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

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| **Author: Jaehyeon Yang, Gyunyoung Heo, Kunok Chang, Hyungdae Kim\***  *Kyung Hee University, Korea*  *\*hdkims@khu.ac.kr* | |
| **Abstract Title: Methodology of Scenario Development for Risk Assessment of a Deep Geological Repository for High-Level Radioactive Waste in Korea** | |
| **Abstract (300-500 words):**  According to the regulations for deep geological disposal of high-level waste in Korea, the total annual risk should not exceed 10-6 for a representative individual. A crucial aspect is that the assessment of total risk should be based on a scenario set integrating major potential exposure situations anticipated from the disposal system, rather than evaluating each exposure situation individually. This risk-based approach, taking into account the disposal system's performance period of at least one hundred thousand years during which the receptor will be exposed to various scenarios, is conceptually ideal.  However, implementing this approach by quantifying scenario probabilities and developing a scenario set that can represent the safety of the disposal system is considerably challenging. In response, the Korea Institute of Nuclear Safety (KINS) has proposed a methodology to implement the risk-based approach. This methodology simplifies the exposure pathway from waste to a representative individual into radionuclide release, transport, contamination, and radiation exposure, and includes the of procedure quantifying scenario probabilities. Enterprises and research institutions aiming to construct a safety case must adopt and properly implement a methodology that meets the requirements of the national regulatory authorities.  This study presents a methodology for developing release and transport scenarios that align with the risk-based approach proposed by KINS, supporting the construction of a safety case for a deep geological disposal repository in Korea.  This methodology differentiates release-transport scenarios through spatial and temporal distinctions. Spatially, it is based on engineered and natural barriers, while temporally, it references the performance criteria of engineered barriers designed to limit radionuclide release through natural barriers for a minimum of several thousand years, with ten thousand years serving as the benchmark for distinction. Compartmentalized scenarios are further subdivided according to normal conditions, human-induced events, and external events. These refined scenarios are detailed through phenomenological analysis for each situation and screened through probability analysis. Scenarios elaborated through phenomenological analysis are depicted in the form of Process Influence Diagrams (PID) to effectively demonstrate the long-term evolution of the disposal system over time. | |