Advanced Simulation Capability for Environmental Management (ASCEM): Development and Demonstrations

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The U.S. Department of Energy Office of Environmental Management, Technology Innovation and Development is supporting development of the Advanced Simulation Capability for Environmental Management (ASCEM). ASCEM is a state-of-the-art scientific tool and approach for understanding and predicting contaminant fate and transport in natural and engineered systems. The modular and open source high performance computing tool facilitates integrated approaches to modeling and site characterization that enable robust and standardized assessments of performance and risk for EM cleanup and closure activities. The modularity of ASCEM enables new scientific understanding to be incorporated as it is developed. The open-source nature is envisioned to be critical for adoption of ASCEM by the scientific community for use in quantifying and understanding flow and transport associated with a variety of critical energy and environmental subsurface systems.

During the second full year of the project, ASCEM has continued to make significant progress in the development of Platform and Integrated Toolsets and a High Performance Computing (HPC) Multi-Process Simulator. The Platform, called Akuna, includes toolsets that support data management, parameter estimation, uncertainty quantification, and visualization of model input and output. The HPC capabilities target process model representations, toolsets for interaction with Platform, and verification and model confidence testing. The HPC simulator, called Amanzi, includes transient flow using both structured and unstructured grids implemented on a parallel computer using up to 1000 processors. Additional capabilities are now being added, including: transport and geochemical processes and interfaces with Platform capabilities. A build system is being developed to permit compiling on different desktop and supercomputers.

The ASCEM Project is working to complete a second demonstration focused on three working groups. The working groups include 1) Attenuation-Based Remedies for the Subsurface, focused at the Savannah River Site F Area, 2) the Hanford Site Deep Vadose Zone, and 3) a representative Waste Tank Performance Assessment. Progress on ASCEM development and demonstrations will be highlighted in this poster.