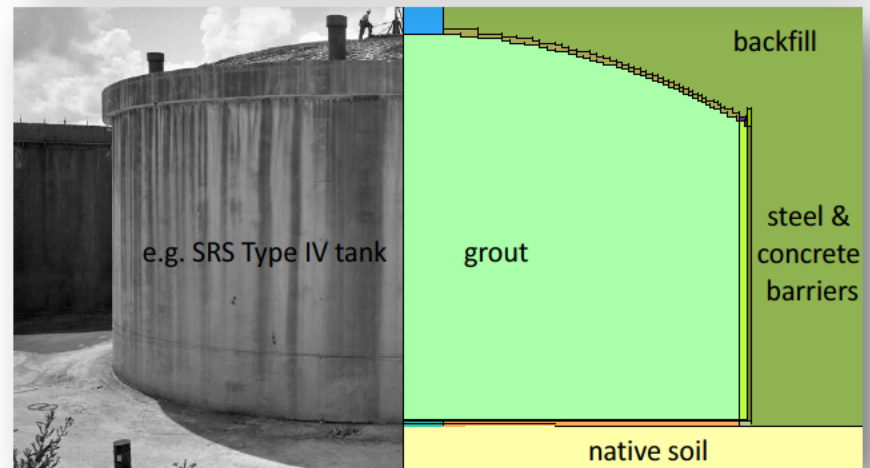


ASCEM Demonstration Examples

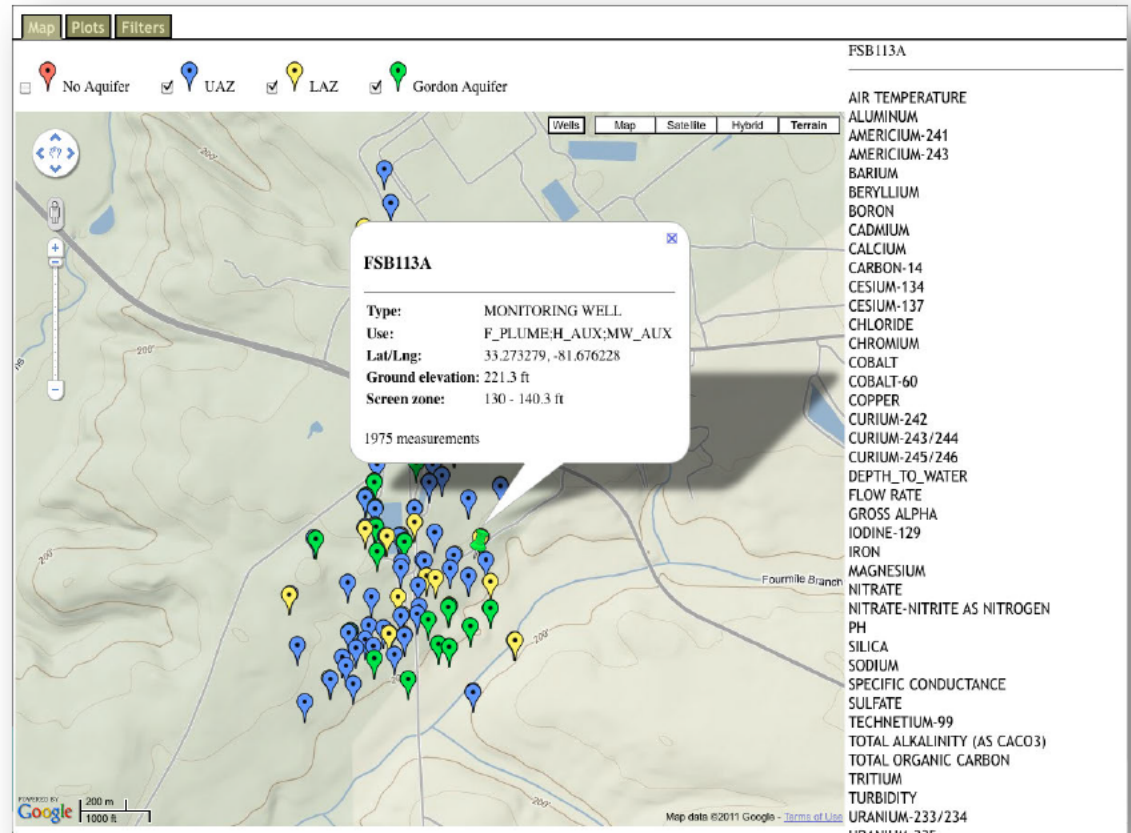
Multiple demonstrations are being used to test and highlight ASCEM capabilities

- F Area Seepage Basins are being used to test and showcase capabilities associated with geochemistry and modeling of remedial actions
- Tank closure demonstration is being used to test the tools on engineered systems



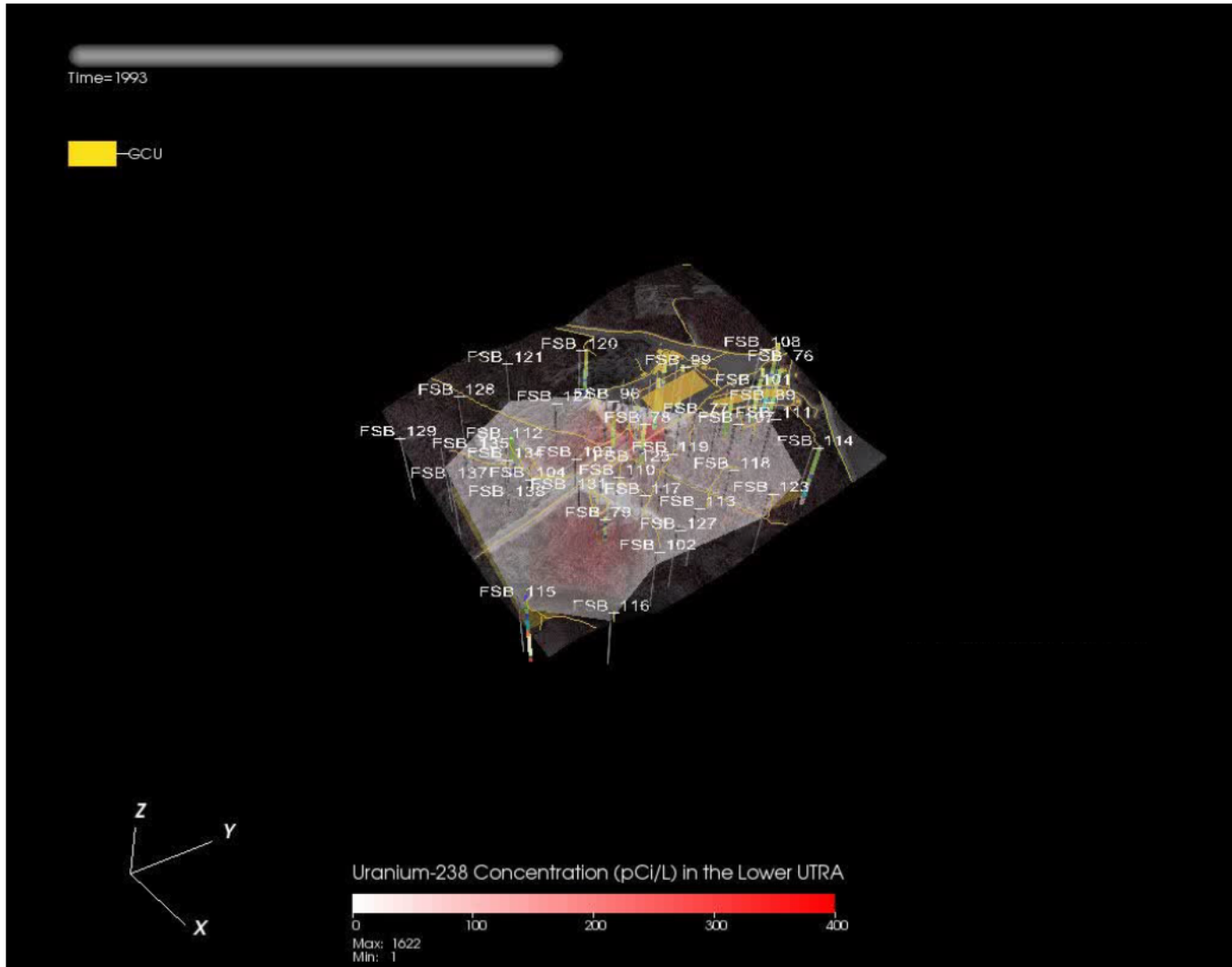
F-Area Seepage Basins

- Use ASCEM tools to explore how uncertainty impacts long-term predictions of uranium mobility
- Google-map based data management methodology that allows users to easily access, browse, and download a variety of data
- Modeling migration of uranium including chemical reactions in the environment

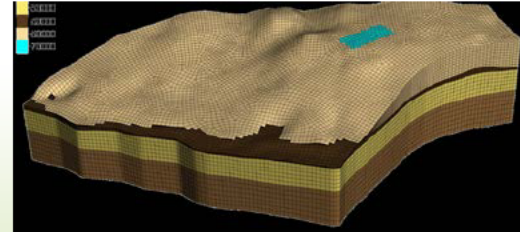


Well Locations in Data Tool

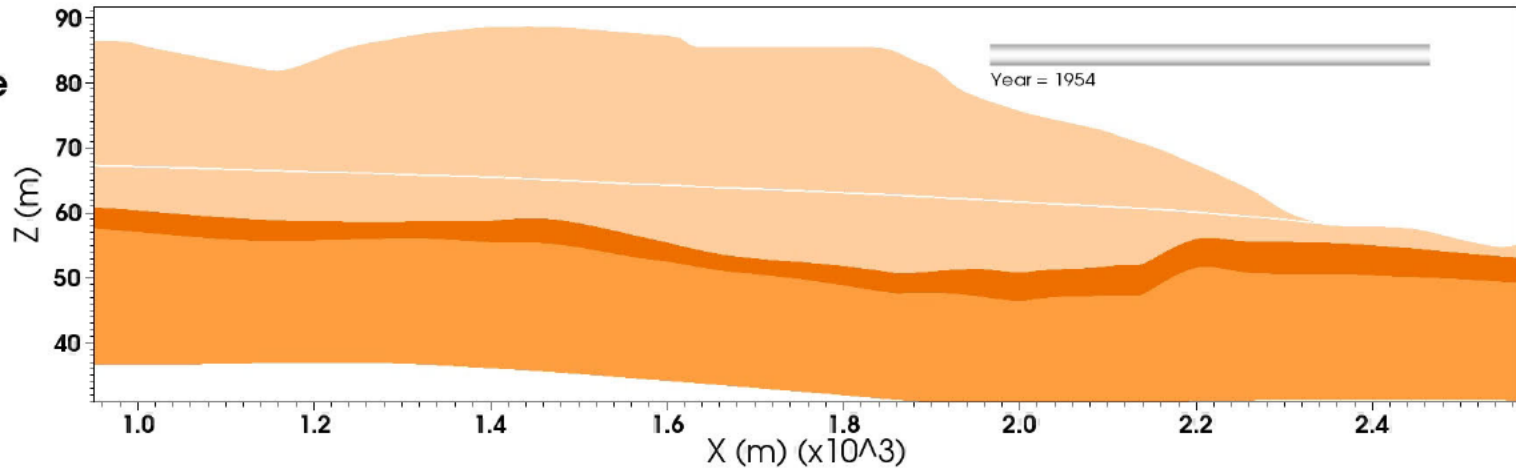
Well Locations and Concentrations



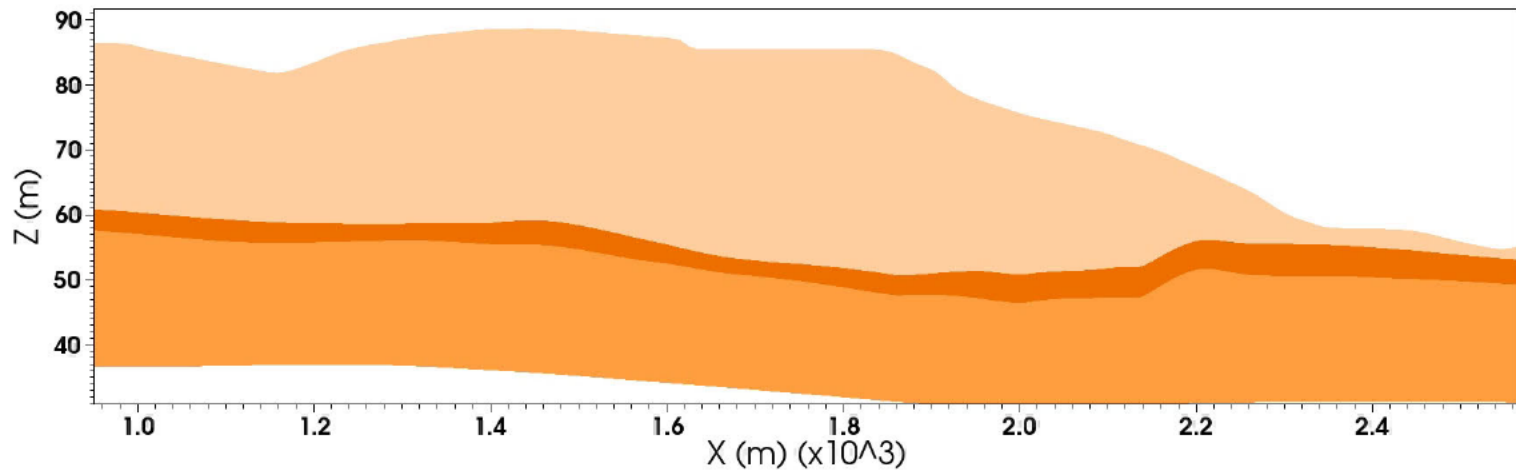
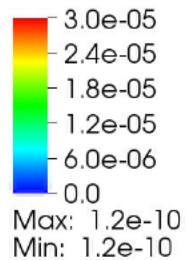
Uranium Migration and Water Table Changes



Geology and Water table



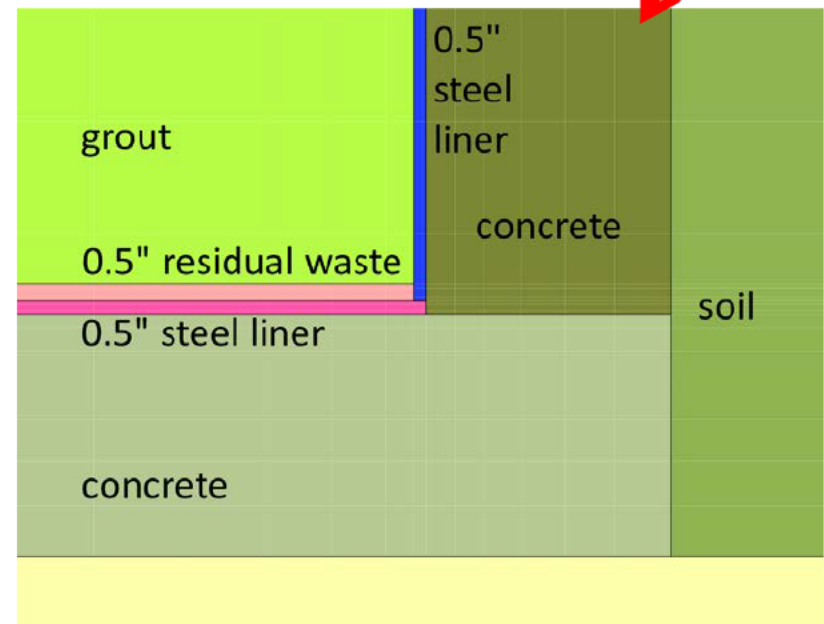
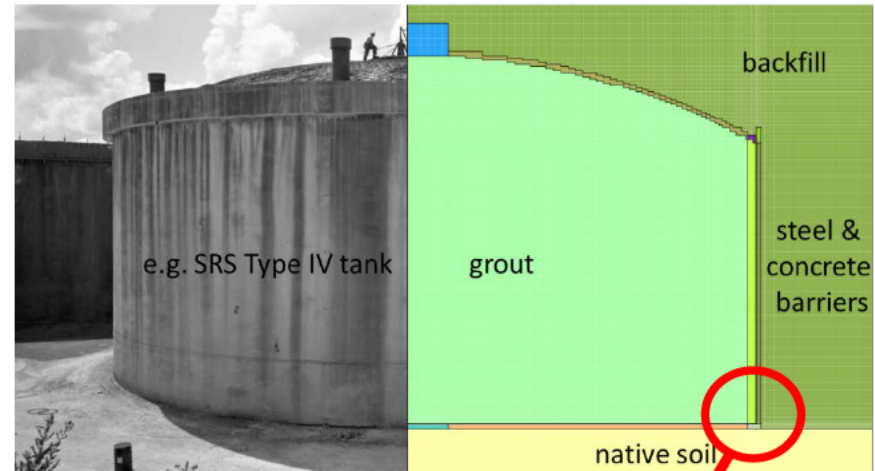
Total U(VI)



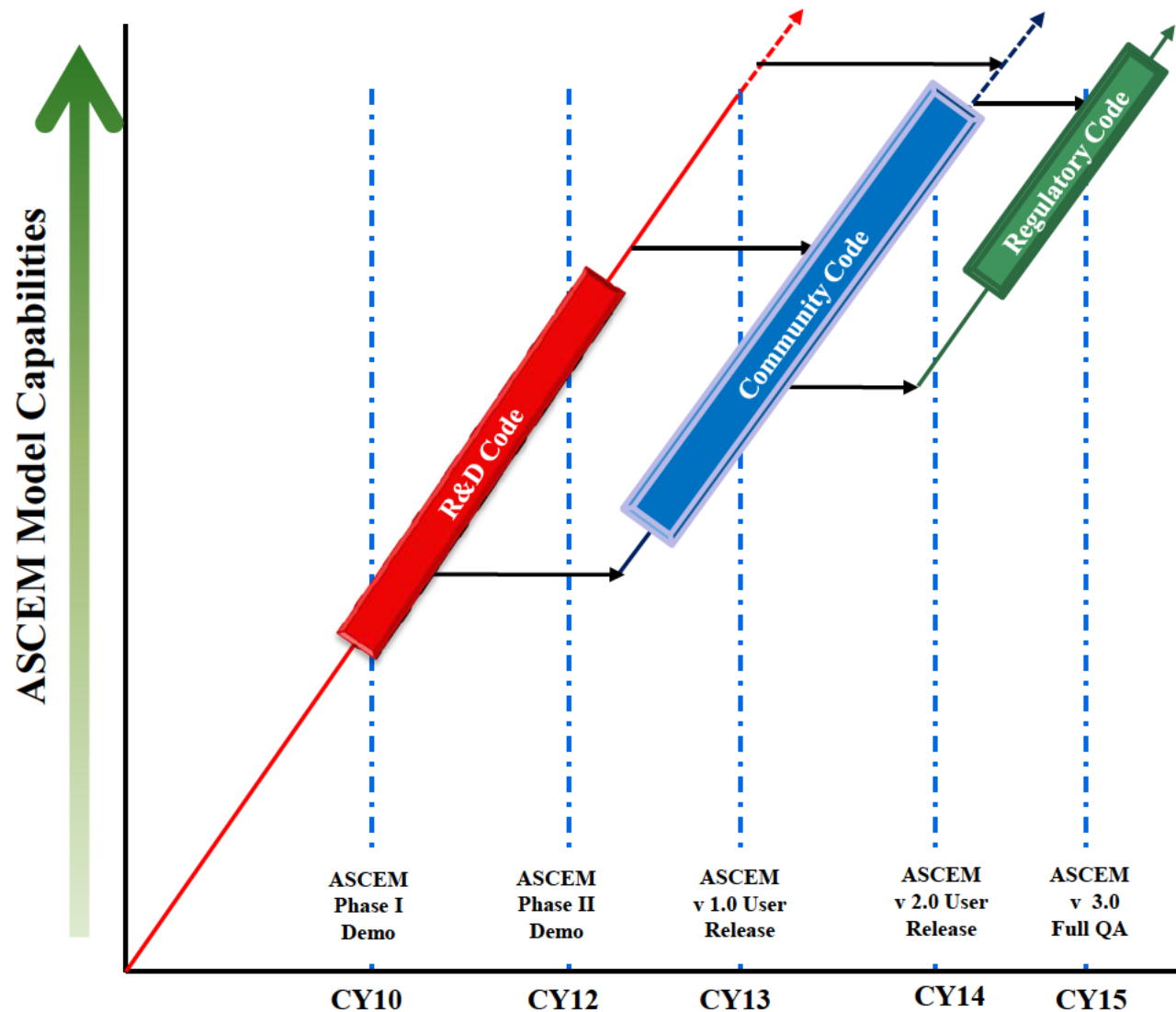
TCCZ – Tan Clay Confining Zone
 UUTRA – Upper, Upper Three Runs Aquifer
 LUTRA – Lower, Upper Three Runs Aquifer

Waste Tank Performance Assessment

- **Waste tank closures** are a high DOE-EM priority – Solid waste disposal and D&D also underway across DOE
- **Performance Assessment** of engineered barriers and waste forms involves significant subsurface modeling challenges, including:
 - waste form and barrier reactive chemistry (e.g., grout and concrete)
 - evolution of physical and chemical properties over long time periods (10,000+ years)
 - Cracks and thin liners
- Linking with Cementitious Barriers Partnership tools




ASCEM Development Timeline (2010-2015)



Summary

- Mathematical modeling plays an important role in supporting the DOE-EM cleanup mission
- Models are used to help improve the understanding of system behavior to help prioritize activities, evaluate options and demonstrate compliance
- ASCEM is being pursued to move towards more standardized and consistent environmental modeling approaches for the DOE Complex
- Tools for data management, visualization, reactive transport, uncertainty quantification, etc. have been developed
- A limited user release for testing is planned in the near future and development and quality assurance activities are continuing for a regulatory version in 2015

Questions





[HOME](#)

[ABOUT](#)

[THRUST AREAS](#)

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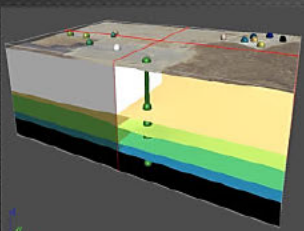


Transforming environmental management through computing

ASCEM

Advanced Simulation Capabilities for Environmental Management (ASCEM) is a software project that aims at developing next-generation, science-based reactive flow and transport simulation capabilities and supporting modeling toolsets within a high-performance computing framework to address DOE-EM's waste storage and environmental cleanup challenges.

➔



PLATFORM

The Platform consists of a set of tools integrated into a consistent user interface that supports a flexible modeling workflow. It includes tools for data management, visualization, model



HPC SIMULATOR

The Multi-Process HPC Simulator, named Amanzi, is a flexible and extensible open-source simulator for coupled flow and reactive transport in geologic media and engineered system components.



APPLICATION

Site Application experts ensure that the HPC simulator and Platform toolsets incorporate the capabilities needed to support DOE-EM's remediation and closure decisions.

THRUST AREAS

ASCEM is an integrated simulation framework developed along three Thrust Areas:

- 1. Platform and Integrated Toolsets: Provides the user with toolsets for model development and analysis, visualization, and management of data and simulation results.*
- 2. Multi-Process HPC Simulator: Provides the user with state-of-the-art*

<http://ascemdoe.org/>

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More Information about ASCEM

- **Mathematical Formulation Requirements and Specifications for the Process Models;** ASCEM-HPC-2011-01, 2011
- **High-Level Design of Amanzi: The Multi-Process High Performance Computing Simulator;** ASCEM-HPC-2011-03, 2011
- **2011 ASCEM Platform Thrust Design Document;** ASCEM-PIT-2011-01, 2011
- **ASCEM Phase II Demonstration Plan;** ASCEM-SITE-2011-01, 2011
- **ASCEM User Needs Report – FY 2011;** ASCEM-SITE-2011-02, 2011
- **ASCEM Phase 1 Demonstration;** ASCEM-SITE-102010-01, 2010
- **Advanced Simulation Capability for Environmental Management (ASCCEM): An Overview of initial Result;** *Technology and Innovation, Vol. 13, pp. 175–199, 2011.*

<http://ascemdoe.org/>