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Abstract for SRA 2006 meeting: Using the SPARC method to extract risk insights from a performance assessment for review of a near-surface disposal facility for radioactive waste

Performance assessments (PAs) often are the chief source of risk information supporting decisions regarding nuclear waste disposal systems. These PAs typically contain numerous uncertainties, and sensitivity analyses often are used to determine which system features are the most important and why. Although disposal facilities typically are designed so that a combination of sub-systems is used to limit the exposure of potential receptors to residual contamination, sensitivity analyses often focus on one system feature or parameter at a time without offering a holistic explanation of system performance in terms of combinations of sub-system properties. Strategic Partitioning of Assumption-Ranges and Consequences (SPARC) is a sensitivity analysis method whose goal is to construct a specific explanation of the PA results of interest, specifically by uncovering what sets of model parameter values taken together could result in failure to meet performance goals. This paper discusses the SPARC method in the context of a Nuclear Regulatory Commission (NRC) review of a Department of Energy non-HLW determination. NRC evaluated the safety of disposal by comparing predicted facility performance to the performance objectives specified in NRC regulations for the disposal of low-level waste (10 CFR Part 61 Subpart C). Potential radiological dose to receptors was evaluated with a PA model that simulates wasteform degradation, radionuclide release, radionuclide transport through the environment, and exposure of potential receptors to residual contamination. The SPARC method was used to determine which aspects of the disposal facility design and natural system are most important to limiting potential receptor doses. Risk insights generated with the SPARC method were used to focus review resources on the factors most important to meeting the performance objectives, and to facilitate identification of system components that should be monitored to ensure adequate facility performance.