**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:**  **Geologic Disposal Safety Assessment (GDSA) Framework: an open-source software toolkit** | |
| **Abstract (300-500 words):**  The U.S. Department of Energy’s Spent Fuel & Waste Science and Technology (SFWST) Campaign is conducting research and development (R&D) on geologic disposal of spent nuclear fuel (SNF) and high-level nuclear waste (HLW). A high priority for SFWST disposal R&D is developing subsurface simulation software for use in post-closure performance assessment of deep geologic disposal systems.  Geologic Disposal Safety Assessment (GDSA) Framework is an open-source software toolkit for probabilistic performance assessment. GDSA Framework simulates the coupled processes affecting radionuclide mobilization and transport in deep geologic disposal systems and performs forward propagation of uncertainties to generate multiple realizations of system evolution. GDSA Framework has been applied to generic repository concepts in salt, argillite, and crystalline rock, as well as generic deep borehole disposal concepts. GDSA Framework will run on your laptop or on a supercomputer. It includes the multi-physics simulator, PFLOTRAN; the uncertainty quantification and sensitivity analysis tool, Dakota; pre- and post-processing tools; and the visualization tool, Paraview.  PFLOTRAN is an open-source, state-of-the-art, massively parallel subsurface flow and reactive transport simulator, and the engine of GDSA Framework. PFLOTRAN solves a system of generally nonlinear partial differential equations describing multiphase, multicomponent, and multiscale reactive flow and transport in porous materials. Dakota delivers both state-of-the-art research and robust, usable software for optimization and uncertainty quantification (UQ). The Dakota toolkit provides systems analysis methods for desktop or high-performance computing, including optimization, uncertainty and sensitivity analysis, and parameter estimation.  This presentation will provide an overview of GDSA Framework highlighting its recently added capabilities. SAND2024-02372A. | |