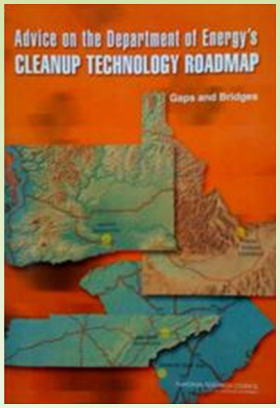
Advanced Simulation Capability for Environmental Remediation (ASCEM)

How and When Will We Assist the Next Generation of Environmental Management's (EM) Risk and Performance Assessments (PAs)?

- *FY10: Evaluate existing data, models, and site needs to develop requirements and design documents.*
- *FY11: Prototype of a high performance computing (HPC) core and advanced toolsets; initial capability demonstration.*
- *FY12: An integrated, modular, open source simulation capability with added process modules; second prototype demonstration*
- *FY13: Platform with full decision analysis and risk assessment tools; testing by limited site user groups.*
- *FY14: ASCEM with full platform and multi-process model capabilities; full demonstration at a selected site; user training and enduring infrastructure for model maintenance and updates.*

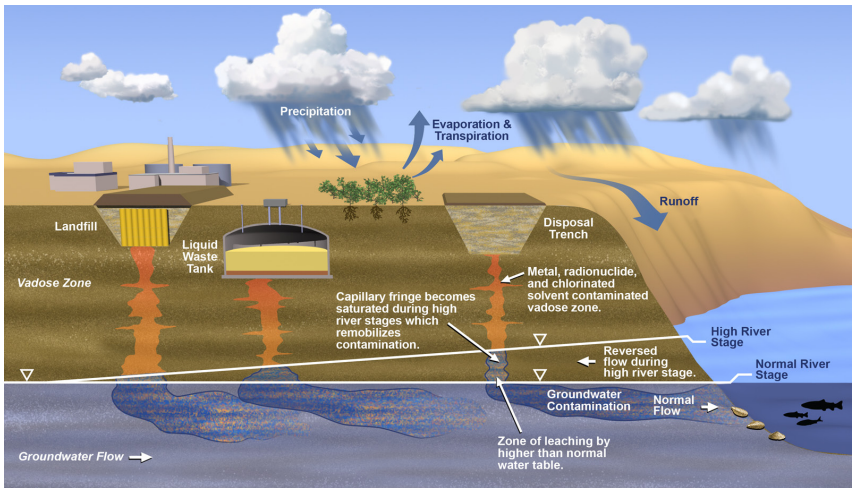


What Did the National Academy of Sciences Identify as the Key Technical Challenges?

- *Contaminant subsurface behavior poorly understood (high risk).*
- *Site and contaminant source characteristics limit usefulness of baseline (traditional) approaches (medium risk).*
- *Long-term performance of trench caps, liners, and reactive barriers cannot be assessed with current knowledge (medium risk).*
- *Long-term ability of cementitious materials to isolate wastes is not demonstrated (high risk).*

What Does ASCEM Entail?

ASCEM is a state-of-the-art scientific tool and approach for understanding and predicting contaminant fate and transport in natural and engineered systems.



U.S. DEPARTMENT OF ENERGY

EM Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

For more information:
www.em.doe.gov/Pages/GroundwaterSoilCleanup.aspx
ascem.lbl.gov

The modular and open source high-performance computing tool will facilitate integrated approaches to modeling and site characterization that enable robust and standardized assessments of performance and risk for EM cleanup and closure activities. Use of ASCEM will help EM better estimate cleanup time and costs, and reduce uncertainties and risks.

How Will ASCEM Meet the Technical Challenges?

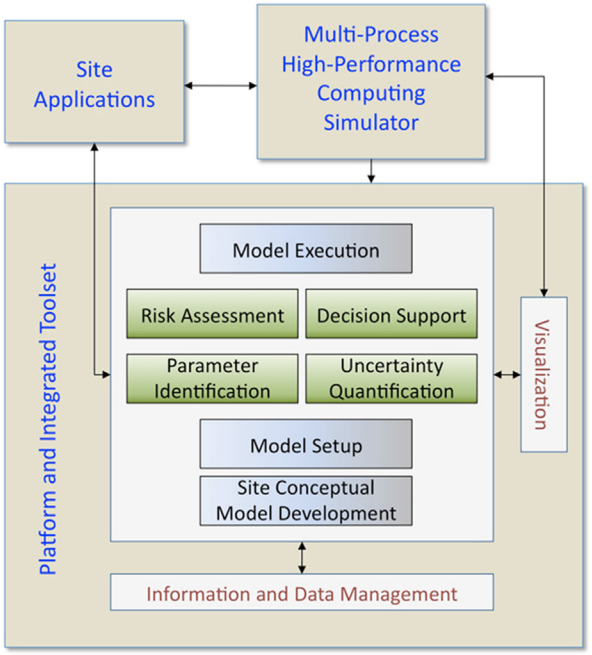
- *Assemble an interdisciplinary team of national laboratory, university, and private sector researchers with significant national expertise in subsurface sciences, material sciences, environmental remediation, and advanced modeling and simulation.*
- *Leverage latest subsurface/ environmental science research, as well as advanced HPC technologies from other Department of Energy (DOE) programs such as the Subsurface Biogeochemical Research (SBR), Scientific Discovery through Advanced Computing (SciDAC), Energy Frontier Research Centers (EFRC), Nuclear Energy Advanced Modeling and Simulation (NEAMS), Advanced Simulation & Computing (ASC), climate change modeling, and geologic carbon sequestration studies.*
- *Work hand-in-hand with DOE field offices and Performance Assessment (PA) practitioners, and involve regulators and other stakeholders.*
- *Perform rigorous and impactful independent peer reviews of work plans and deliverables.*

Key ASCEM Program Participants

Los Alamos National Laboratory, Lawrence Berkeley National Laboratory, Pacific Northwest National Laboratory, Oak Ridge National Laboratory, and Savannah River National Laboratory, with support from Argonne National Laboratory, Idaho National Laboratory, and Lawrence Livermore National Laboratory.

What Are the Transformational Concepts Advancing this Effort Over Others?

ASCEM's science-based high performance computing simulator for coupled hydrological, biogeochemical and mechanical processes will accurately represent complex conditions at EM sites. Its modular and open-source structure will provide a flexible and enduring capability for future PA updates based on advances in environmental research and HPC technologies. Formal uncertainty quantification (UQ) and decision support analyses will improve prediction accuracy and reduce technical uncertainty. Portable from high-performance computers to laptops, ASCEM will enable flexible applications by EM sites, regulators, and other stakeholders.



IMPACT TO SITE MILESTONES

- Enables Federal project managers and site contractors to integrate various site data and scientific understanding into effective tools to guide remediation and closure activities.
- Quantifies and reduces uncertainty associated with remediation and closure of EM sites.
- Provides a transparent and consistent modeling approach for regulatory interactions across the DOE EM complex.

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