaboration between advanced and early-stage waste management programmes. Monitoring Equipment and Data Treatment for Safe Repository Operation and Staged Closure (MODATS) is Work Package (WP) 17 of the EURAD programme. This WP aims to address a range of research needs relating to repository monitoring data and technologies.

This abstract summarises research relating to the interactions between repository monitoring systems and the multi-barrier systems in which they are emplaced. A detailed features, events and processes (FEP) analysis is being undertaken to identify and describe the manner in which monitoring systems may interact with multi-barrier systems. Monitoring system components are generically considered in this research; they include data acquisition technologies, power technologies, data transmission technologies and data loggers. No specific disposal concepts have been selected; however, a range of commonly engineered barrier system materials and typical host rocks are considered.

This FEP analysis research will provide an understanding of the impacts of monitoring systems, which could be used to aid monitoring system design optimisation, for example by supporting the screening of monitoring technologies (White and Scourfield, 2019). It may also provide evidence to demonstrate that monitoring systems do not unacceptably impact the safety functions of the multi-barrier system.

Potential interactions may include the creation of gas migration pathways along monitoring power or data transmission cables positioned in the multi-barrier system. This process has been observed in underground research laboratory experiments, such as the Large Scale Gas Injection Test (LASGIT) experiment in the Äspö Hard Rock Laboratory, which involved a series of gas injection tests in a full-scale KBS-3V deposition hole. Other possible interactions could include (non-exhaustive) corrosion of metallic components, degradation of non-metallic components, microbial activity, gas generation, void introduction and formation and volume changes.

The final output of this research will be a catalogue of FEPs describing the interactions between generic monitoring systems and multi-barrier systems. Similar to the Nuclear Energy Agency FEP lists, this FEP catalogue is intended to be a starting reference for waste management organisations to use to understand the potential interactions between their specific monitoring systems and multi-barrier systems.

References

White, M. J. and Scourfield, S. (Eds.): Repository Monitoring: Strategies, Technologies and Implementation: The Modern2020 Project Synthesis, Modern2020 Project Deliverable D6.5, European Commission, report, 2019.