**postIntegration Group for the Safety Case (IGSC) Symposium 2024**  
*MOVING TOWARDS THE CONSTRUCTION OF A SAFE DGR – GETTING REAL*

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| **Abstract Title:** Reducing key safety case uncertainties in a multibarrier system with poorly indurated clay and concrete | |
| **Abstract (300-500 words):**  The Netherlands has a policy of long-interim storage in which waste is planned to be disposed of only in 2130 but the National Programme for the management of RAdioactive waste (NPRA) needs to be updated every 10 years (EC, 2011; van Gemert et al., 2023). The publication of safety cases in COVRA’s research programme is aligned with the review cycles of the NPRA (Verhoef et al., 2020). Disposal concepts are developed through a hierarchical set of different levels of requirements in a requirements management system. The performance and evolution of components in the multibarrier system are described and their contributions to the post-closure safety are assessed in a safety case.  A key model uncertainty (NEA, 2023) is the oversimplified treatment of water chemistry and transport in barrier materials during reactions in the multibarrier system. Release of radionuclides from waste forms takes place through alteration or corrosion processes. These processes consume water for waste forms such as metal and glass. In a multibarrier system with poorly indurated clay as a host rock, concrete is frequently used as an engineered barrier. It has been estimated that a consumption rate of 0.1 kg water per year per cross section disposal tunnel per metre is too large to prevent desaturation of the backfill. The leachability of concrete by clay pore water can be controlled by the choice in cement with which concrete is manufactured. Recent work on the properties of waste package concrete (Blanc et al., to be published) appears to severely limit the access of water to the waste form throughout the long post-closure phase. Inclusion of the conceptual understanding of the necessary rate of water consumption by the waste form appears to have a major impact on the calculated expected releases of radionuclides to the biosphere (Neeft et al., to be published). Inclusion of the plausible range in water consumption rate in the post-closure safety assessment can be used to optimize the content of waste in a single waste package or to minimize the necessary disposal depth for many types of waste.  Blanc et al., (to be published). Description of ILW modelling results and recommendations for future experiments and numerical work: Deliverable 2.15.  EC, (2011). Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, Official Journal of the European Union L199/48-56 02.08.2011.  NEA, (2023). Building Confidence in the Face of Uncertainty OECD Publishing, Paris.  Neeft al., (to be published). COPERA Clay 2024 Safety case and Feasibility studies.  van Gemert et al., (2023). Draft Memorandum on Scope and Level of Detail - National Programme on Radioactive Waste (NPRA).  Verhoef et al.( 2020), Long-term research programme for geological disposal of radioactive waste, Overall research programme and work programme for 2020-2025. | |