URS | EM WP Technical Exchange

Hanford/SRS Tank Waste Path Forward

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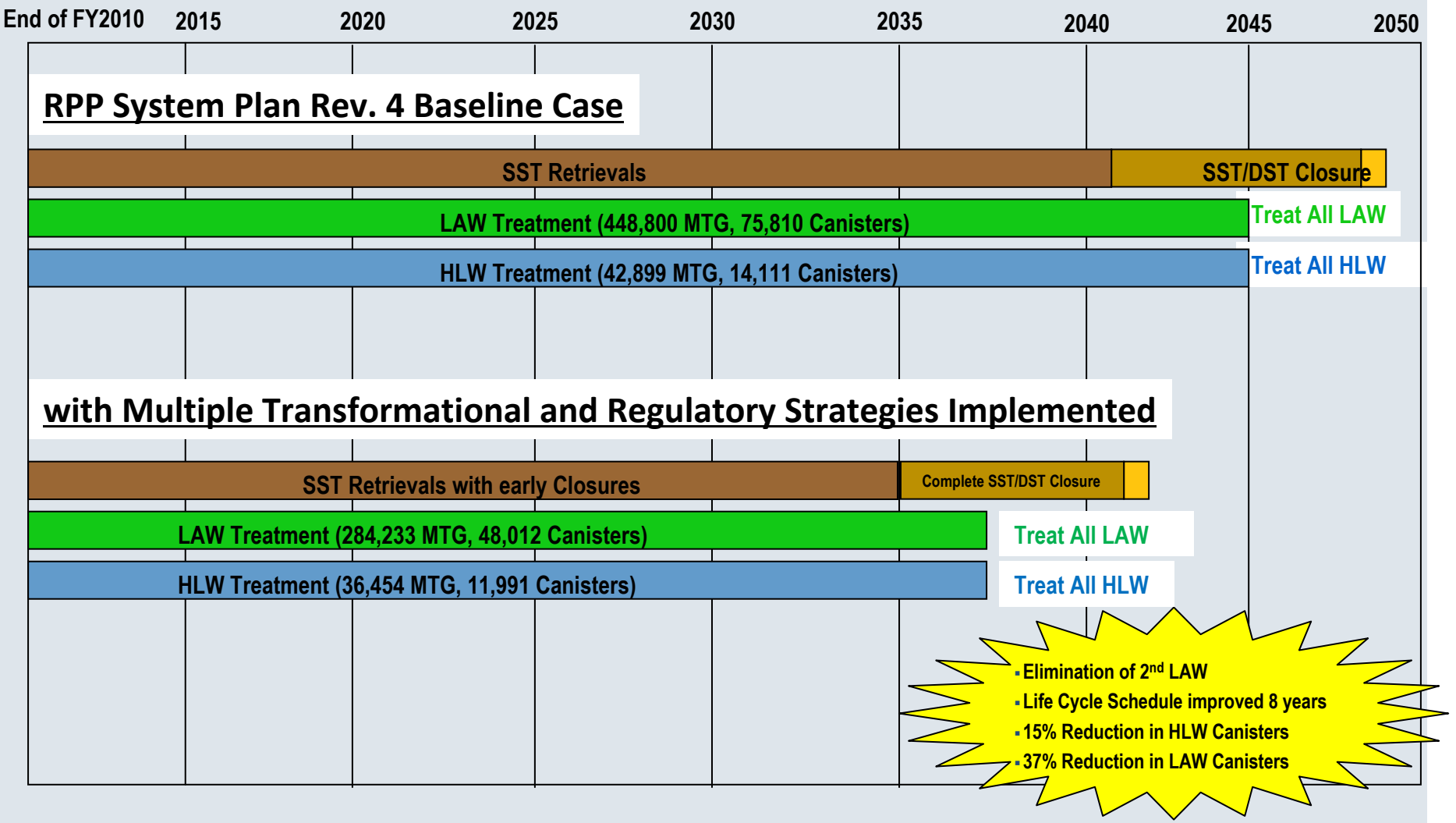
Overview

- **Technology Deployment Vision**
- **Tank Waste Strategy and Life-Cycle Benefits**
  - Transformational Technology Scenarios
- **Hanford**
  - Vitrification Technologies
  - Salt Processing: LAW Pretreatment and Immobilization
    - Rotary Microfiltration/Small Column Ion Exchange (RMF/SCIX)
    - Alternate LLW: Fluidized Bed Steam Reforming (FBSR)
  - Accelerated SST Retrieval
- **SRS**
  - Vitrification Technologies
  - Salt Processing
    - Rotary Microfiltration/Small Column Ion Exchange (RMF/SCIX)
    - Next Generation Modular Caustic Side Solvent Extraction (MCU)

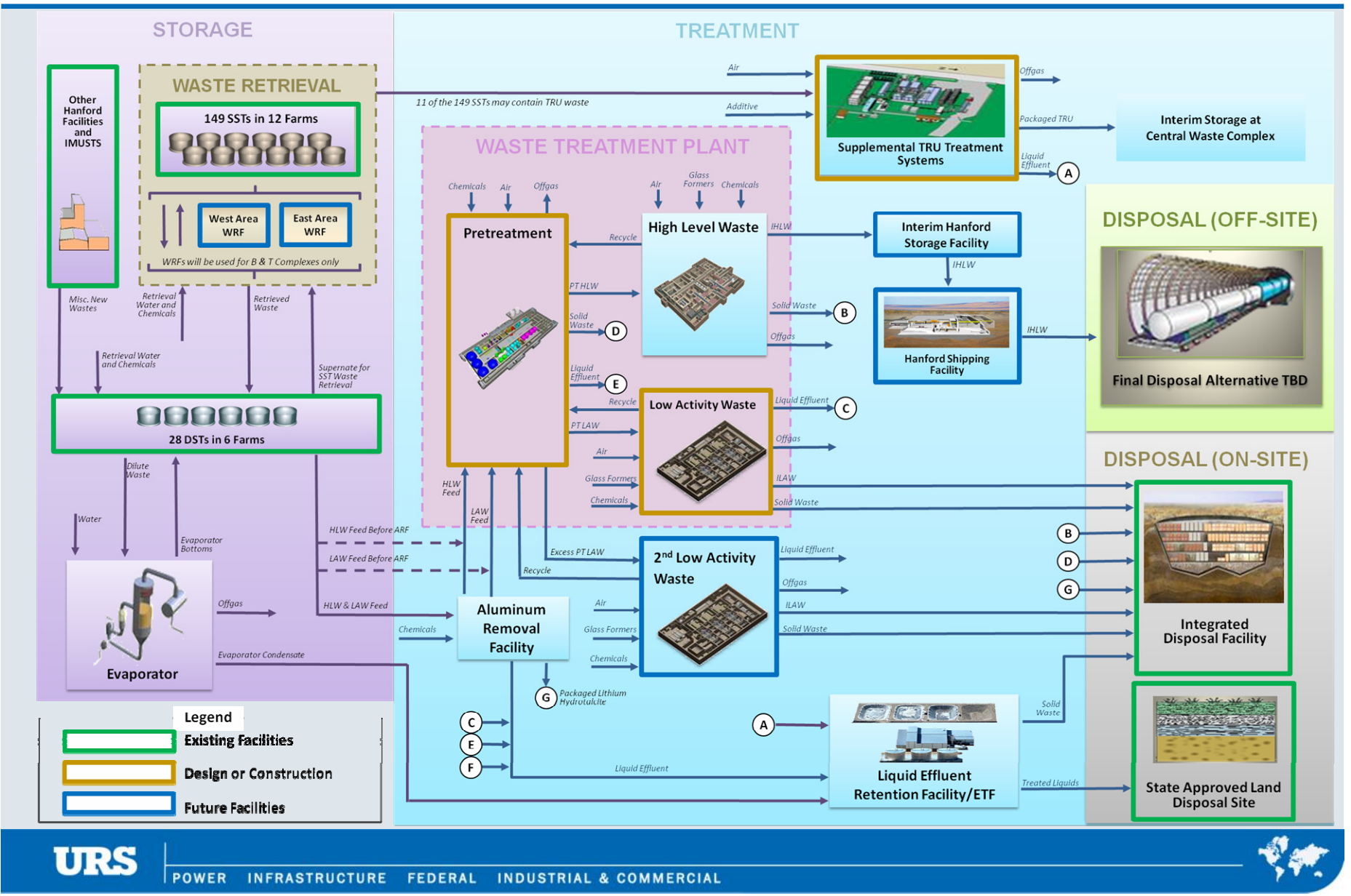
Technology Deployment

- Goal-oriented technology deployment process to integrate and manage resources through collaboration between multiple sites and technology agencies
- Strategic technology view to insert technologies at an appropriate maturity
- Integrated with DOE-EM Office of Technology Innovation and Development
- Integrated with DOE-EM Integrated Project Team strategic initiatives

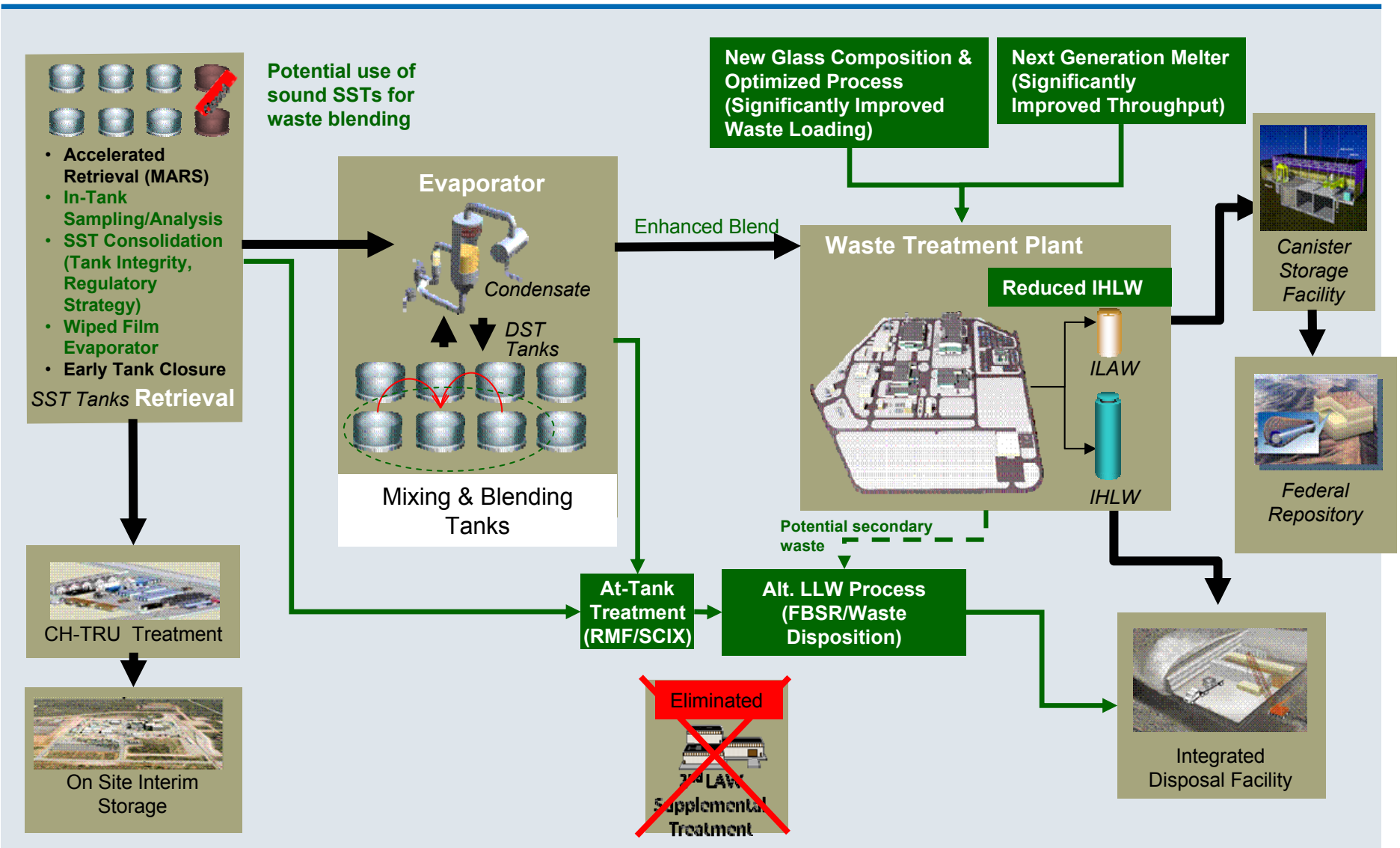
Hanford Transformational Technology Deployment Impact Scenario



RPP Current SP5 Flow Sheet

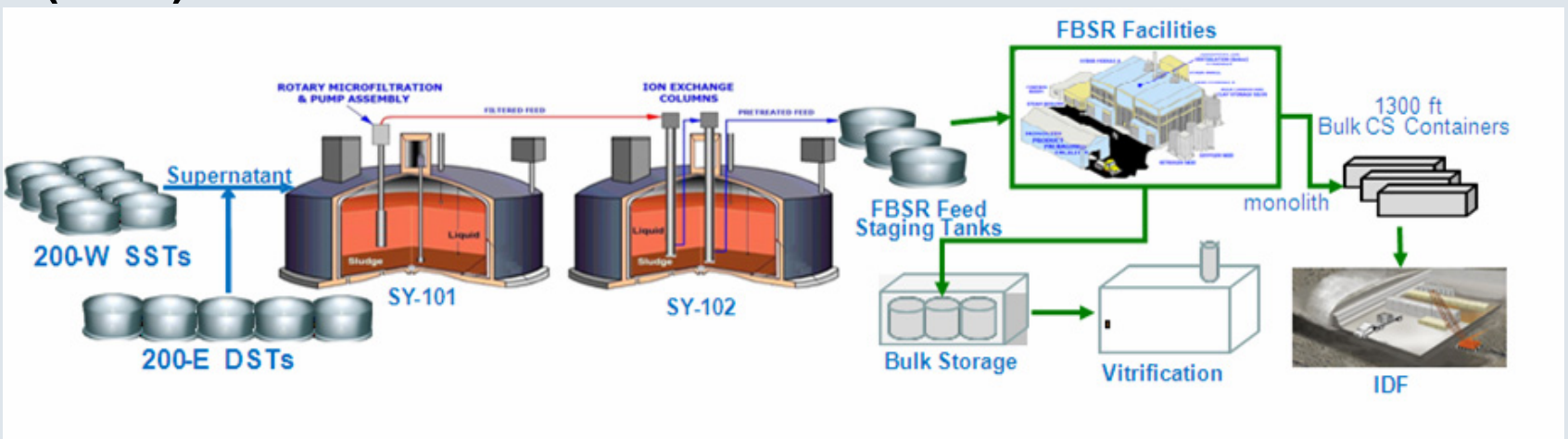


Integrated Hanford Technology Deployment Scenario



LAW Pretreatment & Immobilization Technology Deployment Scenario

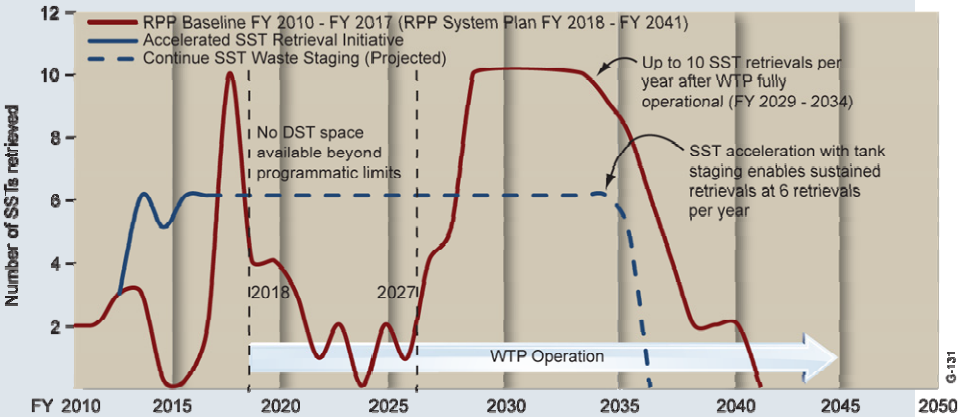
- **Provide in-tank pretreatment – RMF in SY-101 & SCIX in SY-102**
- **Produce a Monolithic FBSR Mineralized Waste Form for direct IDF disposal**
- **Leverage DOE investments in FBSR (INL/SRS) and RMF/SCIX (SRS)**

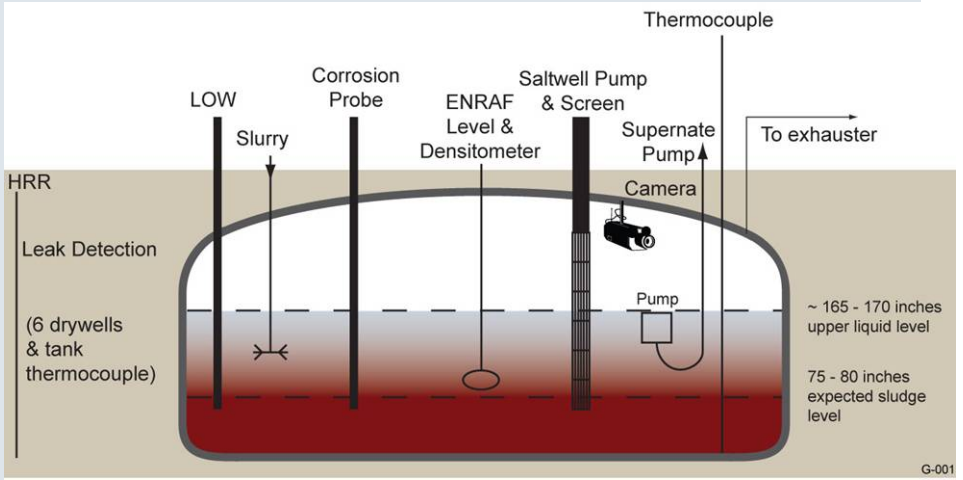


NOTE:
- 100 Inch FBSR=1100 MT Na/Year
- ~80,000 MT Na to be immobilized (w/o Na management) in the mission

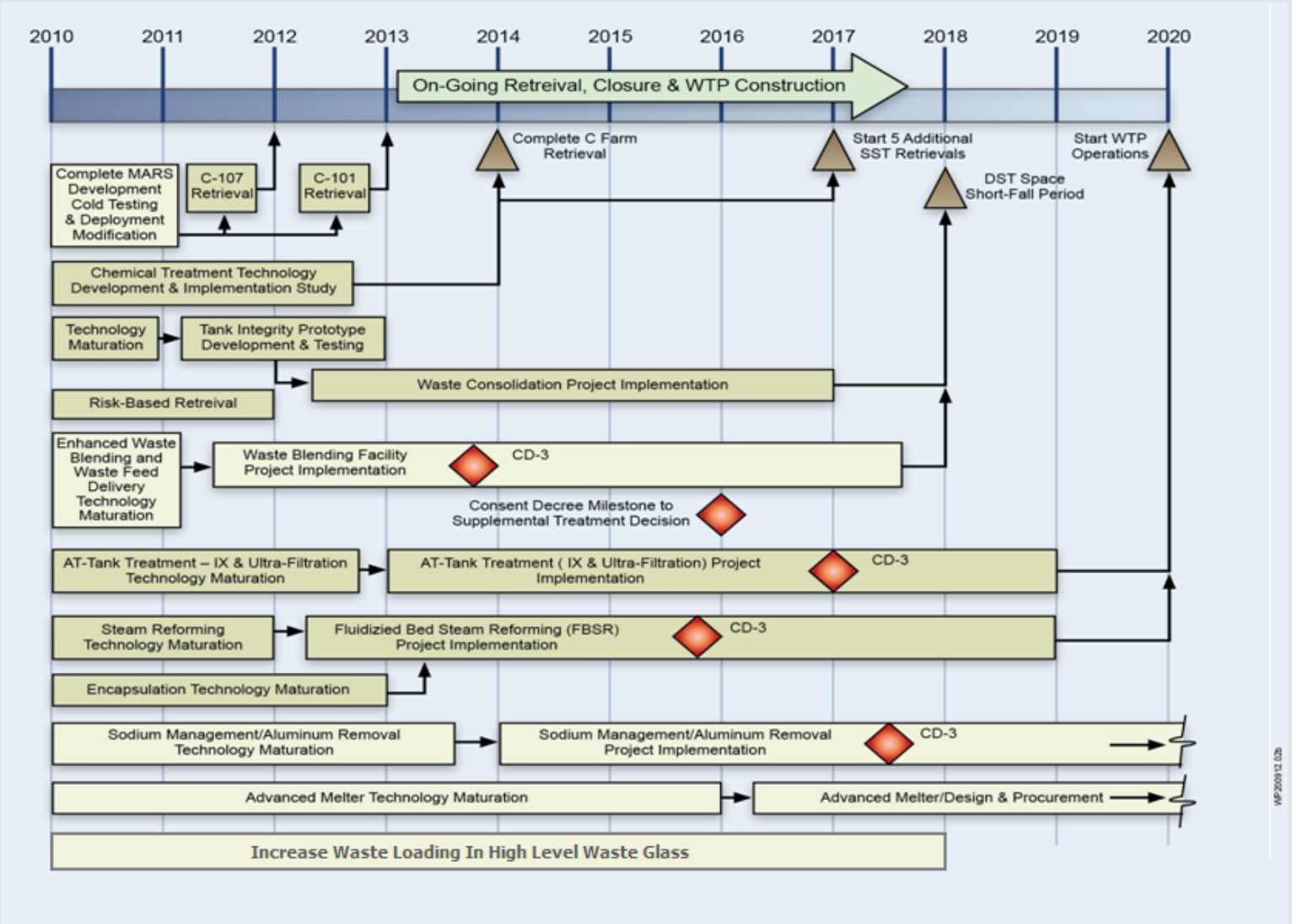
Accelerated Retrieval of Tank Leakers

- **Objective**
  - Accelerate Retrieval of SSTs and Mitigate Lifecycle Mission Risks due to lack of Double-Shell Tank space
- **Strategy**
  - Reduce Bow-Wave Risk by Accelerating retrieval of "Assumed Leaker" Tanks
  - Mitigate Mission Risk by Staging Waste in Qualified "Sound" Single-Shell Tanks
  - Evaluate staging waste using available space in DST SY-102 and a sound SST
  - Consider retrieval of 6 SX-Farm "Assumed Leaker" tanks containing 11.5M Curies of sludge
  - Qualify two sound SSTs
  - Initially select one SST for staging demonstration
- **Premise**
  - Interim storage of waste in "Qualified", "Sound", SSTs with enhanced monitoring capability and emergency transfer equipment is better than storing it in leaker SSTs
  - It is not feasible to build additional DST space before the startup of WTP

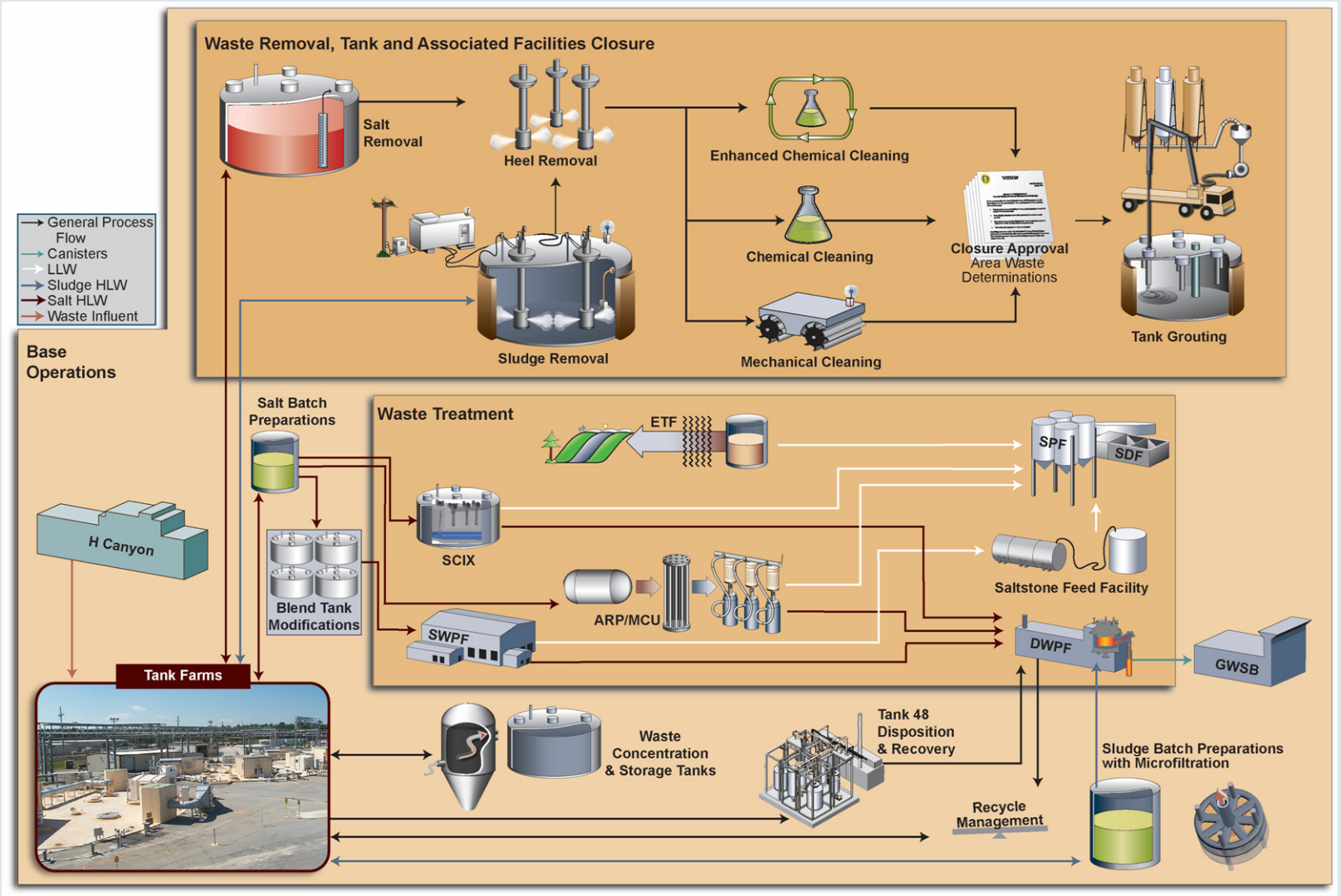




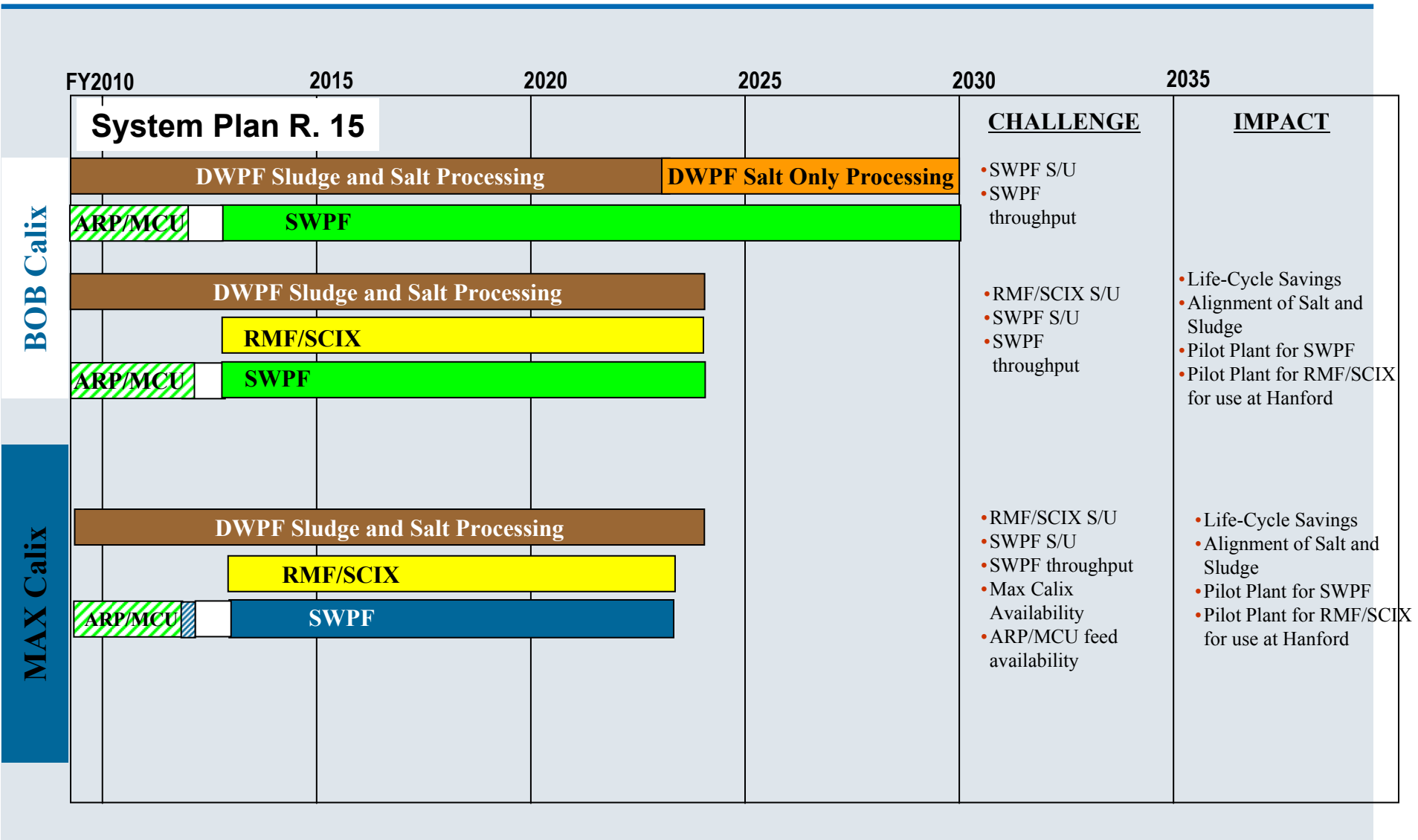
Hanford Technology Deployment Scenario



SRS Future System

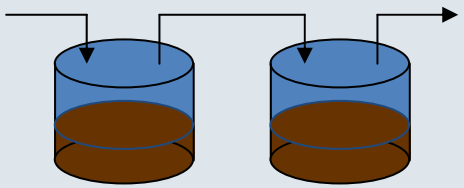


SRS Transformational Technology Deployment

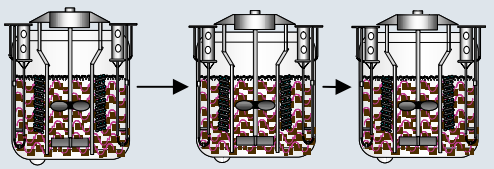


SRS Sludge Processing

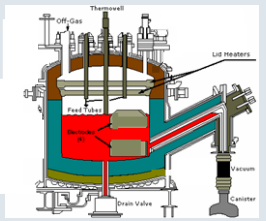
Tank Farm



DWPF Chemical Process Cell



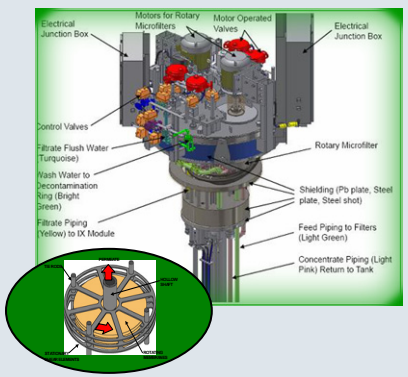
DWPF Melt Cell



Joule Heated Melter

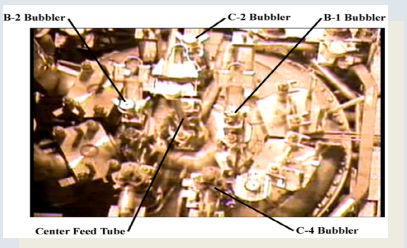
Sludge Feed Prep → *Melter Feed Prep* → *Vitrification*

- Dedicate additional sludge prep tank
- **Deploy rotary microfilters**

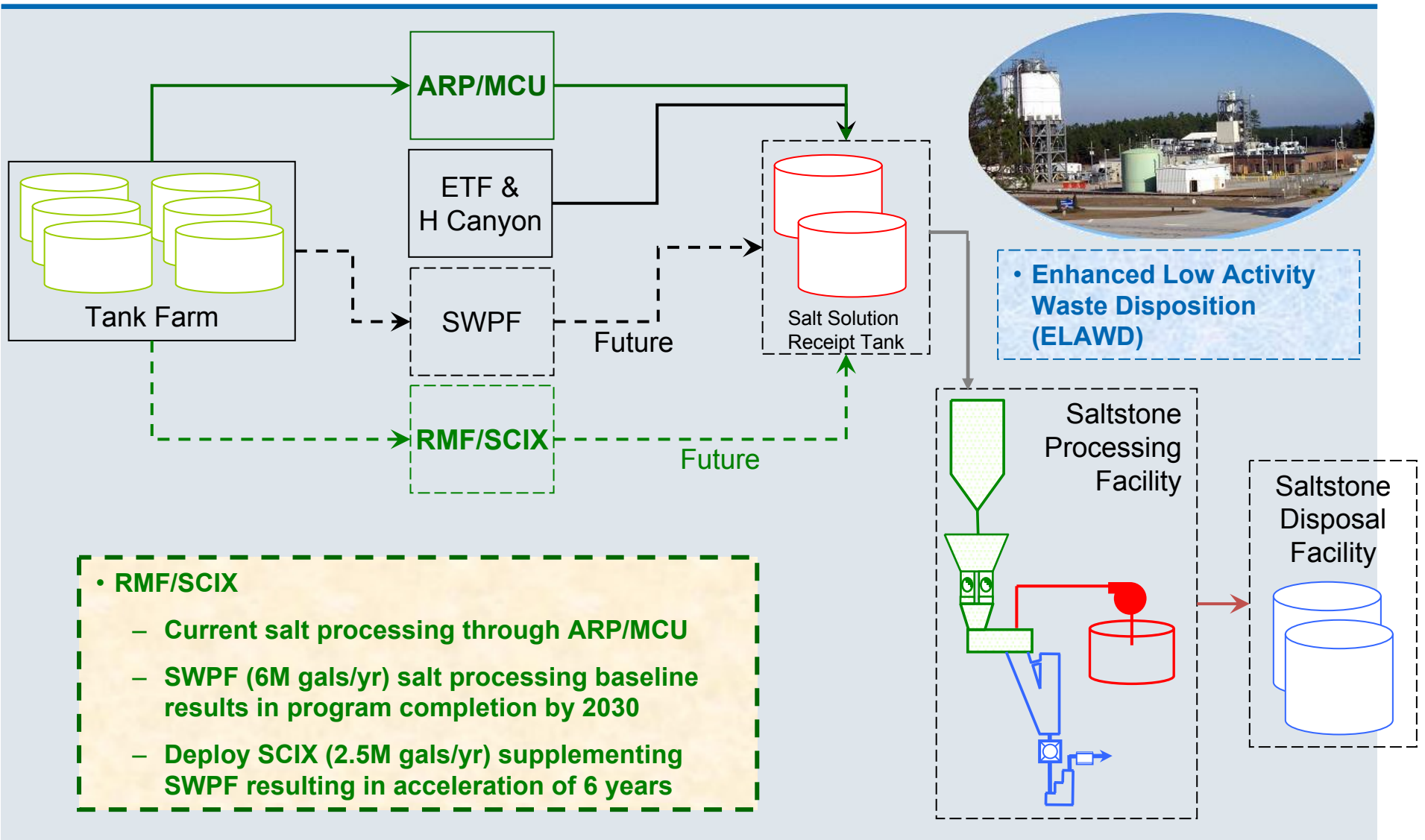


- Alternate reductant
- Dry process frit addition
- Water separation from decon frit
- Provide flexibility for strip effluent addition

- **Deploy Melter Bubblers**
- Increase Waste Loading
- Decrease HLW canister wall thickness
- Continue frit optimization



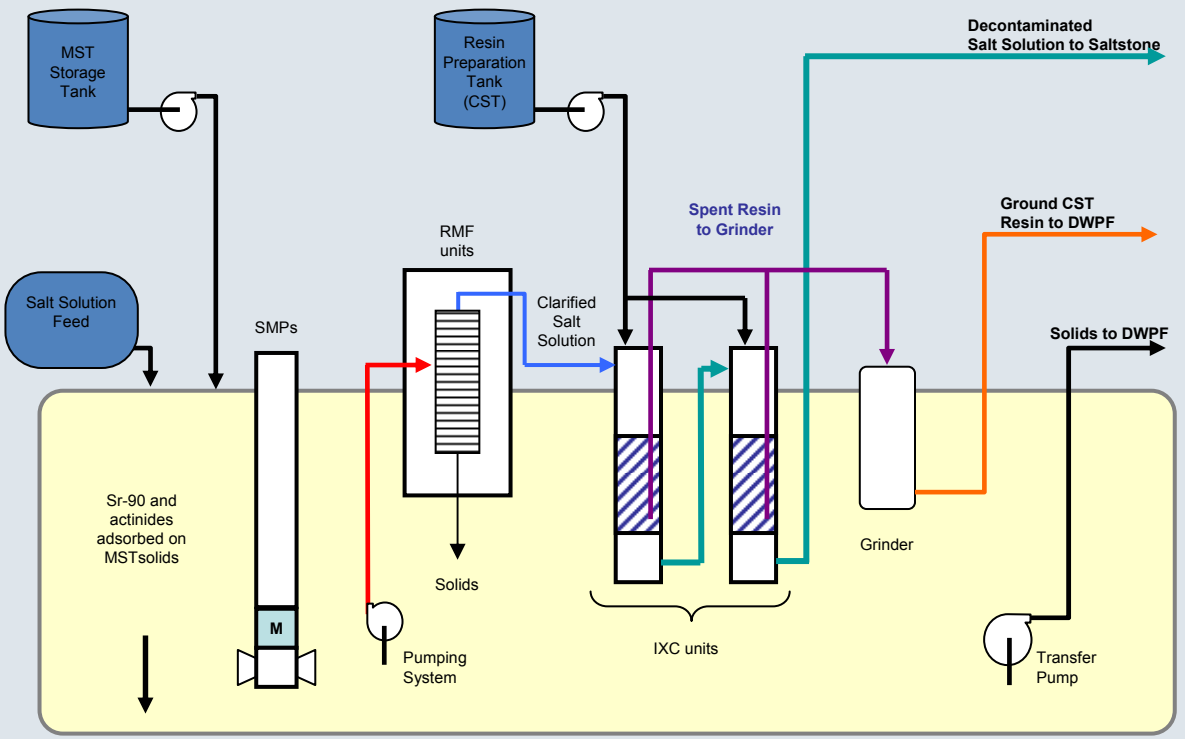
Supplemental Salt Processing Initiative



- **RMF/SCIX**
  - **Current salt processing through ARP/MCU**
  - **SWPF (6M gals/yr) salt processing baseline results in program completion by 2030**
  - **Deploy SCIX (2.5M gals/yr) supplementing SWPF resulting in acceleration of 6 years**

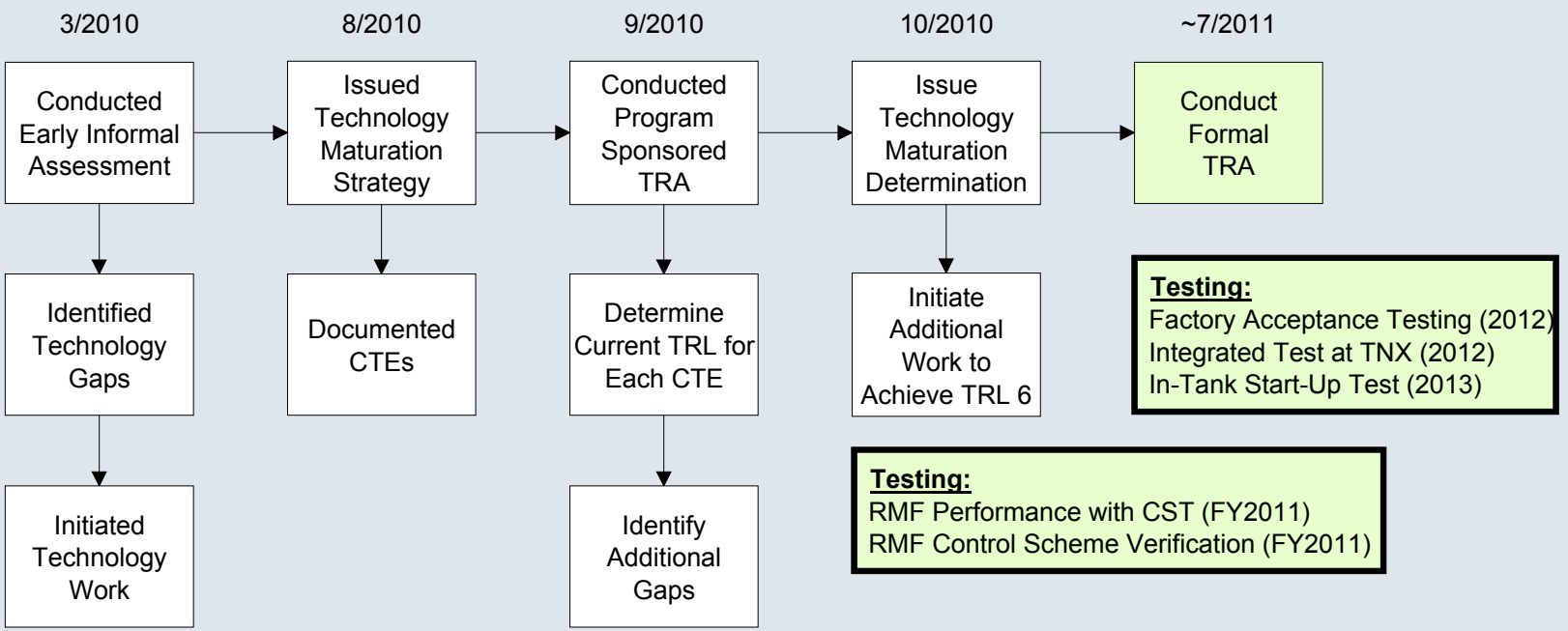
SCIX Process

1. Add MST to waste tank
2. Mix tank contents
3. Filter sludge and MST/actinides from salt solution
4. Pass clarified salt solution through ion exchange columns
5. Transfer decontaminated salt solution to Saltstone Processing Facility
6. Transfer sludge and MST/actinide tank heel to DWPF
7. Transfer spent ion exchange media to DWPF



SCIX Technology Deployment

SCIX Program Technology Readiness / Testing Strategy



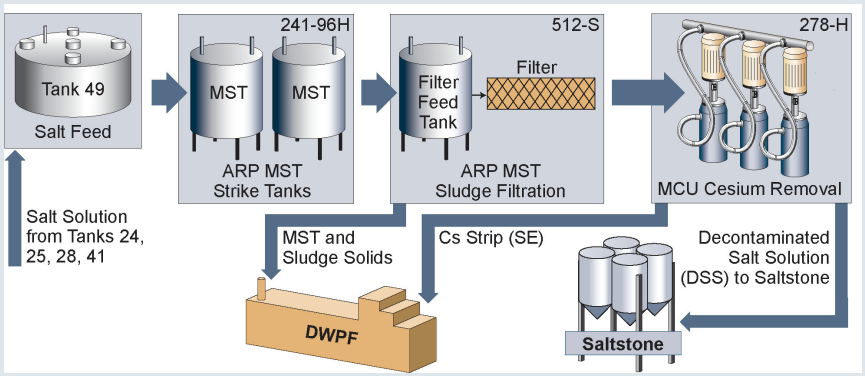
Testing:
Loading Studies
Mixing Studies
Thermal Modeling
NAS Formation Studies
DWPF Impact Studies
Grinding / Sluicing Tests
1,000-hr RMF Test

CST - Crystalline Silicotitanate
CTE - Critical Technology Element
DWPF - Defense Waste Processing Facility
NAS - Sodium Aluminosilicate
RMF - Rotary Microfilter
TRA - Technology Readiness Assessment
TRL - Technology Readiness Level

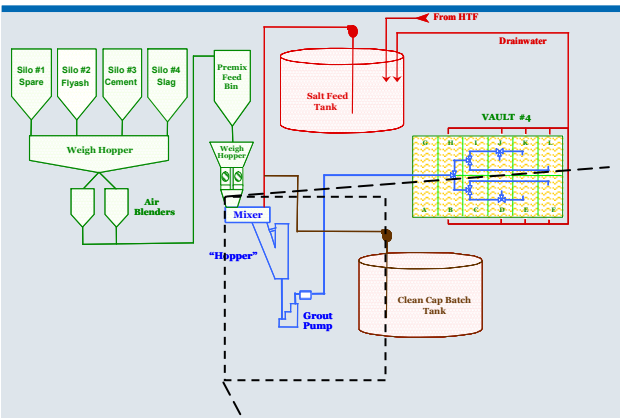
Complete
In Progress
Future

NGS Deployment

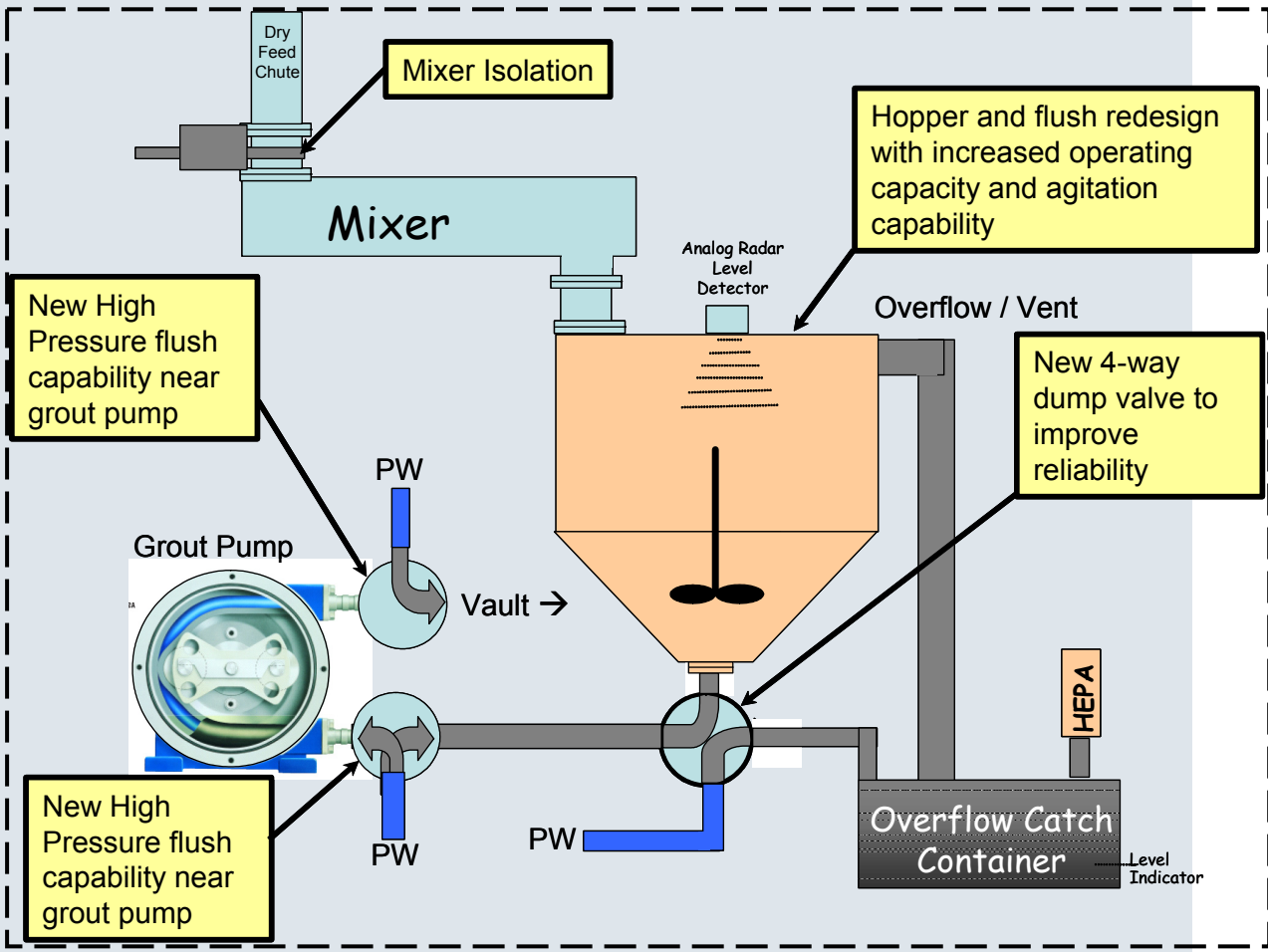
- **Integrated technology development and deployment team: DOE EM-30, DOE-SR, SRR, SRNL, ORNL, ANL**
- **R&D**
  - Real Waste Bench Scale Flowsheet Test
  - Full Scale Contactor Testing
- **Engineering**
  - MCU Process Engineering
  - Flowsheet Integration: DWPF
    - Glass Formulation Studies
    - Melter Testing
    - Chemical Process Cell (CPC) Flowsheet demonstration



ELAWD: Saltstone Enhancements and Reliability



- **Enhancements to meet the needs of salt processing capacity with supplemental salt processing initiatives deployed**
- **Equipment Upgrades**
  - Dry Feed Control System
  - Salt feed pump
  - Hopper redesign
  - Air compressors
  - Grout mixture optimization
- **Support 24/7 operations**
- Potential improvements systematically reviewed and prioritized to achieve greatest increase in operating margin and reliability
- Work scopes will be "outage ready" by the end of FY11



Tank Closure Progression

Bulk Waste Removal

Tanks 4,7,11,12,13 in progress

Tanks 4, 7, 9, 10, 11, 13, 14, & 15 in progress

Tank 8 complete

Mechanical Heel Removal

Tank 12 in progress

Tank 16 complete

Chemical Cleaning

Tank 8 being prepped for chemical cleaning
And ECC design/real waste testing in progress

Cooling Coil Flushing

Tank 5, 6 in progress

Annulus Cleaning

Tank 16 in progress

Tank 18,19 in progress

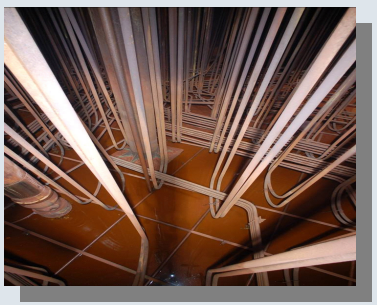
Final Sampling and Isolation

Tanks 5, 6,18 & 19 in progress

Grout Tank

Tanks 17 & 20 closed

December 2009 Status
Current Status



Summary

- **Hanford and SRS share key technical challenges in vitrification, waste treatment, and chemistry management**
- **Commitment to deploy ready technologies which reduce lifecyle and cost**
- **Complex-wide integration and common approaches**
  - Technologies, designs, data
  - Regulatory and safety approaches
  - Information exchange and lessons learned
  - Shared expertise and peer review

QUESTIONS?