Pre-Decisional Draft

Tank Waste System Integrated Project Team

Tank Waste Corporate Board

July 29, 2009

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Office of Engineering and Technology

Agenda

- Purpose of IPT
- Accomplishments
- Process Optimization
- Modeling
- Regulatory
- Challenges
- Next Steps

Purpose of IPT

The Tank Waste System Integrated Project Team will develop a Tank Waste System Strategic Model and alternative strategies and transformational solutions that could result in an improved, optimized and less-costly tank waste system.

Accomplishments

- Held Kick off meeting March 24, 2009
- Established IPT Subteams
- Held tank waste system reviews at Office of River Protection (ORP) and the Savannah River Operations Office (SR) in April
- Completed initial draft of model parameters / capabilities
- Identified a model that can meet objectives (development and updates will be required)
- Drafted descriptions of current ORP and SR tank waste systems

Accomplishments

- Developed initial drafts of optimization strategies for ORP and the SR
- Conducted briefing for EM management on proposed ORP and SR optimized tank waste strategies on June 25, 2009
- Developed initial drafts of regulatory optimization strategies
- Began development of tank waste system model
- Identified proposed transformational solutions for the tank waste system

Process Optimization

- IPT has identified over 30 optimization strategies
- Top strategies fall into three categories
  - Pretreatment
  - Vitrification
  - Retrieval and Closure

Proposed Top Optimized Strategies*

Cross-walk of top strategies to the *Roadmap*

Roadmap Initiative Area	Optimization Strategies* * *May change following strategic model analysis and further development of the technical strategy* ✧ *EM-1 and EM-2 focus*
Pretreatment	ORP ✧ At-tank treatment ORP ✧ Sodium and Aluminum management ORP ✧ Mixing and blending systems optimization ORP Off-site disposal of Class A and C Wastes SR ✧ Increase salt processing rate (includes extending operations of ARP/MCU) SR Reduce complexity of low-level waste disposal SR Aluminum management (remove aluminum and dispose of resulting Class A waste streams off site) SR Removal of risk drivers (I, Tc, Cs)
Vitrification	ORP ✧ Glass Optimization - Improve waste form performance, waste loading, and melt rate SR ✧ Glass Optimization - Improve waste loading and increase Pu limit in glass

Proposed Top Optimized Strategies*

Cross-walk of top strategies to the *Roadmap*

Roadmap Initiative Area	**Optimization Strategies*** **May change following strategic model analysis and further development of the technical strategy*
Retrieval and Closure	ORP Waste staging in single shell tanks and then area tank closure ORP Risk-informed retrieval and closure SR Reduce complexity of tank cleaning and closure. Includes: a. Implement risk-informed cleaning and closure requirements b. Grout tanks in major groupings instead of individually and then area tank closure c. Optimize point of compliance location and expand definition of maximum extent practical SR Place Saltstone grout in tanks during closure

Proposed Top Optimized Strategies*

- Alignment with Waste Processing Gaps identified in the NAS 2009 Report
  - The Retrieval & Closure strategies align with Gap 1
    - WP-1 Substantial amounts of waste may be left in tanks after their cleanout—especially those with obstructions or associate piping.
  - The Pretreatment and Vitrification strategies align with Gap 4
    - WP-4 Increased vitrification capacity may be needed to meet schedule requirements of EM's HLW programs.
- Technology development is required to implement most of these strategies

**May change following strategic model analysis and further development of the technical strategy*

Technology Development - ORP

	Top Optimized Strategies – ORP*	Technology Development Needs
(T)	1. At-tank treatment	Requires in-riser and tank-side treatment technologies
(T)	2. Sodium and Aluminum management	Requires alternative Sodium recovery and Aluminum leaching technologies
(T)	3. Mixing and blending systems optimization	Requires tank mixing, sampling, and characterization technologies, and physical properties studies
	4. Glass Optimization - Improve waste form performance, waste loading, and melt rate	Requires new melter technologies
(T)	5. Waste staging in single shell tanks and then area tank closure	Requires tank integrity improvements and development of improved evaporation technology such as Wiped Film Evaporator
	6. Risk-informed retrieval and closure	Requires versatile retrieval technologies such as MARS (Mobile Arm-Based Retrieval System), and closure technologies including fill, barriers, and monitoring
(T)	7. Off-site disposal of Class A and C Wastes	Requires technologies for coarse removal of solids from salt waste, and possibly other treatment technologies

* *May change following strategic model analysis and further development of the technical strategy*

(T) *Transformational Strategy*

Technology Development - SR

	Top Optimized Strategies – SR*	Technology Development
(T)	1. Increase salt processing rate (includes extending operations of ARP/MCU)	Requires alternate salt processing technologies such as small column ion exchanger
(T)	2. Reduce complexity of tank cleaning and closure. Includes: a. Implement risk-informed cleaning and closure requirements b. Grout tanks in major groupings instead of individually and then area tank closure c. Optimize point of compliance location and expand definition of maximum extent practical	None
(T)	3. Reduce complexity of low-level waste disposal	Requires volume reduction technologies such as wet air oxidation or fluidized bed steam reforming, and/or alternate low-level waste form
(T)	4. Aluminum management (remove aluminum and dispose of resulting Class A waste streams off site)	None
	5. Glass Optimization - Improve waste loading and increase Pu limit in glass	Requires new melter technologies
	6. Removal of risk drivers (I, Tc, Cs)	Requires removal technologies, process improvements, and waste form performance testing
	7. Place Saltstone grout in tanks during closure	Requires engineering and design only

* *May change following strategic model analysis and further development of the technical strategy*

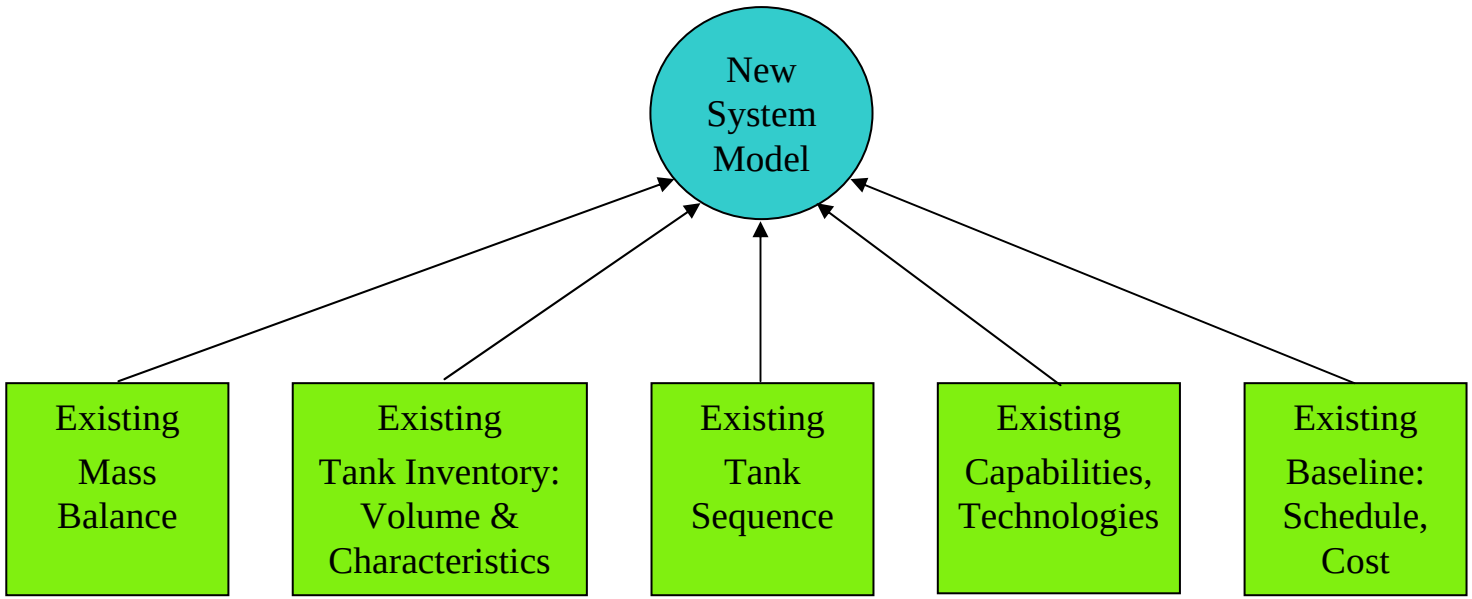
(T) *Transformational Strategy*

Tank Waste System Strategic Model

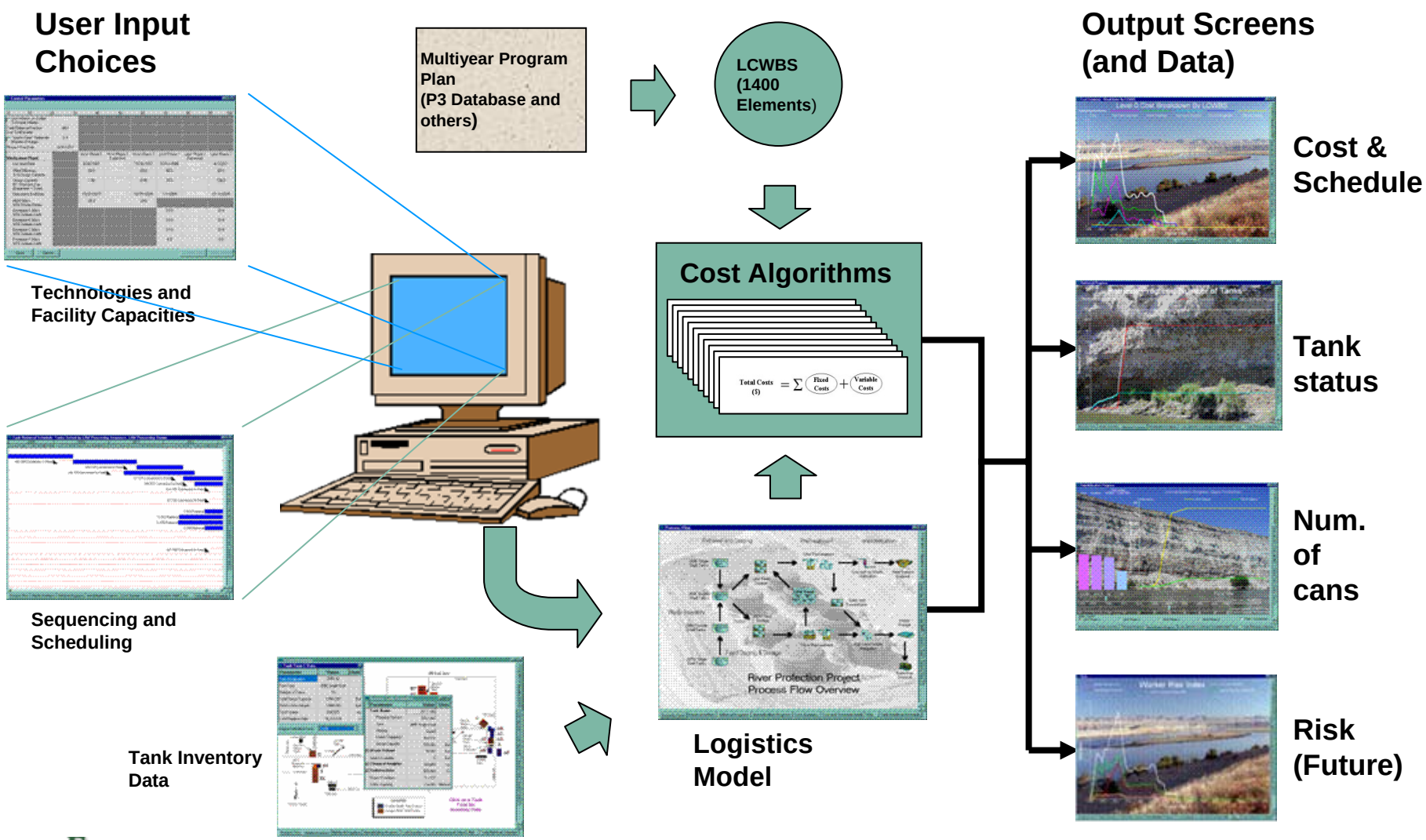
- Develop capability for strategic analysis
- Evaluate and optimize tank waste system

Strategic Model - Structure

- Establish a model that draws information from existing models and data sources
- Identified a tool at PNNL that may be beneficial
  - Tool was used for Hanford tank waste planning through 2003



Proposed Lifecycle Analysis- System Flow Chart



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Strategic Model Capabilities

- Glass Optimization
  - Waste loading improvement
  - Melt rate
  - Next generation melter
- Process Optimization
  - At-tank or in-tank processing
  - Alternate waste streams
- Risk-informed retrieval
  - Tank sequencing
- Risk-informed area closure/footprint reduction
- Worker Risk
- Cost and Schedule

Possible Metrics

- At Tank Treatment
  - Which Tanks
  - Volume change in tanks
  - Curie reduction over time
  - Number of cans produced over time
  - Change in schedule completion
- Na / Al Management
  - Number of cans produced over time
- Mixing and Blending
  - Number of new facilities
  - Number of cans produced over time
  - Percent waste loading over time
- Retrieval and Closure
  - Tank sequence
  - Areas closed
- Glass Optimization
  - Percent waste loading over time
  - Number of cans produced over time

Deliverables – Model

- September 30*
  - Updated model based on current strategies
  - Limited runs for cost and schedule impacts
    - ORP - At-tank treatment; Sodium and Aluminum management; and Glass Optimization - waste form performance, waste loading, and melt rate
    - SR - Increase salt processing rate (includes extending operations of ARP/MCU); and Glass Optimization - waste loading and increase Pu limit in glass

- December 31 **
  - Model framework fully functioning
  - Goals:
    - Site specific parameters loaded for both sites
    - Able to analyze the top 14 strategies
    - Multiple strategies
    - No new facilities

Notes:

* Current strategies do not reflect soon to be developed system planning input

** Assumes full support from contractors at both sites

Regulatory Focus

- Evaluating regulatory actions, if any, to enable Optimization Strategies
- Evaluating operations/closure activities within a different risk envelope

Challenges

- Aggressive schedule
  - Dependence on involvement of both federal and contractor personnel at the sites to support strategy and model development
  - Communications with stakeholders – when and how

- System planning at sites is evolving
  - Feasibility Report may be issued before system plans are updated
  - New contractors at each site

Next Steps for Tank Waste System IPT

- Finalize Optimization and Regulatory Strategies
  - Feasibility report under development
  - Strategy summaries under development
- Develop costs
  - Initiated 7/27/09
- Complete IPT Scope of Work
  - Working Model and Feasibility Report by 9/30/09
  - Final Model and Final Report by 12/31/09

Tank Waste System IPT

BACKUP

Tank Waste System Integrated Project Team Scope

Scope

- Develop the Tank Waste System Strategic Model
- Further evaluate the three attributes that could result in an improved, optimized and less-costly strategy for the tank waste system
  - Optimized processing
  - Risk-informed retrieval
  - Area-based tank closure
- Identify transformational solutions

Goal

- Identify a savings of more than $1 Billion in lifecycle costs

Scope of IPT Subteams

Model Development & Integration

- Capability to analyze tank waste system performance and costs
- Accessible to Headquarters, the field, and stakeholders
- Prepare IPT report

Optimized Strategy

- Optimized strategies for Hanford and Savannah River
  - Optimized processing
  - Risk-informed retrieval
  - Area-based tank closure
  - Research and technology
- Programmatic impacts, such as availability of a repository

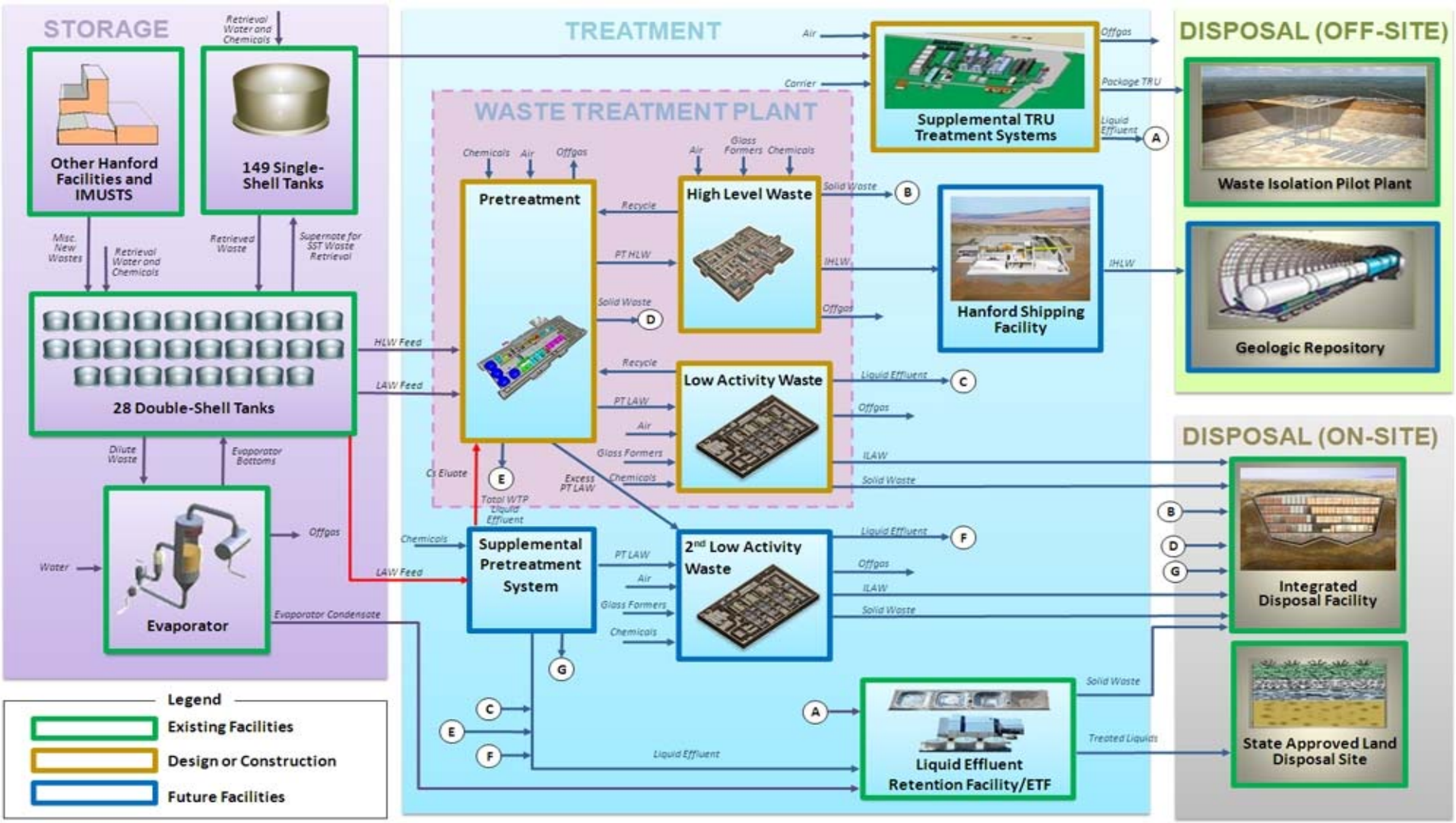
Regulatory and Stakeholder

- Develop win-win regulatory strategy
- Prepare communications plan, including fact sheets

Review of Schedule

Activity	Forecast	Status
Conduct Site Meetings at Hanford and Savannah River	April	Complete
Complete Current Tank Waste Strategy Documentation	4/30/09	Draft Complete
Complete Initial Parameters for Tank Waste System Model	4/30/09	Complete
Complete Draft Optimized Site Strategies	5/31/09	Draft Complete
Identify Draft Transformational Solutions	5/31/09	In-Progress
Begin Preparing Detailed Cost Estimates	6/1/09	In-Progress
Complete Draft Regulatory Strategy	7/15/09	In-Progress
Complete Initial Model Test Runs	8/30/09	
Complete Working Model and Feasibility Report	9/30/09	In-Progress
Complete Final Model and Final Report	12/31/09	
Conduct Additional Site Meetings	As Needed	
Brief Senior Management Review Team	Monthly	

River Protection Project Flow Diagram



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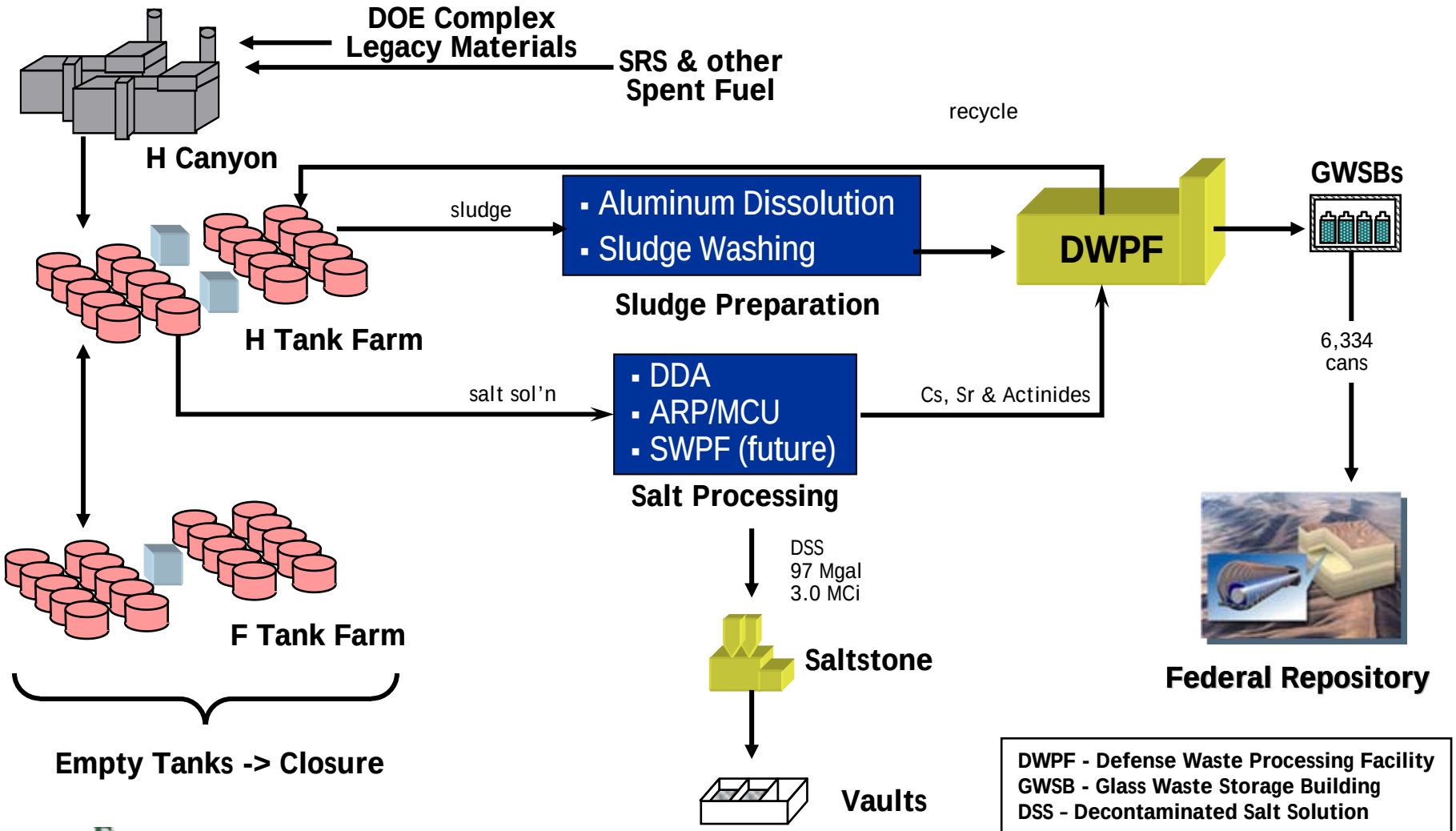
SR Flowsheet



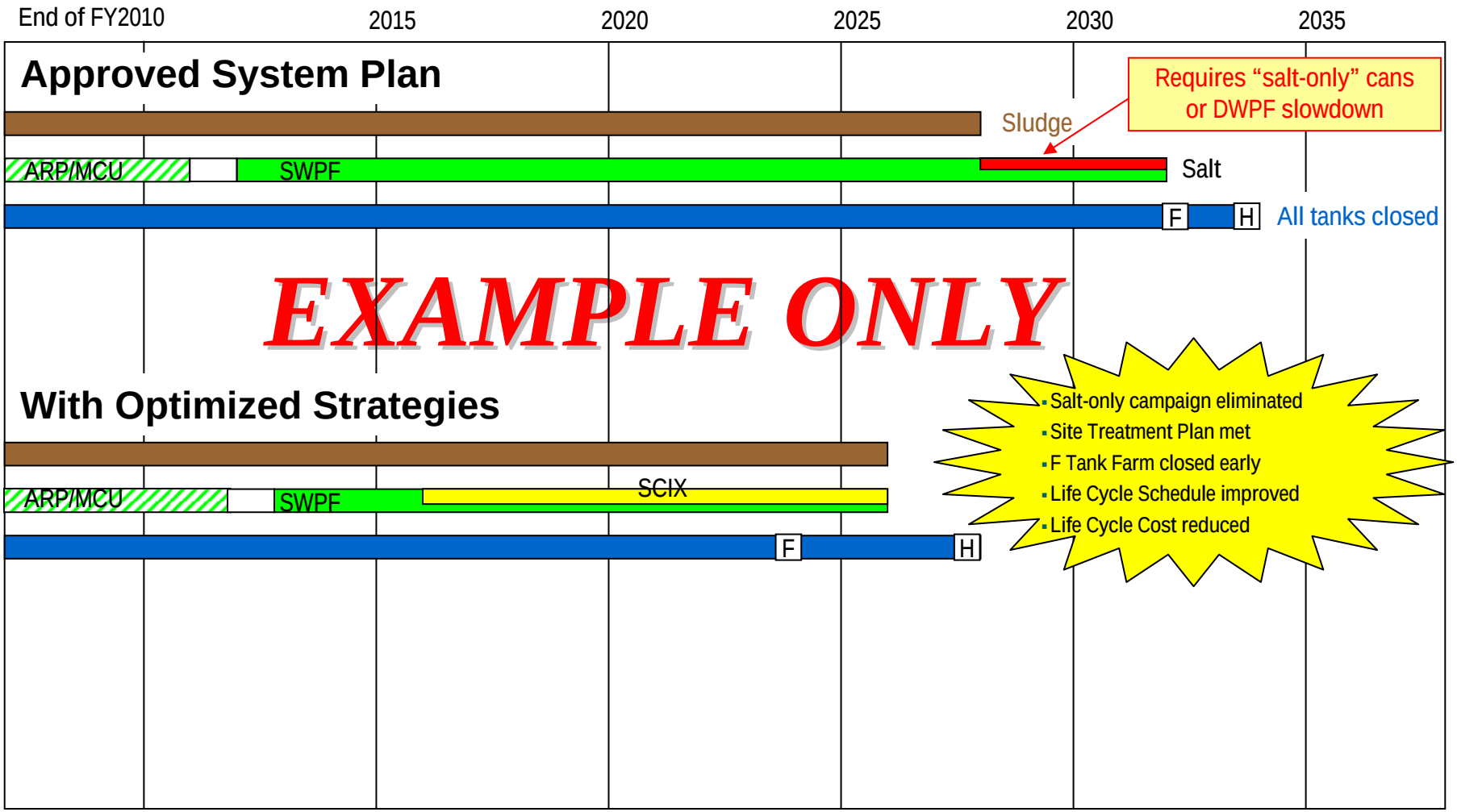
DWPF - Defense Waste Processing Facility
GWSB - Glass Waste Storage Building
DSS – Decontaminated Salt Solution

Waste Processing Areas: Roadmap & NAS 2009 Report

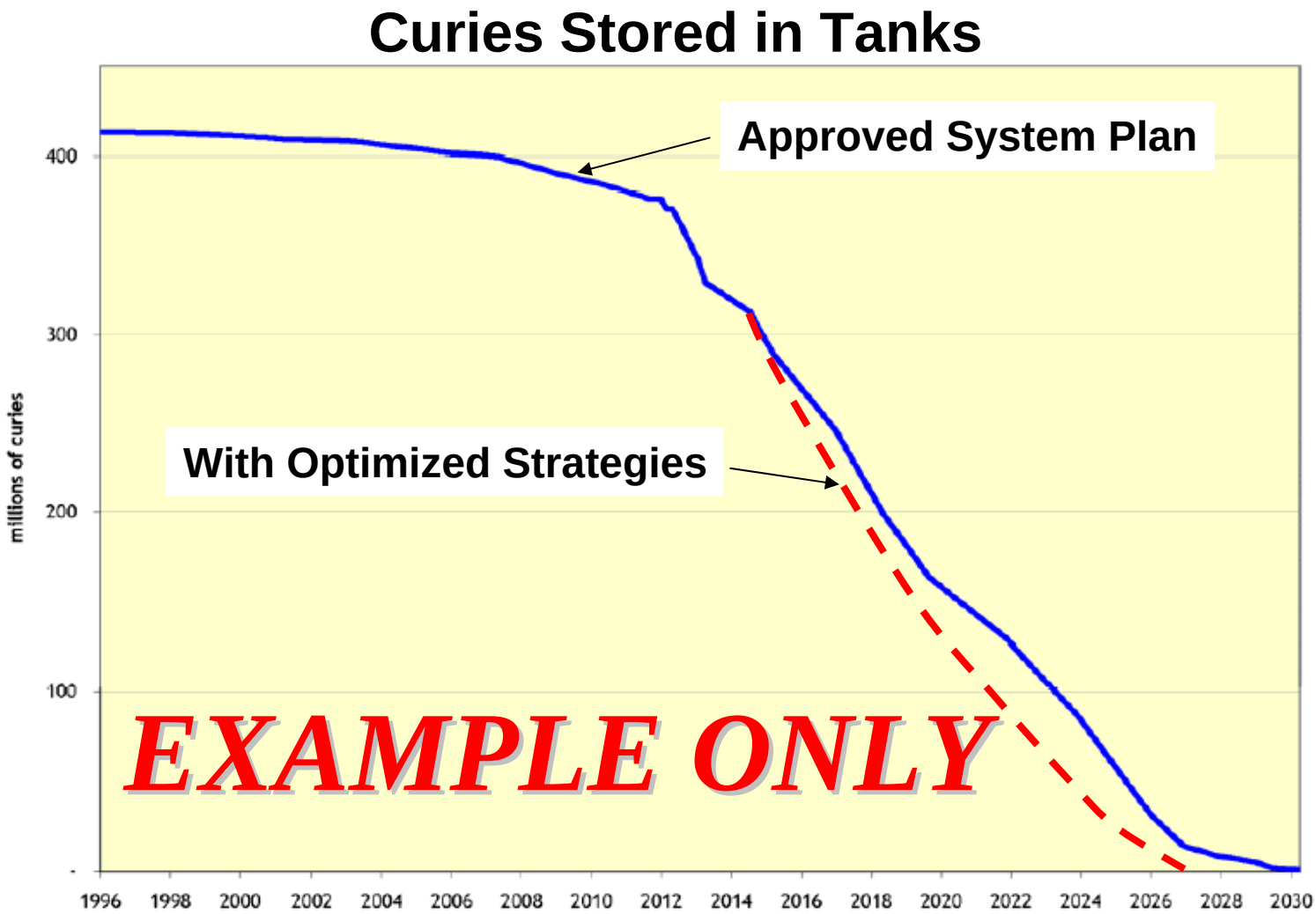
- Roadmap Waste Processing Strategic Initiatives
  - 1.1 Improved Waste Storage Technology
  - 1.2 Reliable & Efficient Waste Retrieval Technologies
  - 1.3 Enhanced Tank Closure Processes
  - 1.4 Next-Generation Pretreatment Solutions
  - 1.5 Enhanced Stabilization Technologies

- NAS 2009 Report, Gaps for Waste Processing
  1. Substantial amounts of waste may be left in tanks after their cleanout—especially those with obstructions or associate piping. (High Priority)
  2. Low-activity streams from tank waste processing could contain substantial amounts of radionuclides. (Medium Priority)
  3. New facility designs, processes usually rely on pilot-scale testing with simulated rather than actual wastes. (Medium Priority)
  4. Increased vitrification capacity may be needed to meet schedule requirements of EM's HLW programs. (High Priority)
  5. The baseline tank waste vitrification process significantly increases the volume of HLW to be disposed of. (Medium Priority)
  6. A variety of wastes and nuclear materials do not yet have a disposition path. (Low Priority)

Metric Example – Schedule, Savannah River



Metric Example – Curie Reduction



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Metric Example – Canister Production