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

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| **Abstract Title:**  **Study of operational safety designs and assessment: lessons learnt from NUMO safety case** | |
| **Abstract (300-500 words):**  NUMO has developed a methodology for tailoring a repository design to the geological features specified through the stepwise site investigations. At the stage without a specific site, maintaining a range of designs that meet the requirements captured in “design factors” allows flexibility to tailor design to the diverse geological environments expected in Japan. The range of designs were organized as “design options” within a repository concept catalogue [1]. Their capabilities and practicalities have been studied in collaboration with both national institutes and overseas waste management organizations.  The repository designs described in the “The NUMO Pre-siting SDM-based safety case” ("NUMO-SC" hereafter) [2] were developed by applying the design methodology mentioned above. Several design options were applied to the site-descriptive model (SDM) based on general geological observations in Japan. Radiological safety during both the pre- and post-closure phase of the repository were assessed for several repository designs in the SDMs. This presentation is concern with the findings and lessons learnt regarding operational safety in NUMO-SC.  The repository design regarding operation of repository was planned to protect public and workers from abnormal conditions resulting from drop of the radioactive waste, fire spread, equipment failure, human errors, loss of external power as internal events in facilities. A wide range of abnormal conditions were assessed focusing on the potential failure of containment due to the physical or thermal impact and resulting radionuclide release. Partial deformation by the impact of drops was noted, but excess damage to the waste containers that could lead to RN release was unlikely. In addition, even if the temperature of HLW or TRU waste was elevated due to fires or failure of ventilation cooling, current analyses suggest that the temperature is sufficiently low for a risk of thermal damage.  It was suggested the points below would contribute to further improvement in operational safety:   * Enhancement of the reliability of the assessment~~,~~ and more detailed equipment designs will be developed based on specific site conditions, allowing development and evaluation of a more complete range of abnormal conditions, encompassing both internal and external events. * Detailed mitigation and recovery plans for accidents will be specified in the future when formulating operational plans based on specific site conditions and then, relevant accident response techniques will be developed.   After establishing NUMO-SC, several efforts were underway to develop design options, for example, to reduce the risk of fire from vehicles transporting waste in access to underground facilities, as well as measures to ensure a safe work environment under normal conditions (e.g., ventilation, drainage pathways, water inflow reduction, etc). The latest study on the waste transportation system in an access shaft for eliminating fire and mitigating drop impact will be briefly presented, with detailed reporting available in a poster [3]. The findings of these studies will inform future repository design tailored to the specific site.  [1] NUMO (2004), NUMO-TR-04-03, [2] NUMO (2021) NUMO-TR-21-01, [3] Ichimura et al. (2024) “A study of operational safety countermeasures for the waste transport systems using shaft and straight ramp”, in poster presentation. | |