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

|  |  |
| --- | --- |
| **Abstract Number: 66** | **Session 7.2.3** |
| **Author:**  Keto, P., Naumer, S., Häkkinen, S. Tulkki, V., Hellä, P., Juutilainen, P & Schatz, T.  VTT, Technical Research Centre of Finland  Contact: timothy.schatz@vtt.fi | |
| **Abstract Title:**  Considering Disposal of Spent Fuel from Small Modular Reactors (SMRs) and Next Generation Reactors in Finland | |
| **Abstract (300-500 words):**  Finland plans to dispose of spent fuel from LWR-NPPs in a deep geological repository, ONKALO, applying the KBS-3 concept featuring emplacement of packaged spent fuel at a depth of approximately 400 m in crystalline rock. The spent fuel is encapsulated in copper canisters that are in turn surrounded by bentonite barrier material. Spent fuel generated by LW-SMRs, 4th generation reactors or by using accident tolerant fuels will likely have different characteristics compared to the spent fuel from the fleet of NPPs currently operating in Finland for which the DGR is designed. For example, the smaller reactor cores featured in LW-SMRs will lead to spent fuels with smaller burnups and higher reactivities. These differences will need to be considered to assess the applicability and optimization of the KBS-3 concept for disposal of these new spent fuels as the safety analysis must consider radionuclide inventories, radiotoxicity, thermal properties, reactivity, interactions with the engineered barrier system and host rock. The basis for licensing disposal of new spent fuel into an existing repository is that combined radioactive releases from the repository comply with regulatory requirements. Therefore, further development of the current KBS-3 method or development of new methods may be needed in Finland.  It may also be the case that deployment of SMRs will be more dispersed than large NPPs and different waste management strategies may be of interest. Although centralized treatment, storage and disposal facilities may have advantages in terms of siting, security, safeguards and cost, associated increases in transport needs could lead to additional acceptability, regulatory and technical challenges. Additionally, alternative waste management schemes may need consideration given potential uncertainties regarding disposal availability.  The issues outlined above have been recently examined in the Finnish National Nuclear Safety and Waste Management Research Programme. The outcomes from this work will be discussed including the results from burn-up calculations with the continuous-energy Monte Carlo code Serpent which were performed for two LW-SMR designs. The upcoming EURAD-2 project features a proposed work package (FORSAFF) related to waste management for SMRs and advanced reactors. The scope and structure of this work package will also be discussed. | |