Advanced Simulation Capability for Environmental Management (ASCEM) Overview and Example Application

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The U.S. Department of Energy Environmental Management (DOE EM), Office of Soil and Groundwater Remediation is investing in development of the Advanced Simulation Capability for Environmental Management (ASCEM) to support modeling analyses at complex legacy waste sites. This investment includes development of an open-source user environment called Akuna that manages subsurface simulation workflows and a high-performance computational simulator called Amanzi. Core toolsets accessible through the Akuna interface include model setup, grid generation, sensitivity analyses, model calibration, and uncertainty quantification. Additional toolsets are used to launch Amanzi, manage simulation data, and visualize both model input and results. This new set of workflow capabilities is demonstrated by streamlining model setup, calibration, and uncertainty analyses using high performance computation for the BC Cribs Site, a legacy waste site with technetium-99 contamination in the deep vadose zone at the Hanford Site in Washington State. The impact of remediation alternatives to address the deep technetium-99 is explored by examining the uncertainty associated with both net infiltration and detailed heterogeneity represented in multiple realizations of the conceptual model.