



U.S. DEPARTMENT OF  
**ENERGY**

OFFICE OF  
**ENVIRONMENTAL  
MANAGEMENT**

# Waste Management 2014 Hot Topics Panel

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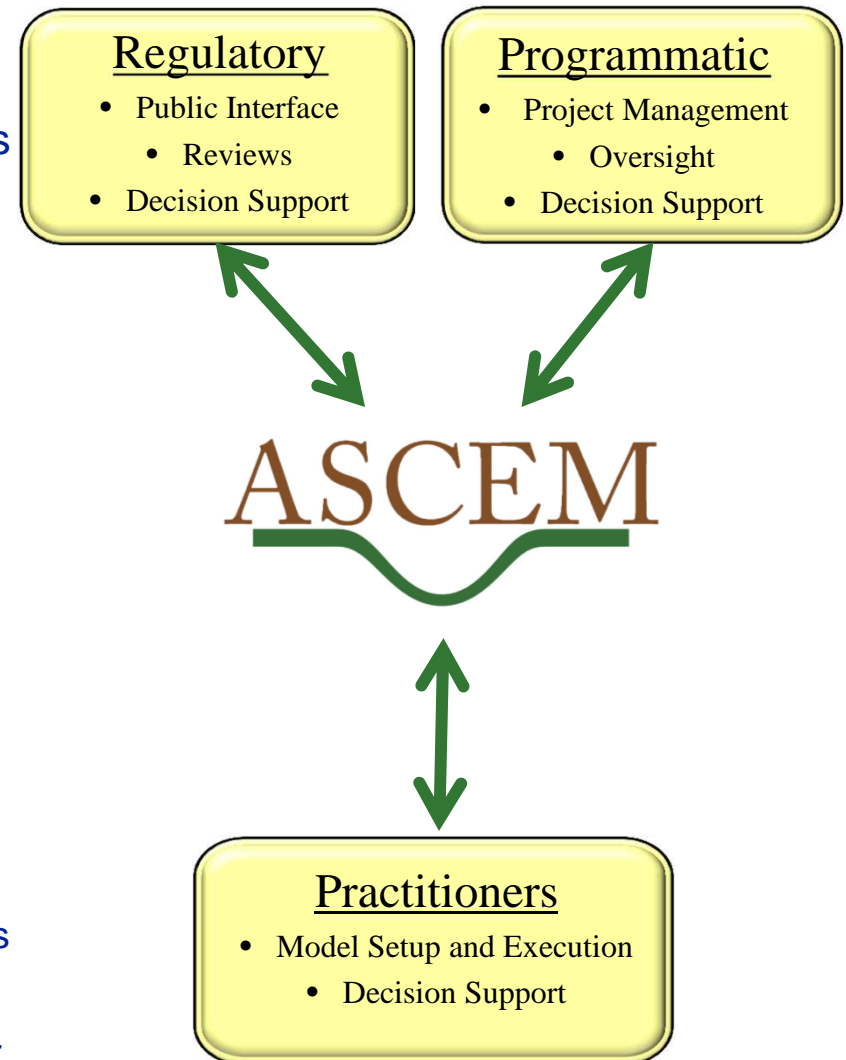
- The mission of the Office of Site Restoration is:
  - To identify and advance strategies to plan and optimize EM soil and groundwater remediation, deactivation & decommissioning and facility engineering projects within a risk informed and sustainable framework
  - To ensure optimized management of projects and technical practices and to incorporate transformational technologies and sustainability factors into remediation
  - To ensure technically sound environmental and public health risk evaluations and performance assessments in selecting remedies and disposal sites
  - To promote long-term protectiveness and to ensure environmental compliance across the EM complex
- The Office of Site Restoration is comprised of three offices
  - Environmental Compliance
  - Soil and Groundwater Remediation
  - Deactivation & Decommissioning and Facility Engineering

- Develop and demonstrate technologies that support cost-effective cleanup
- Sponsor studies and tools that provide the sound technical and scientific underpinnings to support decision making
- Risk inform cleanup sequencing and remedy selections
- Develop strategies to execute sustainable site operations and remedial alternatives
- Share best practices and lessons learned

- Develop a predictive understanding of the impact of surface water and groundwater interactions on the transport of mercury from known mercury source areas
- Integration of components technologies into systems-based pilot demonstrations of enhanced attenuation such as humate to attenuate iodine 129.
- Biological performance optimization strategy for the Hanford 200 West Pump and Treat System
- Pilot test of an innovative monitoring strategy at the Savannah River Site's F Area Seepage Basins to determine controlling variables of contaminant fate and transport to meet regulatory requirements of a stable plume and reduce the number and cost of well measurements
- Pilot application of recently completed Phosphor Paint characterization tool that detects Tc-99

- In-situ sensor networks to support entombment of decommissioned contaminated facilities and closure of waste tanks to detect waste form degradation, liquid movement , and other physical and chemical properties
- Robotics and remote systems for characterization, size reduction, and material handling during decontamination and decommissioning to avoid worker exposure

- **Advanced Simulation Capability for Environmental Management** – a state-of-the-art approach for predicting contaminant fate and transport through natural and engineered systems
- Links with EM Applied Field Research Initiatives, Cementitious Barriers Partnership, Office of Science, and Applied DOE Energy Offices
- Development focus on user interactions – regulators, stakeholders, program managers, practitioners
- Site Applications and “what if” scenarios
- **Current Activities**
  - Ongoing testing and evaluation of the ASCEM Tool Suite by selected initial users: Hanford Site, Savannah River Site, Nevada National Security Site, and Lawrence Berkley National Laboratory
  - Interaction with the end user community - regulators and stakeholders
  - Development of additional toolsets not in initial user release – parameter estimation, decision support



## Systems-based approaches for Remediation and Monitoring

Characterization, remediation, modeling and monitoring efforts are coupled to site-specific conceptual model

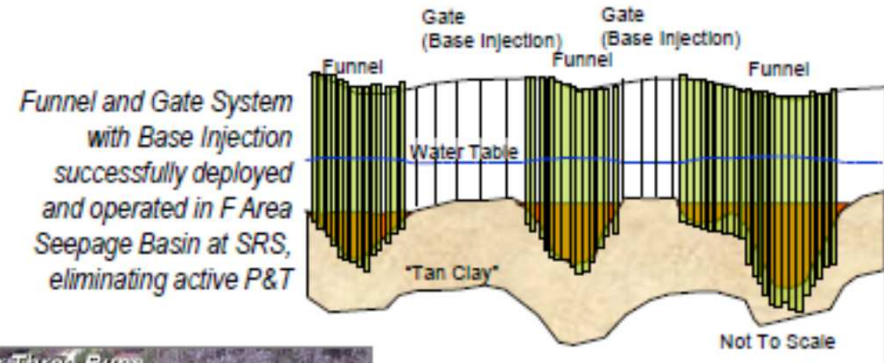
Phased Implementation of remedial efforts allows for system optimization

Focus on transition from active to passive processes

Core team process integrates regulatory and stakeholder interaction through life of the project

Savannah River Site F-area

- Hydraulic barrier coupled with subsurface amendment injection to control tritium and immobilize metals, uranium and iodine
- Pilot testing of innovative paradigm or long term monitoring
- Field testing of effective long-lived attenuation-based remedies



Hydraulic Barrier to control groundwater contaminated with tritium



## Systems-Based Strategy for Cleanup End Points

- Critical to DOE's ability to achieve cleanup
  - Defining technically defensible end points
  - Developing and implementing systems-based remediation approaches and systems-based monitoring strategies
  - Drive the selection of remedial objectives
  - Monitoring approaches to measure progress towards remedial objectives, provide feedback on estimated timeframe for remediation, and to detect changes in site conditions that may affect the conceptual site model
- Systems-based cleanup and long-term management strategies have potential to use resources more effectively and sustainably
- Remediation Management of Complex Sites Team – established by the Interstate Technology Regulatory Council (ITRC) to develop guidance at the state and local level on establishing end points to remediation



- National Academy of Sciences charged by EM to facilitate workshops on best practices for risk-informed remedy selection, closure, and post-closure control
  - Workshops held October 2013 and November 2014
  - Panelists included DOE, DoD, EPA, NRC, state regulators, key stakeholders, tribal representatives and subject matter experts from industry, national labs, and universities
  - Reports to be published in late spring to early summer; workshops agendas and presentations available on the NAS web site
- Topics Addressed
  - Holistic approaches for remediation of sites with multiple contaminant sources and multiple post-closure uses, including technically based point-of-compliance and point-of-use monitoring locations
  - Effective post-closure controls: monitoring, engineered and natural controls
  - Assessing performance of site remedies and closures, especially technically advanced approaches that reduce performance uncertainties and need for post-closure controls on land use, resource management, and intruder prevention
  - Risk-informed decision-making

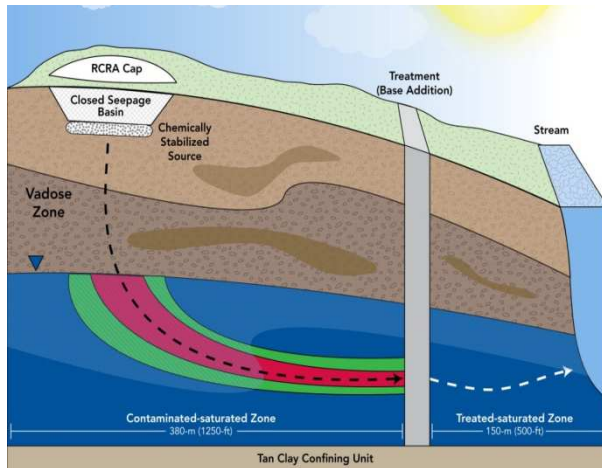
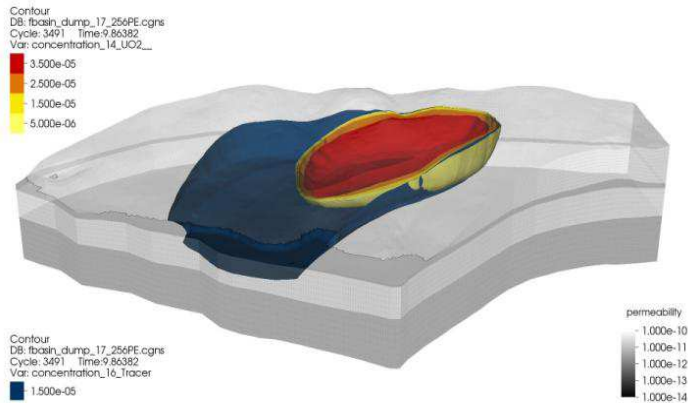
## Hanford Site-Wide Risk Review

- Goal: Through an independently led and transparent review by the Center for Risk Evaluation and Stakeholder Participation (CRESP), help make the most efficient use of DOE-EM resources by developing a common understanding of risks driving cleanup decisions
- Objective: To develop a Hanford site-wide assessment of human health, nuclear safety, environmental and cultural resource risks from former defense operations with participation by the state and federal regulators, tribal nations, DNFSB, elected officials, and other stakeholders
- Results: A cataloguing of environmental and nuclear safety hazards and risks, along with a foundation for incorporating national sustainability objectives and focusing optimization efforts for cleanup
- Kicks off next week

- Expand our thinking about risk and sustainability to best manage existing risks
- Evolve from “cleaning to green” to “green cleaning”
- Take a more comprehensive and integrated approach to balancing impact of addressing environmental contamination risk
  - Short-term and long-term impacts
  - Worker and community impacts
  - Local and global impacts
- Factor end states and future and revitalization use into consideration
- Continue EM’s leadership in reducing green house gas emissions and energy use
- Incorporate actions to strengthen our resilience to extreme weather and prepare for the impacts of climate change

- Federal Remediation Technology Roundtable (FRTR) Project Subgroup on Management of Complex Sites and Spring 2014 FRTR Meeting May 14 on Tools Used for the Management of Complex Sites (includes EPA, Defense, DOE, Interior and NASA)
- Knowledge Management Information System (KM-IT)
  - In collaboration with Florida International University developed and are using the KM-IT as a repository of D&D knowledge and near-real time support
  - Collaboration with IAEA and OECD is also supporting the sharing of best practices and lessons learned
- Communities of Practice
  - Compliance
  - Performance and Risk Assessment

# “Hot Topics” Summary



- Innovative technical solutions and scientific approaches for site restoration
- Collaborative research and technology development and deployment program
- Sharing best practices and lessons learned through interagency groups, communities of practice, and independent reviews
- Managing contamination in a manner that balances protection of human health and the environment and cost effectiveness for current and future generations
- Incorporating the three pillars of sustainability – environmental, economic, and social – into cleanup processes