U.S. DEPARTMENT OF ENERGY

∫(EM-30)*dx*

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Office of Waste Processing (EM-31)

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Presented to the Performance Assessment Community of Practice

EM Environmental Management
safety ❖ performance ❖ cleanup ❖ closure

This document is intended for planning and analysis purposes, assuming a continuing constrained budget environment. Every effort will be made to comply with all applicable environmental and legal obligations, while also assuring that essential functions necessary to protect human health, the environment and national security are maintained.

Yvette Collazo, Director

Office of Technology Innovation and Development, EM-30

Mission

Transform science and innovation into practical solutions for environmental clean-up.

Vision

Through leadership in integration, collaboration and communication, we will accelerate environmental clean-up and reduce costs.

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The Tank Waste System Integrated Project Team was tasked to develop and evaluate alternative technical strategies and *transformational* solutions that could result in an improved, optimized and less costly tank waste system.

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1. At-Tank/Near-Tank Processing –
   - Begin the treatment earlier and will increase the processing rate.
   - Modular treatment applied at both Hanford and Savannah River.

2. Glass Optimization –
   - Increase waste loading and reduce processing time (increased throughput) at Hanford and Savannah River.
   - Develop and deploy next generation melters at Hanford.

3. Advanced Separations Processes –
   - Aluminum and caustic removal to separate low-activity wastes from the tank waste to minimize the volume of high-activity waste at both sites.

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4. Alternative Treatment/Disposal Processes –
   - Alternative treatment processes, such as steam reforming and evaporation followed by sodium silicate solidification, to generate new waste forms.
   - New waste forms reduce the volume of high and low activity waste i.e., replace saltstone grout.
   - Applied at both Hanford and Savannah River.

5. Waste Staging/Area Closure –
   - Consolidate waste in SSTs and DSTs to improve feed to treatment facilities, and allow whole tank farms to be closed. Whole farm closure more efficient.
   - Applied at both Hanford and Savannah River.

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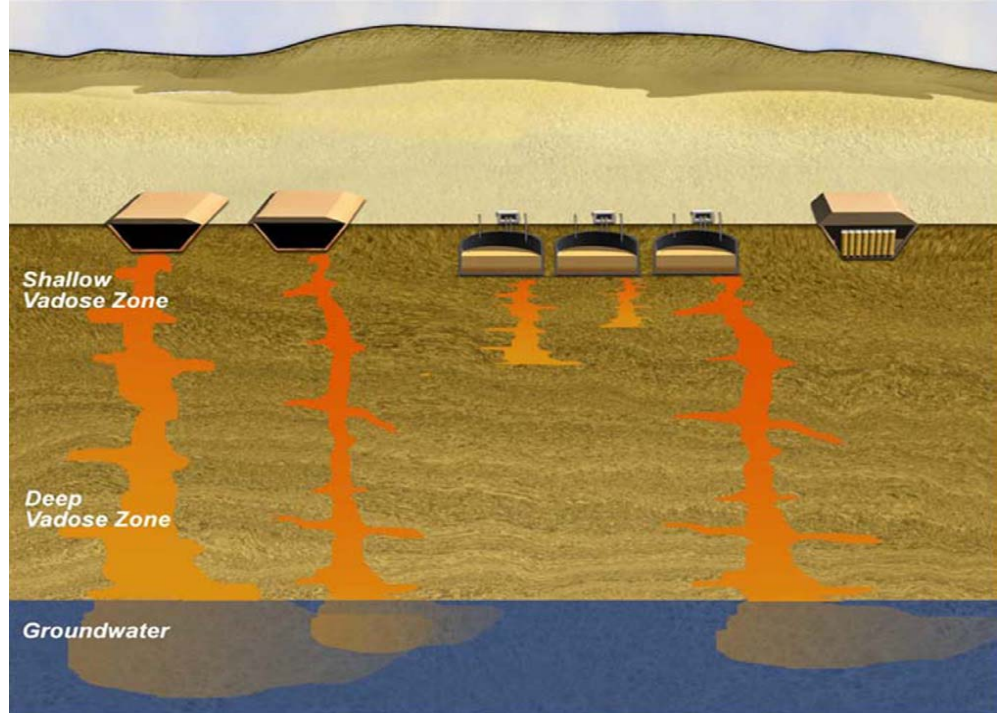
6. Mixing/Blending –
   - Waste processing systems at Hanford should include optimized mixing and blending operations to improve WTP processing, similar to feed preparation for DWPF.

7. Integrated System Analysis –
   - Continue work on the development of a tool(s) to assist in performing integrated systems analysis.
   - Complete analysis of multiple attributes of the tank waste systems to determine if additional transformational changes can be made to the tank waste systems at Hanford and Savannah River.

Action Area 1

Advanced Remediation Methods for Metals and Radionuclides in the Vadose Zone

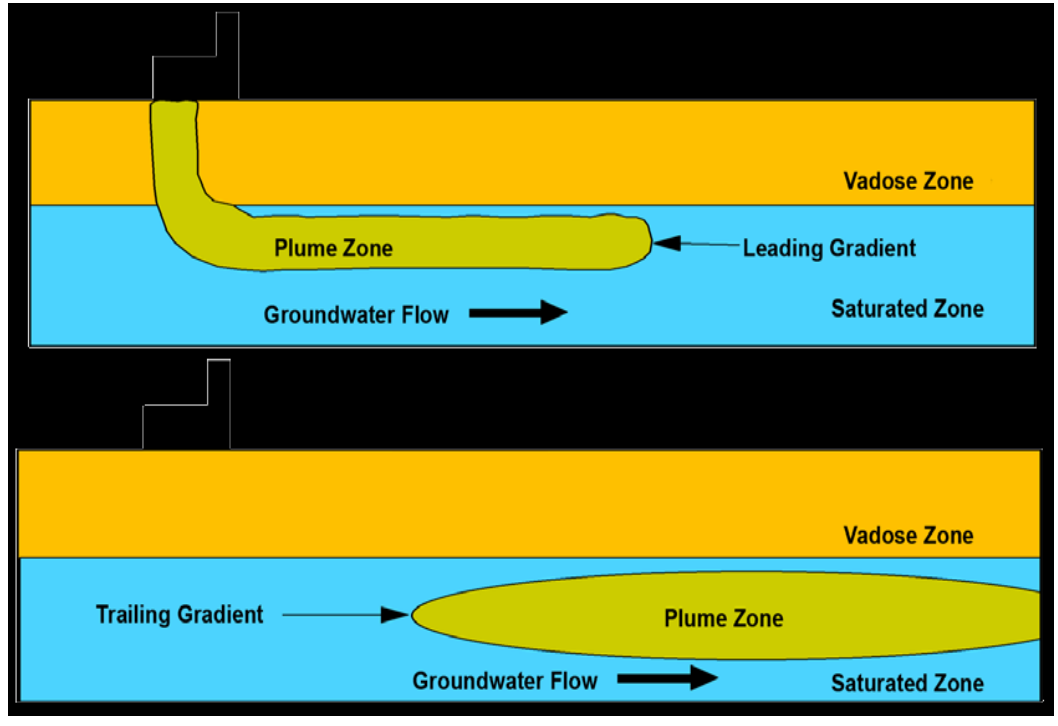
- Develop in situ methods for the remediation of metals and radionuclides in unsaturated environments



Action Area 2

Attenuation-based Remedies for Metals and Radionuclides in Groundwater

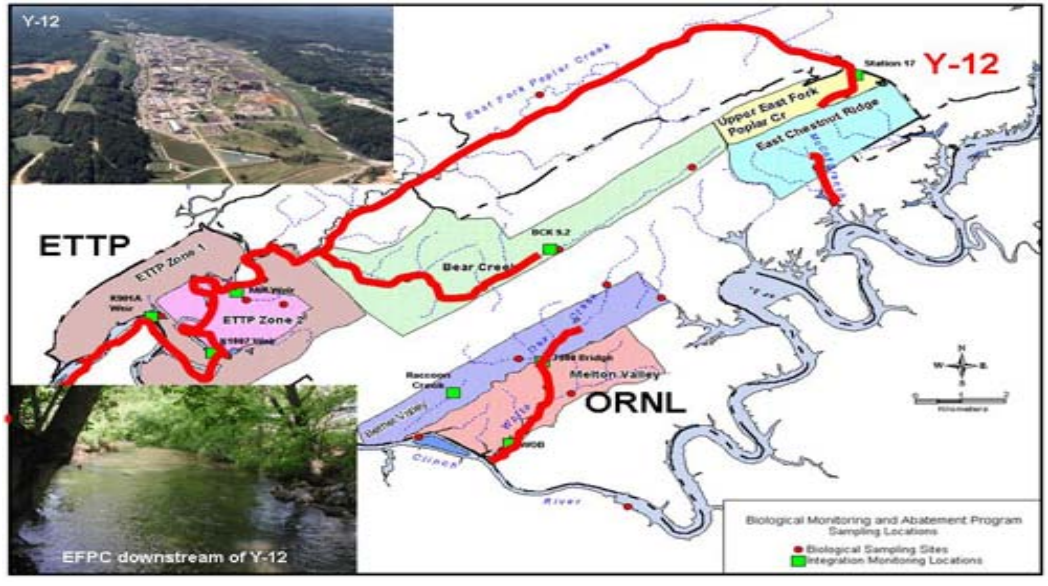
- Demonstrate reduced risk of attenuation-based remedies through development of technical guidance and tools



Action Area 3

Mercury Characterization and Remediation

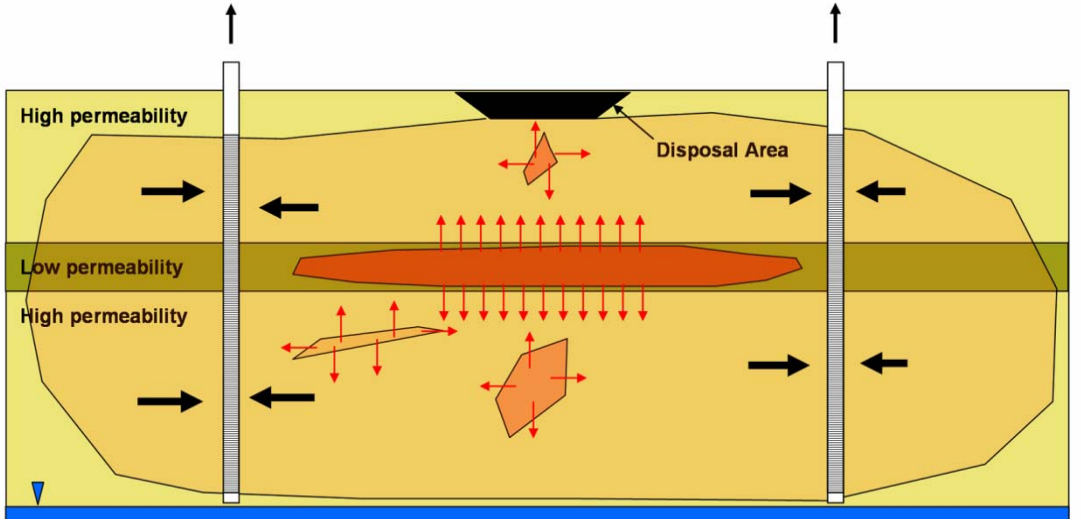
- Reduce mercury contamination in water and fish at Oak Ridge's Y-12 area



Action Area 4

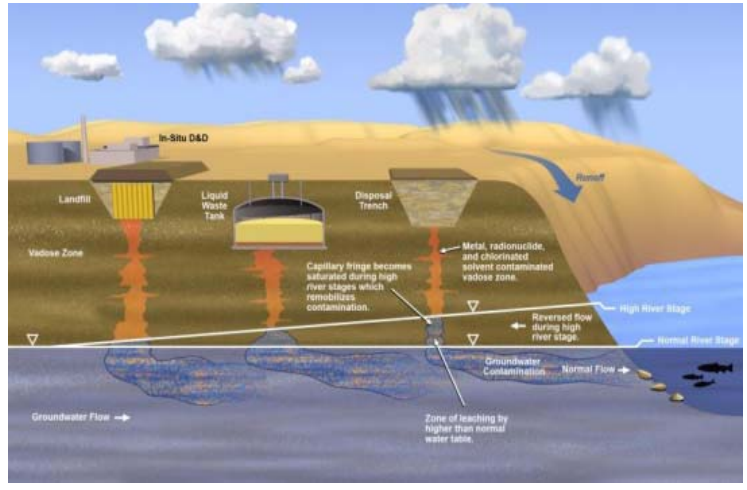
Attenuation-based Remedies for Chlorinated Solvents in the Vadose Zone and Groundwater

- Develop evaluation, monitoring, and remediation approaches

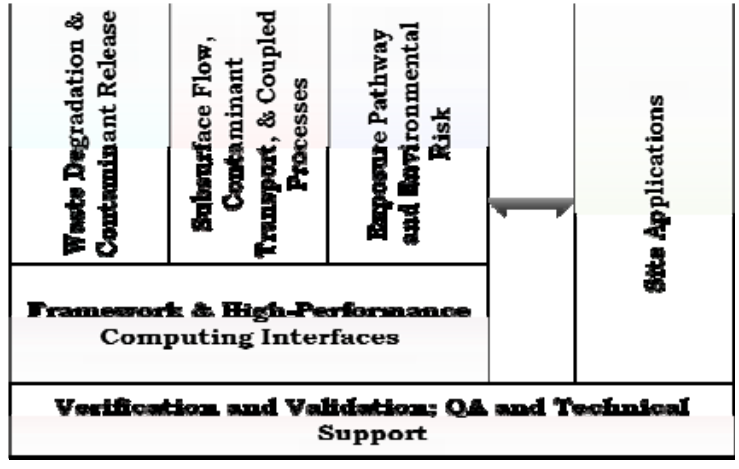


Action Area 5

Advanced Simulation Capability for Environmental Management (ASCEM)



- State-of-the-art scientific tool and approach for understanding and predicting contaminant fate and transport in natural and engineered systems



Office of Nuclear Materials Disposition (EM-33)

- Mission is to manage and dispose of surplus nuclear material
  - Develop strategic documents
  - Perform life-cycle alternative analysis
  - Interface with other Department of Energy (DOE) Program Offices

Key Activities for the Office Nuclear Materials Disposition

- Plutonium
- Spent Nuclear Fuel (SNF)
- Highly Enriched Uranium (HEU)
- Other Surplus Materials

EM SNF Disposition Strategy

Majority of SNF (> 96%) is/will be packaged for interim storage awaiting final disposition

Sodium-bonded SNF (< 3%) may require some treatment before final disposition

Aluminum-clad SNF (< 1%) may be processed for highly enriched uranium recovery and down-blending for use in commercial reactors

Above strategies are under evaluation

EM HEU Disposition Strategy

- Disposition about 5.6 MT of HEU
  - processed through in H-Canyon
  - ~90% complete
- EM HEU mission will be completed by the end of Fiscal Year 2010

Note: NNSA has responsibility for DOE's overall surplus HEU disposition program

Other Surplus Materials/Challenging

- Special nuclear material; activated reactor components & test assemblies; classified nuclear components; & unique transuranic wastes
- Develop comprehensive catalog & categorization
- Treatment, conditioning, & disposal technologies