



OFFICE OF
RIVER PROTECTION
United States Department of Energy

Technology and Innovation at Hanford Tank Farms

Waste Management Symposium 2017

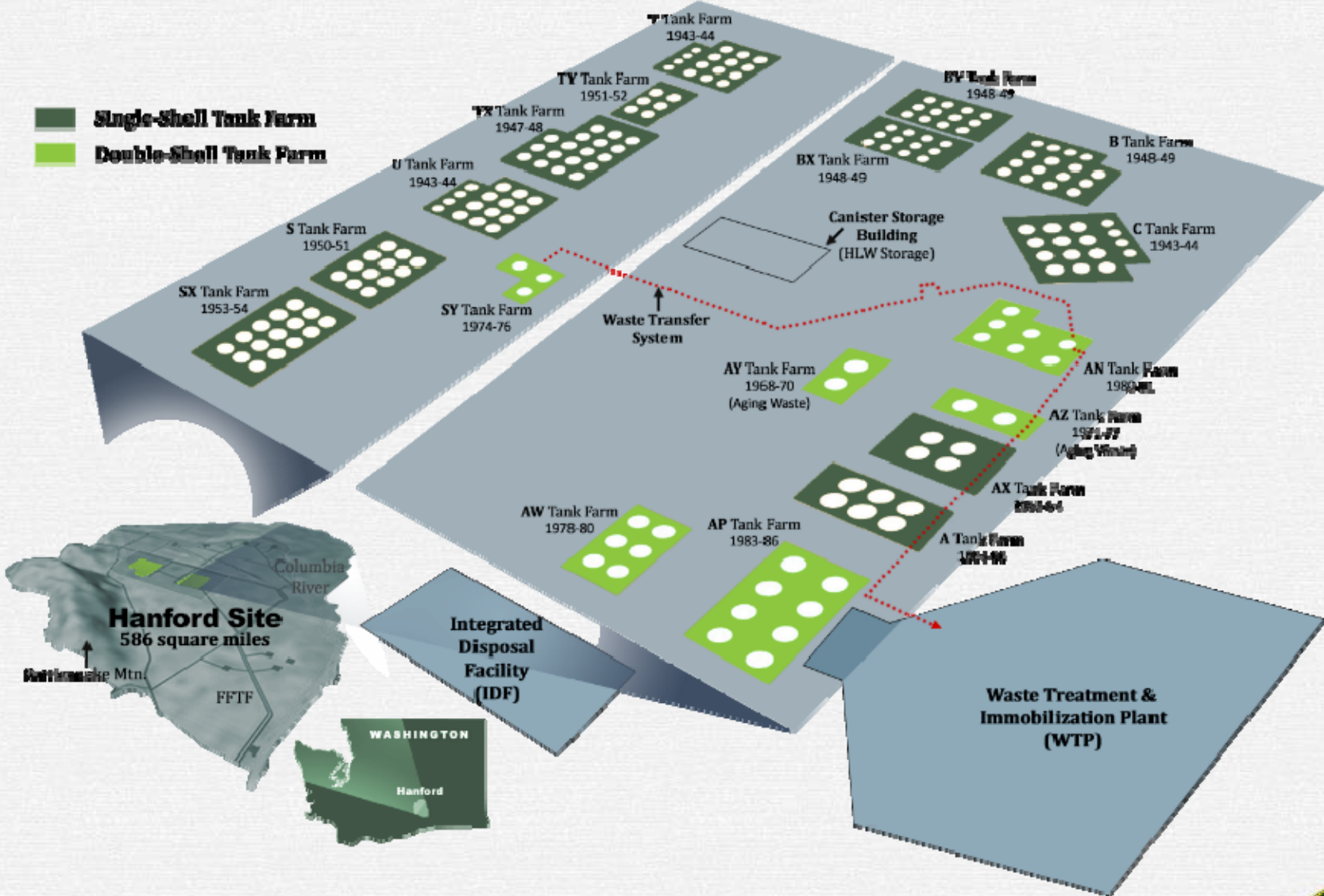
Karthik Subramanian, Manager, One System & Chief Technology Office,
Presented by: Washington River Protection Solutions

March 7, 2017



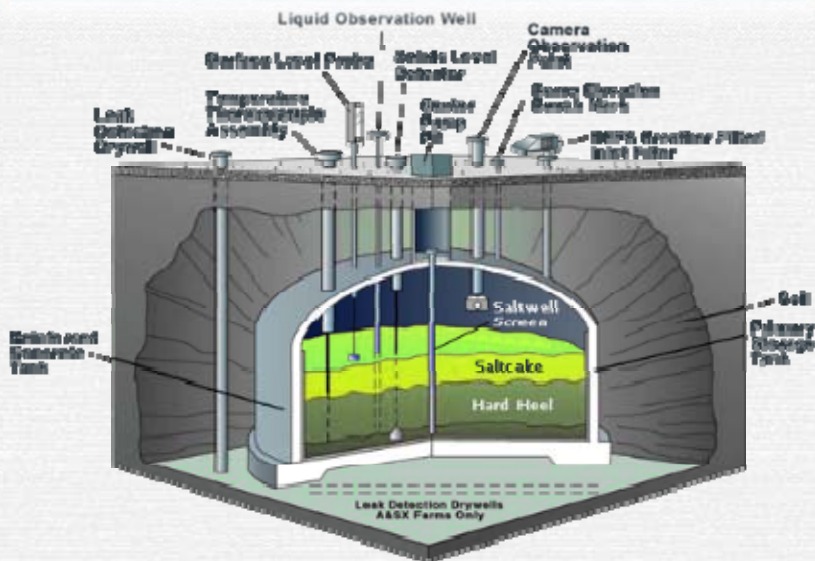


Hanford Tank Farms

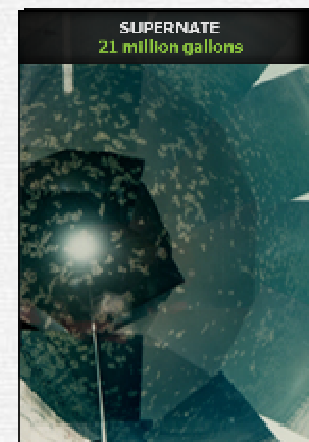
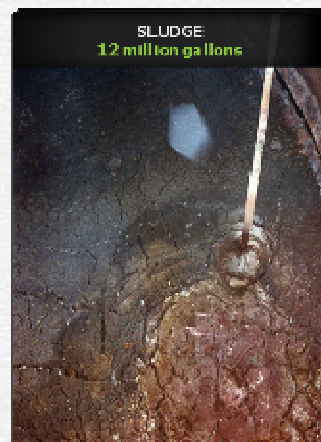
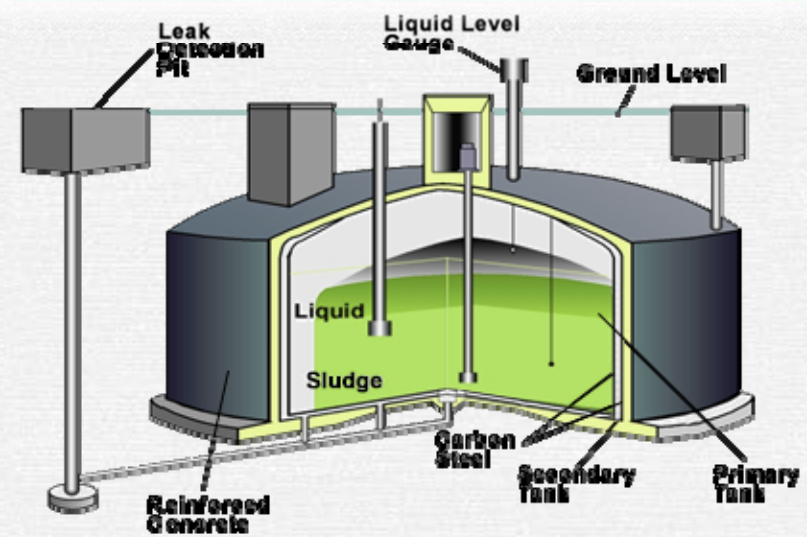




149 Single-Shell Tank (SSTs)



28 Double-Shell Tank (SSTs)





Maintenance and operations of complex high-hazard facilities

Single-shell tank waste retrievals

Integration of tank farms with Waste Treatment Plant through numerous close-coupled operations

- Phased approach to tank waste disposition
- Direct Feed Low Activity Waste (DFLAW)





Direct operational support including enabling technologies

- Centralized control room including vapors monitoring, detection and remediation (VMDR)
- Structural integrity programs

Technology maturation for specific projects

- Waste retrievals
- Low Activity Waste Pre-treatment System (LAWPS)

Long term mission enhancements

- Waste form development

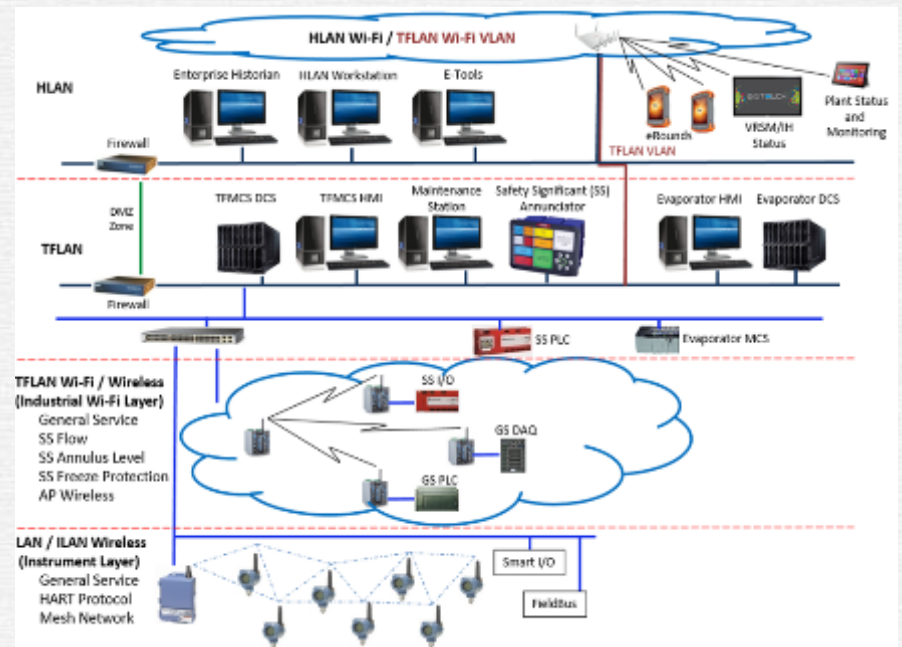




Significant improvements in automation, remote monitoring,
and information management

Integrated remote control and monitoring systems

Networks and wireless infrastructure



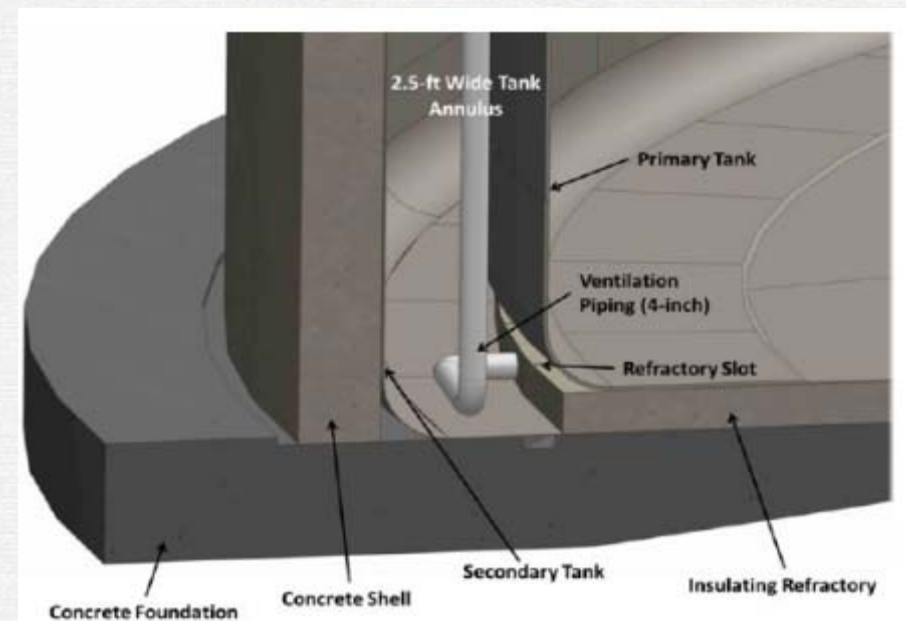
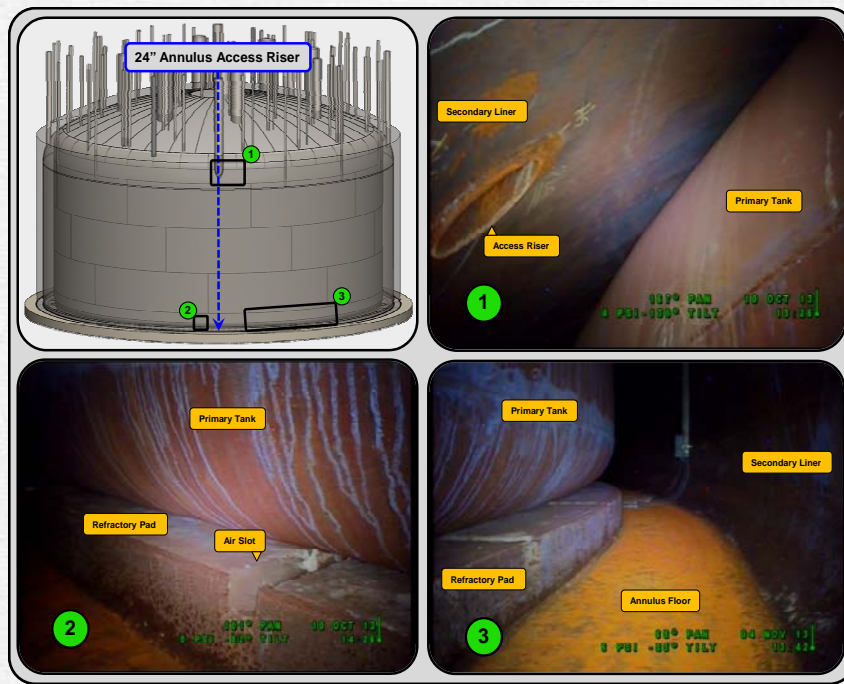


Vapors Monitoring & Detection System

- Centralized control room: Process monitoring and control from a central location
- Ensures effective command and control
- Provides real-time vapor monitoring of source and farm boundary
- Completed bench scale testing at PNNL and ongoing pilot scale testing at A and AP Tank farms
- Delivers early warning to allow pre-emptive actions to all workers on the Central Plateau
- Centralize real-time communications for 200 East/West areas

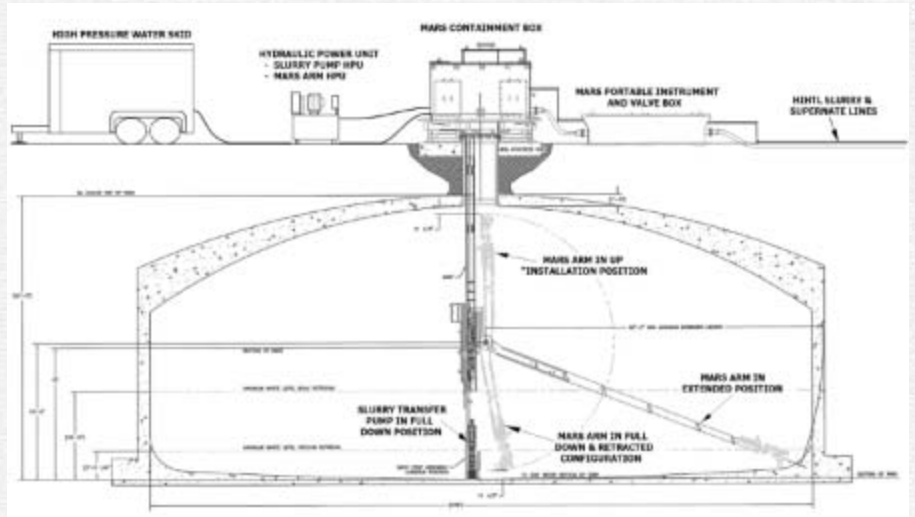
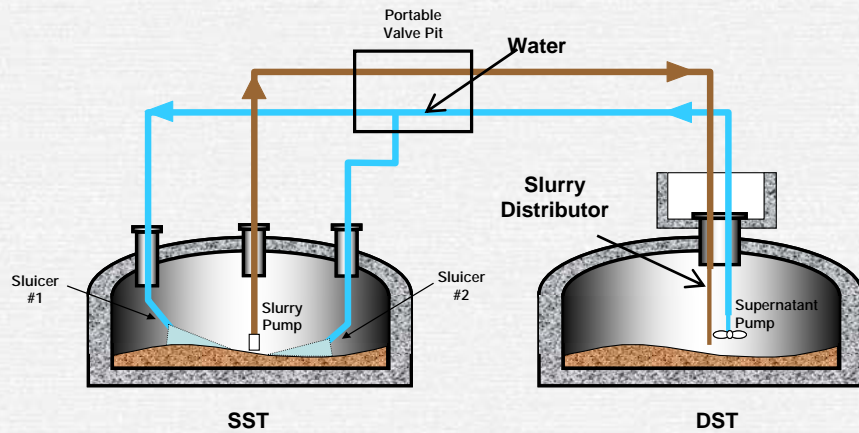


- Maintaining the structural integrity (SI) of the Hanford tanks is critical to mission success
- Comprehensive SI program is in place including corrosion control, structural analyses, and inspection Programs
- Current technology thrust is on inspection of the double-shell tank primary tank bottoms given the access challenges

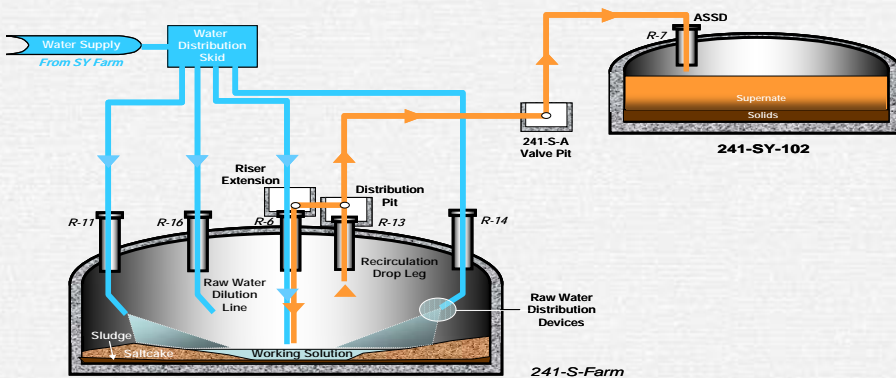




Waste Retrieval



Modified Sluicing/Modified Sluicing with Extended Reach Sluicing System (ERSS)



Saltcake Dissolution & Chemical Dissolution



Mobile Arm Retrieval System (MARS) – Sluice (MARS-S)





Direct Feed Low Activity Waste (DFLAW) Disposition

The first step in a sequential approach to Hanford's tank waste treatment and disposal

- DFLAW facilities and infrastructure actively working to start ops as soon as 2022
- A workable flowsheet that supports operations
- Provides earliest practicable tank waste disposition





Low-Activity Waste Pretreatment System Tech Maturation

Rigorous application of 413.3 technology maturation

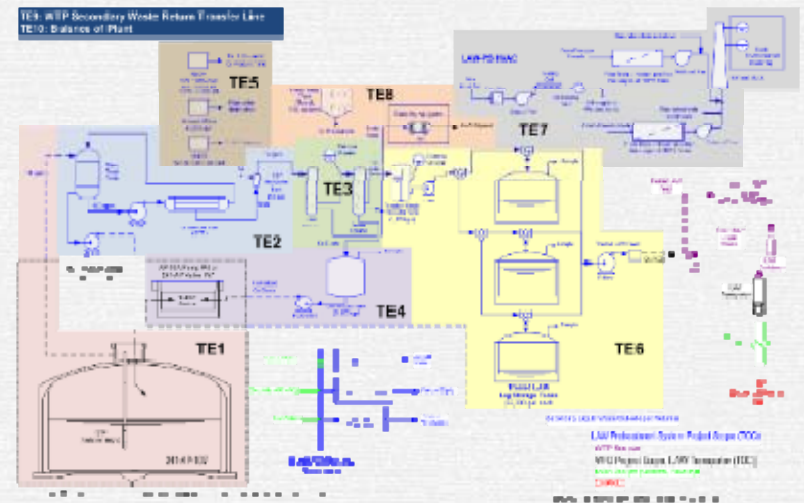
Integrated scale test program

Full-scale ion exchange test program

Testing of safety related parameters, e.g. hydrogen generation

Completed numerous technology maturation activities

- Bead-to-wall pressure testing
- Cross flow filter element corrosion testing
- Spent resin disposition analyses
- Expanded isotherm testing at various sodium concentrations





Hydrogeologic parameters for performance assessment modeling

Glass waste form performance data and other parameters needed for PA modeling to support DF LAW

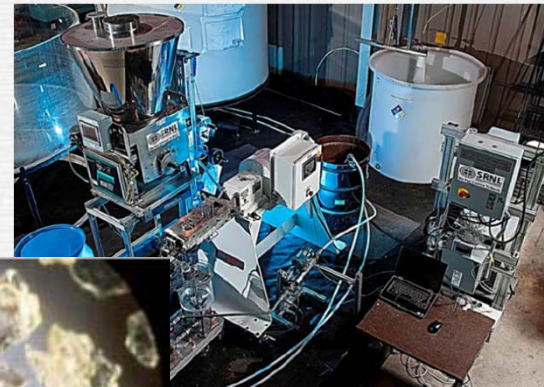
- Glass dissolution rate testing

Secondary waste form development

- Low-temperature waste form development
- Grouting characteristics: flowability, setting/cure times, gas generation
- Waste loading
- Thermal properties

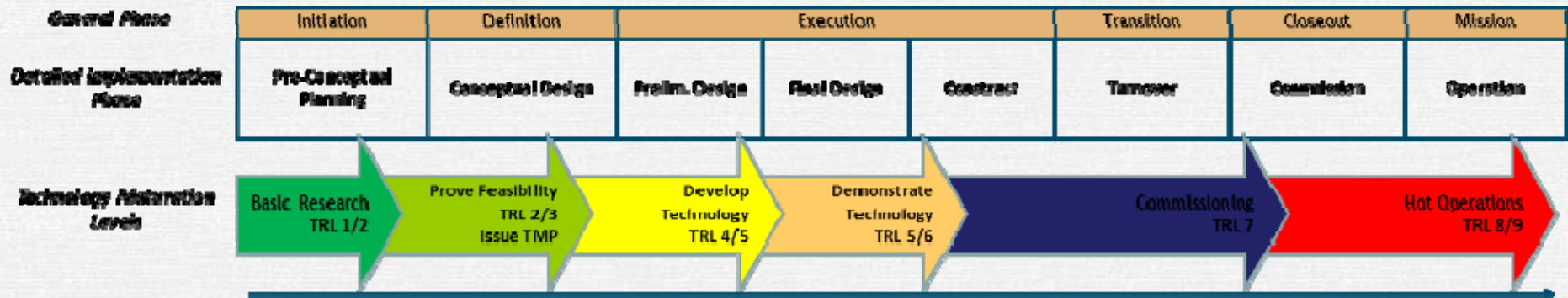
Technology maturation

- Formulation development
- Real waste testing
- Engineering scale testing
- Integrated demonstration

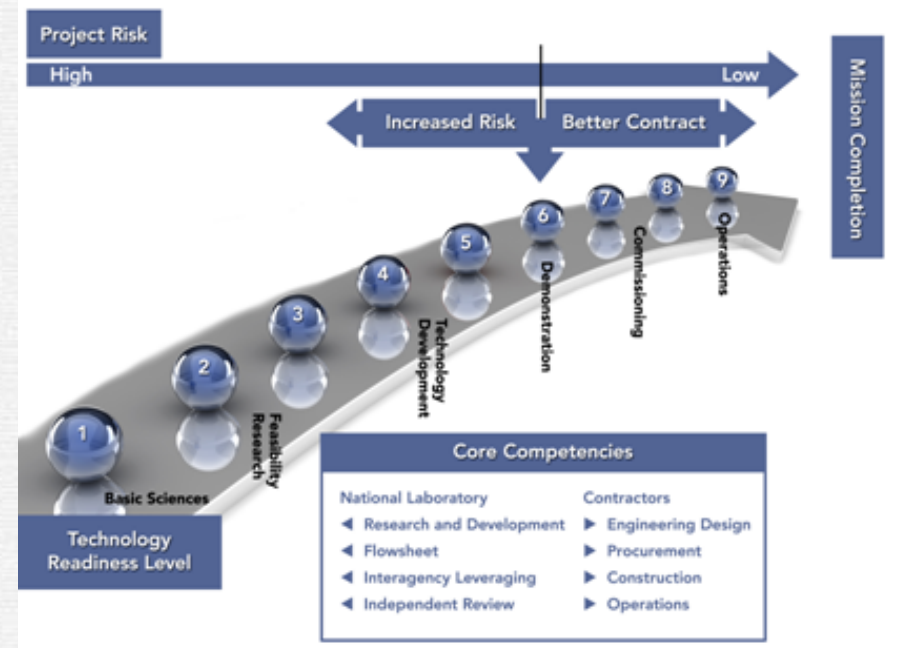




Technology Maturation and Deployment



- Outcome-oriented technology support process to integrate and manage resources through collaboration between multiple sites and technology agencies with balanced mutual benefits
- Strategic technology view to insert technologies at an appropriate maturity
- Leverage ORP's Grand Challenge Workshop





Hanford tank waste disposition mission is a long-term, complex cleanup mission

Technology and innovation are critical to the efficient startup and completion of the mission

Technology and innovation provide support across all facets of the mission

- Near-term operational improvements
- Mid-term project technology maturation
- Long-term mission enhancements

Leveraging ORP's Grand Challenge Workshop, in collaboration with the National Laboratories and other technology agencies, technology and innovation will continue to enhance the progress at Hanford's tank farms





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**With strong technical
justification**

Questions?



The Hanford Reach
White Bluffs Overlooking the Columbia River

